

**Models of Middle Management Roles and Competencies in Agile
Project Governance: A Multiple-Case Study in Nigerian Small-Scale
Agile Software Development Project Settings**

by

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Abstract

Project governance (PG) is a crucial, multifaceted, and complex activity that is performed during agile software development (ASD) projects, and encompasses the necessary oversight, processes, tools, manpower, and support to accomplish projects. Middle managers (MMs) are important constituents of the governance structure in ASD projects. Despite the efficacy of PG and presence of MMs in ASD teams, PG and middle management in ASD projects are under-researched. There remains a lack of clarity regarding the role of MMs in ASD projects and the pertinent competencies that are important for them to function effectively in ASD project settings, not to mention the implications for agile teams, projects, and PG practice.

This study aims to fill this gap by investigating PG activities in small-scale ASD projects and identifying the roles that MMs perform and competencies that can help MMs thrive in ASD projects. It employed a qualitative and interpretive approach involving case studies in two Nigerian agile-practicing organisations and activity theory. It develops an activity-oriented PG conceptual framework (APGov) that aided the inquiry. Thematic network analysis was used to analyse data.

This study develops a model of 25 pivotal roles through which MMs support agile teams during agile PG. These roles relate to five areas: Planning and coordination for project alignment and execution, Continuous improvement and organisational change, Agile and technical leadership, Monitoring, and Capability building. The study found evidence for the dynamic, instantaneous, and transitory nature of the middle management roles. The study also develops a model of 54 competencies that are pertinent for MMs to operate effectively in ASD teams and projects. They relate to five competence aspects: Socio-relational, Delivery, Business, Results-oriented, and People-oriented. The competencies also relate to three elemental aspects of competence: Input, Personal, and Output. Expert agile practitioners validated the models. The study concludes that MMs are pivotal to PG practice and the effectual functioning of ASD teams in the examined cases. This Nigerian study may help researchers and practitioners in industry to better understand the role and relevance of middle management in the governance and delivery of ASD projects for project success. This study contributes to relevant theory and the ‘middle management in agile’ debate. It delivers alternate and clarifying views that may change beliefs about middle management in agile software project settings and offers implications for information systems practice.

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List of Abbreviations

General

AI	Artificial Intelligence
AMM	Agile Maturity Model
APGov	Activity-oriented Project Governance
API	Application Programming Interface
APM	Association for Project Management
ASD	Agile Software Development
AT	Activity Theory
B1	Blog Post
BDC	Bureau De Change
C1	Conference Session
CBN	Central Bank of Nigeria
CEO	Chief Executive Officer
CIO	Chief Information Officer
CLok	Central Lancashire Online Knowledge
CPD	Continuing Professional Development
DSDM	Dynamic Systems Development Method
DT	Digital Transformation
ICT	Information and Communication Technology
IPMA	International Project Management Association
IS	Information Systems
ISD	Information Systems Development
IT	Information Technology
KSA	Knowledge, Skills, and Abilities
LOW	Lower-level Workforce
M1	Model of Middle Management Roles in Agile Project Governance

M2	Model of Middle Management Competencies in Agile Project Governance
MM	Middle Manager
MMgmt	Middle Management
MMs	Middle Managers
NITDA	National Information Technology Development Agency
NDPR	Nigeria Data Protection Regulation 2019
P1	Poster Extended Abstract
PAC	Policy Adherence Challenges Model
PDF	Portable Document Format
PG	Project Governance
PMI	Project Management Institute
R1	Research Paper
RACI	Responsible, Accountable, Consulted, and Informed
ROI	Return on Investment
RQ	Research Question
RQs	Research Questions
RTD	Research and Technological Development
SD	Software Development
SDLC	Software Development Life Cycle
SSA	Sub-Saharan Africa
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TNA	Thematic Network Analysis

Case 1

CS1	Case Study 1
Fintech	Financial Technology
OpEx	Operational Excellence
MPR	Monthly Performance Review

Case 2

CS2

Case Study 2

Chapter One: Introduction

This chapter begins by presenting the research problem statement that describes the issues the present study seeks to address. Following this, it presents the research questions that encapsulate the study. It proceeds to outline the research objectives that are necessary for the orchestration of research efforts so as to focus the study and address the research questions. A brief overview of the research process is also presented. Next, the chapter outlines research outputs that have been used to disseminate findings from this study. This is followed by an overview of the significance of the research that highlights the contributions to information systems theory and practical implications. The chapter concludes with a brief description of the thesis structure. All agile projects considered in this study are agile software development (ASD) projects.

1.1 Research Problem Statement

Agile methods are widely used in technology-enabled organisations (Abrahamsson, 2007; Hummel and Epp, 2015). They include Scrum (Schwaber and Sutherland, 2020), Dynamic Systems Development Method (DSDM) (DSDM Consortium, 2014), and Kanban (Ahmad *et al.*, 2018). They help organisations and their information systems development (ISD) teams to embrace change and uncertainties, allowing for rapid and frequent release of products and services to deliver value and meet stakeholder needs. Benediktsson *et al.* (2006) and Dalcher (2008) affirm that projects which adopt agile methods are likely to experience increased productivity, higher quality product per time and higher stakeholder satisfaction. Serrador and Pinto (2015) concur by asserting that agile methods have the propensity to promote project success. Despite the growing uptake of agile methods (Digital.ai, 2024), issues may arise following agile transformation as it requires organisational changes that impact many aspects of an organisation, such as changes in organisational culture, processes, procedures, structures, roles, competency requirements, and management styles. Some of these issues relate to governance in ASD projects (Chita *et al.*, 2020; Gregory *et al.*, 2016; Lappi *et al.*, 2018; Moe *et al.*, 2019; Sithambaram *et al.*, 2021). Also, despite the popularity of agile methods, there is a lack of ASD research in Nigeria where ASD is nascent compared to western countries (Yerokun and Anigbogu, 2017). The 17th State of Agile Report (Digital.ai, 2024) shows that out of 788 respondents that participated in an international ASD survey, only 2% were located in Africa compared to 48% and 26% located in North America and

Europe, respectively. The report does not state whether or not the African respondents included people from Nigeria. In a review of studies on ASD in Nigeria within Chapter Two, only one study (i.e., Onwuka *et al.*, 2021) provides details to suggest it involved small-scale agile development, whereas other studies do not provide agile implementation scale details. Considering the nascent nature of ASD in Nigeria, it is arguable that small-scale agile development may be prevalent in the region. Uludağ *et al.* (2021, p. 125) define large-scale agile development as “the application of agile methods in large multi-team settings consisting of 50 persons or more, or at least six teams”. Therefore, small-scale agile development can be defined as the application of agile methods in small team settings consisting of less than 50 persons or less than six teams. Small and co-located software project team settings are believed to be the ‘sweet spot’ for the application of agile methods (Uludağ *et al.*, 2021).

Project governance (PG) is regarded as “an oversight function that is aligned with the organization’s governance model and encompasses the project life cycle” (PMI, 2013, p. 34). It is an important but complex activity performed during ASD projects, and encompasses the necessary oversight, processes, tools, manpower, and support to accomplish projects (Lappi and Aaltonen, 2017; Lappi *et al.*, 2018). In project settings, governance “provides the overall framework and controls that guide the selection and delivery of projects” (Newton, 2009, p. 274). It is also associated with “decisions that define expectations, accountability, responsibility, the granting of power, or the verifying of performance” (Kerzner, 2017, p. 20). PG is important for the delivery of projects that are consistent and compliant with organisational strategy and goals (Lappi *et al.*, 2018; Musawir *et al.*, 2020). Indeed, PG is regarded as “a critical element of any project” given that it “provides a comprehensive, consistent method of controlling the project and ensuring its success by defining and documenting and communicating reliable, repeatable project practices” (PMI, 2013, p. 34). PG not only helps to ensure that projects are monitored and controlled, but it ensures that responsibilities and accountabilities are defined for the delivery and realisation of project expectations (Nyandongo and Khanyile, 2019). Despite its importance, PG vis-à-vis ASD projects, remains under-researched and not fully understood (Gregory *et al.*, 2016; Lappi *et al.*, 2018). The governance structures of agile projects have received minimal research attention despite the growing use of agile project delivery within the information technology (IT) industry (Lappi and Aaltonen, 2017). Scholars advocate for more research to explore and demystify the PG

phenomenon in ASD project settings (Biesenthal and Wilden, 2014; Lappi *et al.*, 2018; Song *et al.*, 2022).

Middle managers (MMs) are the individuals that “occupy a central position in organizational hierarchies, where they are responsible for implementing senior management plans by ensuring junior staff fulfil their roles” (Harding *et al.*, 2014, p. 1213). They represent significant and influential constituents of the governance structure in ASD projects. These MMs are expected to work alongside agile teams and play their part to ensure smooth project delivery (Annosi *et al.*, 2020; Russo, 2021). MMs in agile teams may include line managers (Annosi *et al.*, 2020), as well as Scrum masters as gatekeepers, and product owners as stakeholder representatives (Russo, 2021). Although MMs are “not expected to manage teams anymore” in agile development (Kalenda *et al.*, 2018, p. 8), they can still be found in agile teams. However, there is a lack of clarity regarding their role (Ågren *et al.*, 2022; Dikert *et al.*, 2016; Moe *et al.*, 2019), and Barroca *et al.* (2019) show this is one of the top ranked challenges affecting agile teams. Hence, there is a demand for research regarding the role of middle management (MMgmt) in agile settings (Barroca *et al.*, 2019; Hermkens *et al.*, 2020; Moe *et al.*, 2019), which is needed to determine their relevance and impact. Agile projects are considered lightweight, self-organising, and flexible, hence practitioners question how ‘management’ and ‘governance’ fit in. MMgmt role unclarity may negatively impact agile teams (Ågren *et al.*, 2022; Dikert *et al.*, 2016; Fuchs and Hess, 2018), thereby threatening team stability and project congruity. MMs often lack pertinent competencies to function adequately in agile teams—for example agile knowledge—and this deficiency is one of the obstacles affecting ASD projects and teams (Dikert *et al.*, 2016). Managers may lack what it takes to coach their agile teams for autonomous working (Stray *et al.*, 2018). Besides, studies that focus on competencies for contemporary MMs to operate in ISD settings are minimal (Kevor and Boakye, 2022). Critically, not much is known about competencies that are useful to MMs in ASD teams and for their use in the governance and delivery of ASD projects. For instance, recent competency-related studies (e.g., da Costa Filho *et al.*, 2022; Kevor and Boakye, 2022; Mikhieieva *et al.*, 2022) seldom have a specific focus on MMs in the agile domain. Evidence on the contributions and beneficial impact of MMs on agile teams and projects, as well as knowledge of useful competencies that support their productivity in agile settings is scarce. These limitations on the research front equally impact organisations and agile practitioners as they may be impeded in

their ability to develop understanding and knowledge regarding what MMs do within the governance enclave of ASD projects, as well as competencies that are important for MMs to work productively.

Generally, PG-related problems have negative effects on project delivery and performance (Chita *et al.*, 2020; Lappi and Aaltonen, 2017; Mashiloane and Jokonya, 2018; Sithambaram *et al.*, 2021). The roles that project participants perform and the work they do in projects (to enable and support project delivery for project success) are part of PG (Lappi and Aaltonen, 2017; Lappi *et al.*, 2018), and these need to be clearly defined (Nyandongo and Khanyile, 2019). During agile projects, people draw on their competencies, which take the form of abstract (non-material) tools (Dennehy and Conboy, 2017, 2019). The lack of requisite competencies in project teams is a major risk that can adversely impact the success of software projects (Schmidt *et al.*, 2001) and could be linked to inefficiencies in PG (Mashiloane and Jokonya, 2018). PG involves risk management to facilitate project success (Mashiloane and Jokonya, 2018; PMI, 2016); therefore, a failure in managing existing project risks is arguably a failure in PG. This study aims to fill a gap in research by investigating some exigent governance-related issues that are connected with MMs in ASD projects, using the Nigeria context. Therefore, the lack of clarity regarding the role of MMgmt in the governance of ASD projects, as well as the competence deficiencies and unknowingness of pertinent competencies for the effective functioning of MMgmt in ASD teams and projects constitute the research problem, which this thesis addresses. Knowledge regarding the roles MMs perform and competencies that allow them to operate successfully during agile PG (i.e., PG in ASD projects) would maximise the value of MMgmt to agile-practicing organisations.

1.2 Research Questions and Objectives

To investigate the above research problem, the following research questions (RQs) were formulated.

RQ1. What are the roles of middle managers in agile project governance within small-scale agile software development projects in Nigerian organisations?

To determine the various roles MMs play within the PG activity in Nigerian small-scale ASD project settings, it is necessary to ascertain the division of labour in the agile PG activity as it

relates to the responsibilities that MMs perform and what they do, other stakeholders' expectations of MMs, and the degree of influence and authority MMs have (if any) to support and orchestrate governance and delivery of ASD projects. By this RQ, this study also seeks to unmask and understand the contributions and importance of MMs in ASD projects and teams.

RQ2. What competencies are important for middle managers to function effectively in Nigerian small-scale agile software development projects?

Considering the MM roles to be investigated are performed in Nigerian small-scale ASD project settings, it is also necessary to investigate the competencies that are important for MMs to possess in order to be effective in an environment that is characterised by adaptability, team autonomy, shared decision-making, and self-organisation, hence this RQ. These are competencies that MMs draw on as they perform day-to-day duties, work alongside team members and other stakeholders, and play their part in orchestrating, governing, and delivering ASD projects.

It is important to note that this study did not set out to identify competencies that are required for the performance of specific MMgmt roles in agile PG, but rather competencies that are important for them to excel in ASD projects. While the findings of this study allows the reader to perceive or infer links between various identified MM roles and competencies, establishing direct links and relationship between each role and competency is beyond the scope of this study—this is a limitation, and an avenue for future research as recommended in Chapter Seven.

The study was guided by the following objectives in order to orchestrate and focus efforts and address the RQs:

1. Conduct a literature review with the view of gaining thorough understanding of current research gaps, trends, and issues pertaining to PG and MMgmt in ASD projects so as to help situate the findings, outputs, and significance of this present study.
2. Based on existing literature, develop an activity-oriented project governance (APGov) conceptual framework as an analytical tool that will facilitate analysis and understanding of the roles and competencies of MMs in PG activities within ASD projects.

3. Conduct case studies in Nigerian technology-enabled organisations that use agile approaches for small-scale agile development in order to determine the roles and competencies of MMs in ASD projects by investigating the PG activity using the APGov framework.
4. Compare findings from the investigated organisations to identify similarities and differences regarding the MM roles and competencies.
5. Develop and propose models of MM roles and competencies in agile PG.
6. Validate the models by confirming their potential usefulness with expert agile practitioners, using interviews, in order to determine the relevance and importance, understandability, organisation, and comprehensiveness of the two models.

1.3 Research Process Overview

To accomplish the research objectives, I commenced this research with a literature review and literature-based theoretical considerations to develop the RQs and APGov conceptual framework (the descriptive theory), followed by determination of the philosophical stance and preparation for and completion of case study fieldwork in two case organisations using a case study protocol. After data collection and within-case analysis, I cross-analysed the findings to develop two models that address the two RQs. The models were validated with industry-based agile practitioners. The research process, which also ensured the establishment of research trustworthiness, is detailed in the Research Methodology chapter of the thesis (Chapter Three).

1.4 Research Dissemination

To date, findings from this study have been disseminated to researchers and industry practitioners within the wider agile community through agile-related platforms. The research outputs are poster extended abstract (P1), conference session (C1), research paper (R1), and blog post (B1). I received conference Best Poster Award for P1's poster. Below are details of these outputs.

P1 Uwadi, M. C. (2021). Multiple Roles of Middle Managers in Agile Project Governance: An Activity Theory Perspective. In: Gregory, P., Kruchten, P. (eds) *Agile Processes in Software Engineering and Extreme Programming – Workshops. XP 2021*. Lecture Notes in Business Information Processing, vol 426. Springer, Cham. https://doi.org/10.1007/978-3-030-88583-0_19.

- C1** Uwadi, M. (2021, November 9-12). *A Model of Middle Management Roles in Agile Project Governance* [Conference session]. Agile Business Conference 2021, online. <https://www.agilebusiness.org/resource/video-conference-2021-maduka-uwadi.html>.
- R1** Uwadi, M., Gregory, P., Allison, I., & Sharp, H. (2022). Roles of Middle Managers in Agile Project Governance. In: Stray, V., Stol, KJ., Paasivaara, M., Kruchten, P. (eds) *Agile Processes in Software Engineering and Extreme Programming. XP 2022*. Lecture Notes in Business Information Processing, vol 445. Springer, Cham. https://doi.org/10.1007/978-3-031-08169-9_5.
- B1** Agile Research Network. (2024, April 4). The Multi-Faceted Role of Middle Managers in Agile Software Teams: Insights from a Project Governance Perspective. *Agile Business Consortium*. <https://www.agilebusiness.org/resource/insights-from-a-project-governance-perspective.html>.

1.5 Significance of the Research

This research provides findings that could benefit academia, as well as industry given that the findings contribute to the research streams of agile PG, MMgmt, and ASD. Based on the outcome of the research conducted, the contribution of this study to information systems (IS) theory is threefold as itemised below.

1. This study develops and introduces a multi-component APGov conceptual framework by applying activity theory (AT) as the principal theory for a theory-centric research that focuses on MMgmt and agile PG. The APGov framework corresponds to a methodological contribution and a ‘theory of agile project governance’ that comprises various components and concepts based on AT. This study proposes that the underlying structure of PG activities in ASD projects is composed of *Subject, Tools, Object, Community of significant others, Division of labour, Rules and norms, Motivation, Outcome, Actions, Operations, Contradictions, and Zone of proximal development*. The APGov framework was applied in part in the study to bring to light the roles and pertinent competencies of MMs in PG activities within ASD projects.
2. This study develops the *Model of middle management roles in agile project governance* (M1), which is a model of 25 pivotal roles—relating to *Planning and coordination for project alignment and execution, Continuous improvement and organisational change, Agile and technical leadership, Monitoring, and Capability building*. This contribution answers RQ1.

This contribution helps to address the issue of unclarity regarding the MMgmt role in ASD projects. The study findings—limited to the two case studies—reveal that MMgmt constitutes a form of accountability and oversight mechanism for PG in the case study ASD project environments. Therefore, their contributions are believed to be beneficial and critical to the way PG is performed in the case study projects. They engage in strategic exchanges and practices. MMgmt orchestrates project activities between internal and external project stakeholders to ensure successful implementation of mandated ASD projects. They tend to enjoy a certain amount of leeway from senior management regarding decision-making in the agile PG activities. However, there may be exceptions to this depending on the type of decisions being made in accordance with PG stipulations—decisions pertaining to project financial matters and major project changes, for example. Nonetheless, MMs support agile teams in making various key decisions to advance projects autonomously without heavy involvement or day-to-day direction from SM. MMs are eminently involved in making technical decisions, product roadmap decisions, staff promotion decisions, process modification decisions, product design decisions, and project timeline decisions. This study provides practical examples of various agile PG roles MMs perform and the impact they have on ASD projects and teams. Also, the study suggests that non-MMs, i.e., lower-level workforce (LOW) in agile project teams also perform some of the roles that MMs perform. Hence, agile PG roles may not be exclusively performed by MMgmt. MMs perform one or more roles in different instances as circumstances and needs demand during project delivery. Moreover, several MMs can take up particular roles regardless of their job titles.

3. This study develops the *Model of middle management competencies in agile project governance* (M2), which is a model of 54 competencies that are pertinent for MMs to operate effectively in ASD teams and projects. This contribution answers RQ2. The 54 competencies relate to five competence sets: *Socio-relational*, *Delivery*, *Business*, *Results-oriented*, and *People-oriented* aspects, as well as three elemental aspects of competence: *Input*, *Personal*, and *Output* aspects. This contribution helps to address the issue of uncertainty regarding MMgmt competencies that are important for their effective functioning in ASD projects. Based on validation study findings, the model also appears to comprise transferable competencies as well as competencies that prospective MMs may overlook as pertinent ones that they need to

acquire and develop for agile MMgmt responsibilities. Findings from this study contribute to relevant theory regarding competencies that are important in agile software teams.

As for practical implications, agile practitioners may be able to critically view MMgmt in agile project settings through the lens of the multiple contributory roles they play and competencies that are important for them to work effectively in their day-to-day PG efforts. Amongst other benefits of MMgmt this study postulates based on various identified roles they perform, MMs are substantially involved in the strategy development and implementation process in agile project environments. They muster resources for project execution and orchestrate coordination in agile teams. MMs tend not to ignore the emotional needs of their co-workers; they empathise with them to help sustain employee engagement and productivity. MMs have positional power and influence as a result of their unique MMgmt position. Leveraging their influence, they are able to help fix certain issues that demand management attention; issues that LOW may not be able to fix. Due to varying organisational cultures, PG needs, preferences, and priorities in respective organisations, it is likely that MMs may not perform all the identified MM roles in every agile-practicing organisation, nor will such organisations expect their MMs to possess and exercise all the MM competencies identified in this study. Nevertheless, the study findings may benefit MMs, prospective MMs, agile teams, and senior management by increasing their awareness and understanding of useful competencies and the multiple roles MMs perform. This may help improve working relationships between MMs and other team members in agile project teams, strengthen organisation–project strategic connections, help promote organisational agility, and facilitate greater project success. The two models may potentially serve as foundational or supplementary resources in organisations for the development of work-related artifacts, such as (a) responsibility assignment matrices, i.e., responsible, accountable, consulted, and informed (RACI) matrices, (b) project auditing tool, (c) project team member profiles, (d) job descriptions, person specifications, and job interview questionnaires for MMgmt recruitment, and (e) MMgmt performance assessment artifacts.

Overall, this study represents a relevant and interesting contribution to the ‘MMgmt in agile’ debate. The findings have the potential to promote better team harmony and synergy, as well as improved functioning of MMgmt in agile teams by providing insights that may help (a) bring

clarity regarding the role of MMs in ASD projects and the pertinent competencies that are important for them to function effectively, (b) allay redundancy concerns of MMs during agile transformation in organisations, and (c) improve agile PG practice in organisations.

1.6 Thesis Structure

The remainder of this thesis is structured over six chapters. Chapter Two identifies and reviews relevant literature in order to determine current issues, trends, and research gap relating to the research problem and domains of interest being investigated. It provides an understanding of the concepts of governance and PG, discusses ASD projects and ASD in Nigeria, highlights polarising views regarding the MMgmt phenomenon in organisations, and explores current perspectives regarding competencies in agile project teams and competencies for IS MMs as reported in the literature. The chapter highlights the paucity of studies on PG and MMgmt in the ASD project context, as well as lack of ASD research in the Nigeria context, which present opportunities for further research. It draws attention to the issue of lack of clarity regarding the role of MMs in ASD project settings, as well as competence deficiencies and unknowingness of useful competencies to help MMs thrive in ASD projects and teams. These issues can adversely affect agile team productivity, as well as software project performance and success. The issues, coupled with the dearth of targeted research attention on the role and competencies of MMs that operate in ASD projects and teams from a PG standpoint, instigate this study to tackle the research problem. Chapter Three describes the research process, qualitative and interpretive research design, data collection methods, and data analysis approach—Thematic Network Analysis (TNA)—which was used to develop thematic networks that resulted in M1 and M2. The chapter describes activity theory (AT) and the development process of the APGov conceptual framework, which supported data collection and analysis. The rationales for adopting the interpretive paradigm, AT, and case study methodology for this study are also provided.

Chapter Four presents and interprets the findings of the multiple-case study in the form of the two developed models: M1 and M2, which provide evidence to address RQ1 and RQ2, respectively. Chapter Five describes a validation study—involving six expert agile practitioners—that was conducted to assess and substantiate the potential usefulness of M1 and M2, as well as determine their strengths and limitations, and the extent to which this study's findings aligns with the

experiences of agile practitioners in other companies. The chapter presents validation study findings and includes several implications and recommendations based on the validation study findings. Chapter Six discusses the findings of this study in light of related work, and provides a reflection on the study in terms of research trustworthiness, research limitations, and AT application. Lastly, Chapter Seven presents theoretical contributions and practical implications of the study, and concludes the thesis by recommending areas for future research.

Chapter Two: Literature Review

This chapter reviews existing literature pertinent to the roles and competencies of MMgmt in agile project governance (PG). Section 2.1 summarises the concepts of governance and PG. Section 2.2 reviews the literature pertaining to ASD projects: summarising agile methods, the differences between ASD and traditional software development, and self-organisation in ASD teams. Section 2.3 focuses on ASD in Nigeria. Section 2.4 focuses on theories of PG in ASD projects. Section 2.5 reviews PG challenges in ASD projects. Section 2.6 discusses the MMgmt role with emphasis on MMgmt in agile project delivery. Section 2.7 presents the concepts of competence and competency—including the view adopted by this present study. The section also explores current perspectives regarding competencies in agile project teams and IS MMs. Section 2.8 provides a synopsis of the literature review findings.

It is worth setting the scene regarding the meaning of theory, model, and conceptual framework. According to Weber (2012), a theory is a kind of model that accounts for subsets of real world phenomena, and it is a purposeful artifact that is conceptual and helps in predicting and explaining phenomena. Weber (2012, p. 5) defines a model as,

“an abstracted, simplified, concise representation of something else (phenomena) in the world. Models help us to comprehend the world by representing only those major features of the world that are important for our purposes. Often they provide only an approximate account of the complexity that exists in the real-world phenomena they cover”.

Weber argues that before a model can be termed a theory, it must meet specific conditions regarding detailed description of its parts (i.e., constructs, associations, states and events it covers) and specific qualities regarding its whole (i.e., importance, novelty, level, parsimony, and falsifiability). Shapira (2011) posits that conceptual frameworks are foundational forms of models and theories, which are formulated from observed research data, enabling researchers to conceptualise, represent and describe phenomena. They can uncover new insights and areas of study, leading to development of models for predicting phenomena and theories that enable explanation of phenomena (Shapira, 2011). Gregor (2006, p. 614) argues that the term ‘theory’ “can take on many meanings, including “a mental view” or “contemplation,” a “conception or mental scheme of something to be done, or the method of doing it; a systematic statement of rules

or principles to be followed,” a “system of ideas or statements held as an explanation or account of a group of facts or phenomena; a hypothesis that has been confirmed or established by observation or experiment, and is propounded or accepted as accounting for the known facts; statements of what are held to be the general laws, principles, or causes of something known or observed,” a “mere hypothesis, speculation, conjecture”¹. Gregor (2006) designates models, frameworks, and suchlike as theories; hence, the term ‘theory’ is used this way in this thesis.

2.1 Understanding Governance and Project Governance

Governance, according to McGrath and Whitty (2015, p. 781), refers to “the system by which an entity is directed and controlled”. However, the term ‘governance’—which comes from the Latin word ‘gubernare’ and means ‘to steer’ (Samset and Volden, 2016)—is used in a variety of contexts and forms in theory and practice, and consequently, its definition varies (Kelly, 2010; Rhodes, 2007). For instance, there is corporate governance, which pertaining to a company, “provides the structure through which the objectives of the company are set, and the means of attaining those objectives and monitoring performance are determined” (OECD, 2015, p. 9). There is also agile governance, which according to Luna *et al.* (2014, p. 134) is the “ability of human societies to sense, adapt and respond rapidly and sustainably to changes in its environment, by means of the coordinated combination of agile and lean capabilities with governance capabilities, in order to deliver value faster, better, and cheaper to their core business”. Other forms of governance include IT governance, knowledge governance, network governance, public governance, and PG (Too and Weaver, 2014).

Projects are the nexus between strategy and execution (Dalcher, 2017), and they are used to effect change and transformation (Huemann, 2022). In project management, governance is seen to encompass “the set of policies, regulations, functions, processes, procedures and responsibilities” that are involved in establishing, managing, and controlling projects¹, programmes², and portfolios³ (APM, 2012, p. 8). PG “entails all the key elements that make a project successful”

¹ A project is “a temporary endeavor undertaken to create a unique product, service, or result” (PMI, 2013, p. 553).

² A programme (or program) is “a group of related projects, managed in a coordinated way to obtain benefits and control not available from managing them individually” (PMI, 2004, p. 368).

³ A portfolio is “a collection of projects or programs and other work that are grouped together to facilitate effective management of that work to meet strategic business objectives. The projects or programs of the portfolio may not necessarily be interdependent or directly related” (PMI, 2004, p. 367).

(Alie, 2015, para. 2). However, it lacks a universally accepted definition (Ahola *et al.*, 2014; Musawir *et al.*, 2020). For instance, PG is seen as the “framework, functions, and processes that guide project management activities in order to create a unique product, service, or result to meet organizational strategic and operational goals” (PMI, 2016, p. 4). It is seen as “the alignment of project objectives with the strategy of the larger organization” (PMI, 2013, p.553), as well as the “projection of corporate governance onto the project in order that its activities are aligned with the objectives of the organisation” (Moran, 2015, p. 124). McGrath and Whitty (2015, p. 781) define PG as “the system by which a project is directed and controlled and held to account”. According to Musawir *et al.* (2020, p. 4), common themes in PG definitions suggest it is “a framework for project decision-making, addressing interests of stakeholders, monitoring and controlling project progress, defining and ensuring successful project delivery, and aligning projects with organizational strategy”. However, they also argue that McGrath and Whitty’s (2015) definition “is a useful starting point for defining project governance in practice” given that (a) it captures the central objective of PG in terms of directing, controlling, and holding every project to account, (b) it applies to PG in diverse contexts, and (c) viewing PG as a system means it “allows for the encompassment of all governance elements involved in the direction and control of projects”—policies, accountabilities, structures, frameworks, responsibilities, relationships, processes, and so on (Musawir *et al.*, 2020, p. 7). Despite the lack of a generally accepted definition, previous research (e.g., Joslin and Müller, 2016; Musawir *et al.*, 2017; Sirisomboonsuk *et al.*, 2018) suggests that PG is an important contributing factor to project success.

Burke (2013) outlines several corporate governance values for PG (see Appendix A) which can also be viewed as benefits of PG, as well as possible PG arrangements. However, it is important to note that PG arrangements may vary from organisation to organisation, hence it should be customised to suit each organisation's governance requirements (Alie, 2015). This is because the settings in which PG is applied for individual projects are subject to project-specific, organisation-specific, and even industry-specific contextual factors (Musawir *et al.*, 2020).

Research into PG—a subfield in the project management discipline—is growing and a variety of theoretical lenses have been employed to examine it, such as contract theory, resource-based theory, relational exchange theory, new institutionalism, structuration theory, institutional logics,

role theory, sensemaking theory, and institutional work (Song *et al.*, 2022). There is also organisational justice (Unterhitzenberger and Moeller, 2021), as well as agency theory, stewardship theory, transaction cost economics theory, network theory, institutional theory, stakeholder theory, and contingency theory, but not activity theory (AT) (Musawir *et al.*, 2020). Although scholars like Chita *et al.* (2020) are using AT for research in ASD, empirical AT studies with a specific focus on agile PG are lacking. Due to the dynamic, complex, and multifaceted nature of PG, one theoretical lens may not suffice to fully analyse the complexities and intricacies within (Ahola *et al.*, 2014). Scholars continue to call for more research to fully understand the PG phenomenon (Musawir *et al.*, 2020). This includes further research to examine PG in the ASD project context (Biesenthal and Wilden, 2014; Lappi *et al.*, 2018; Song *et al.*, 2022).

2.2 Agile Software Development Projects

2.2.1 The Agile Approach in Information Systems Development

According to Sambamurthy and Kirsch (2000), methodologies, development tools, and organisational policies and rules can be used in ISD projects. The agile methodology is a methodology that is commonly used for software development in ISD. ASD enables agility in organisations by allowing them to envision, develop and release IT project outputs quickly and adaptively to meet strategic and operational goals (Abrahamsson, 2007; Diegmann *et al.*, 2018; Hummel and Epp, 2015). Agility, according to Conboy (2009, p. 340), is the “continual readiness of an ISD method to rapidly or inherently create change, proactively or reactively embrace change, and learn from change while contributing to perceived customer value (economy, quality, and simplicity), through its collective components and relationships with its environment”.

An ASD method is essentially a ‘lightweight’ approach (Beck *et al.*, 2001) that uniquely helps organisations and their ISD teams to embrace change and uncertainties, enabling fast release of technology products, services and results through iterative and incremental development in the software development life cycle (SDLC) (Abrahamsson *et al.*, 2003; Dingsøyr *et al.*, 2012; Hummel, 2014). There are several agile methods that ISD teams can adopt to achieve fast, frequent, and quality software delivery. Some of the most popular options include Scrum and Kanban (Digital.ai, 2022), as well as DSDM and Extreme Programming (XP) (Olszewski, 2023), of which Scrum is the most commonly used agile method (Barke and Prechelt, 2019; Digital.ai,

2021, 2022). Scrum dictates that the sprint backlog (a selection of tasks that are scheduled for completion in a given sprint) represents “a plan by and for the Developers” who are actively working on tasks, and they decide what tasks to do in a sprint to achieve the sprint goal (Schwaber and Sutherland, 2020, p. 11). Through the use of value-prioritised product backlogs and sprint backlogs in Scrum, project teams are able to iteratively complete software increments. Table 1 summarises key features of these agile methods as adapted from Radhakrishnan *et al.* (2022).

Table 1: Key features of agile methods utilised in ASD projects

Agile method	Main features
Scrum	A product owner develops a product backlog that captures all currently known requirements. The product development team determines the features of each sprint from an evolving product backlog. The project team creates an increment of potentially shippable software during each sprint.
Kanban	It reduces work-in-progress by identifying bottlenecks and makes use of visual cues to guide replenishment.
DSDM	It is a framework for rapid application development where development time and resources are constant while adjusting the functionality accordingly. Development is iterative, incremental, and driven by user feedback.
XP	The highest priority is continuously satisfying changing customer needs. It involves rapid user review and feedback.

ASD research is a well-established area that has been studied by applying various theories, such as control theory (Maruping *et al.*, 2009); modern sociotechnical theory (Mikalsen *et al.*, 2019); AT (Chita *et al.*, 2020); social contract theory (Power, 2014); theory of knowledge transformation, game theory, organizational learning theory, shared mental models theory, adaptive structuration theory, complex adaptive systems, relational coordination theory, team cognition, and double-loop learning (Stray *et al.*, 2022). Despite advancements in ASD research and adoption of various theoretical lenses, scholars continue to call for research to advance understanding. According to Stray *et al.* (2022) for instance, the use and development of theories within agile research is relatively small. Therefore, Stray *et al.* (2022) call on researchers to conduct further theory-centric ASD studies by building their knowledge of existing theories (i.e., theories, models, frameworks) and proceeding to apply and develop theories accordingly. This present study answers the call by adopting AT as a lens to investigate the roles and competencies of MMgmt in agile PG.

2.2.2 Agile Software Development versus Traditional Software Development

Agile methods usage offers several claimed benefits, such as those highlighted in Table 2 adapted from Dybå and Dingsøy (2008), Laanti *et al.* (2011), and Mishra *et al.* (2023).

Table 2: Benefits of agile methods

Benefits of agile methods	Dybå and Dingsøy (2008)	Laanti <i>et al.</i> (2011)	Mishra <i>et al.</i> (2023)
Customer collaboration	X		
Work processes for handling defects	X		
Learning in pair programming	X		
Thinking ahead for management	X		
Focusing on current work for engineers	X		
Estimation	X		X
Higher satisfaction		X	X
Feeling of effectiveness		X	
Increased quality and transparency		X	
Increased autonomy and happiness		X	
Earlier detection of defects		X	
Better control over work			X
Dealing with changing requirements in a better way			X
Reducing delivery schedules			X
Increasing return on investment			X

Considering that agile methods usage represents a counterpoint to traditional methods by which organisations can build and release software products and services in order to execute strategies and achieve business goals more rapidly (Hummel and Epp, 2015), it is important to note that there are key differences between the agile and traditional software development (SD) approaches. Table 3 summarises the key differences between the agile and traditional SD approaches adapted from Cho (2008), Dybå and Dingsøy (2008), and Nerur *et al.* (2005).

Table 3: Key differences between the agile and traditional SD approaches

	Agile	Traditional
Primary objective	Rapid value	High assurance
Fundamental assumptions	High-quality, adaptive software can be developed by small teams using the principles	Systems are fully specifiable, predictable, and can be built

	Agile	Traditional
	of continuous design improvement and testing based on rapid feedback and change	through meticulous and extensive planning
Planning and control	Internalised plans, people-centric and qualitative control	Documented plans, process centric and quantitative control
Management style	Leadership and collaboration	Command and control
Knowledge management	Tacit	Explicit
Requirements	Largely emergent, rapid change, unknown	Knowable early, largely stable
Role assignment	Self-organising teams—encourages role interchangeability	Individual—favours specialisation
Communication	Informal	Formal
Size	Smaller teams and projects	Larger teams and projects
Customer involvement	Critical, dedicated, knowledgeable, collaborated, co-located onsite customers	Important, as-needed customer interactions, focused on contract provisions
Developers	Agile, knowledgeable, co-located, and collaborative	Plan-oriented; adequate skills access to external knowledge
Project cycle	Guided by product features	Guided by tasks or activities
Architecture	Designed for current requirements	Designed for current and foreseeable requirements
Development model	The evolutionary-delivery model	Life-cycle model (waterfall, spiral or some variation)
Desired organisational form/structure	Organic (flexible and participative encouraging cooperative social action), aimed at small and medium-sized organisations	Mechanistic (bureaucratic with high formalisation), aimed at large organisations
Technology	Favours object-oriented technology	No restriction
Refactoring	Inexpensive	Expensive
Quality control	Continuous control of requirements, design and solutions. Continuous testing	Heavy planning and strict control. Late, heavy testing
Risks	Unknown risks, major impact	Well understood risks, minor impact

Despite the benefits of agile methods, their uptake in organisations is typically met by some resistance—particularly from MMgmt (Joiner, 2017; Kalenda *et al.*, 2018; Thorgren and Caiman, 2019). It is however believed that agile methods begin to receive increased appreciation once people adopt and practically apply them, coupled with the belief that time spent and experience gained in using these agile methods will likely counteract the resistance (Laanti *et al.*, 2011).

Also, despite agile methods uptake for reasons that benefit organisations and project teams, governance-related challenges associated with their usage have been identified. These include (a) lack of theoretical understanding (Lappi *et al.*, 2018; Nyandongo and Khanyile, 2019) and practical guidance on application of PG in practice when using agile methods (Gregory *et al.*, 2016), which is important to deliver projects that are consistent and compliant with business strategy, (b) lack of clarity regarding the role of MMgmt (Barroca *et al.*, 2019; Bastiaansen and Wilderom, 2021; Moe *et al.*, 2019), and (c) lack of competencies in MMgmt that are important for effective functioning in ASD projects (Dikert *et al.*, 2016; Stray *et al.*, 2018). Regardless of the challenges, agile methods support ASD teams in the decomposition and delivery of tasks through self-organisation, which is discussed in the following subsection.

2.2.3 Self-organisation in Agile Software Development Teams

Self-organisation is a cornerstone of ASD (Karhatsu *et al.*, 2010). In ASD, teams are generally allowed to self-organise their work, break-up value-prioritised product features into tasks, and quickly complete tasks to deliver software products in increments and iterations in order to meet customer needs. The nature of agile methods demands that agile project teams purposefully operate as self-organising teams, compared to traditional methods that favour specialisation (Nerur *et al.*, 2005). Self-organising teams are autonomous work groups (Karhatsu *et al.*, 2010), which means “teams of employees who typically perform highly related or interdependent jobs, who are identified and identifiable as a social unit in an organization, and who are given significant authority and responsibility for many aspects of their work, such as planning, scheduling, assigning tasks to members, and making decisions with economic consequences (usually up to a specific limited value)” (Guzzo and Dickson, 1996, p. 324). They are synonymous with self-managing teams (Stettina and Heijstek, 2011), self-governing teams (Doblinger, 2022), and empowered teams (Guzzo and Dickson, 1996). According to Karhatsu *et al.* (2010), the building blocks for self-organised software teams are autonomy, team orientation, shared leadership, communication and collaboration, redundancy, and learning—autonomy being one of the foundational building blocks alongside communication and collaboration (Figure 1). Barke and Prechelt (2019) argue that utilisation of self-organising teams may not always be advantageous because both low-performing and high-performing self-organising teams exist. Therefore, self-organisation should not be seen as a panacea to performance issues given that the manner in which teams self-organise

and perform is influenced by various organisational factors, such as availability of resources, leadership, reward system, training, and organisation structure (Karhatsu *et al.*, 2010), not to mention competencies (Doblinger, 2022). Even so, in terms of benefits, self-organising teams offer superior productivity, and they are able to act quickly to solve problems (Karhatsu *et al.*, 2010; Stettina and Heijstek, 2011). The authority to take measures that situations demand lies within them, hence they do not need to seek or wait for approval from a manager (Karhatsu *et al.*, 2010). Nonetheless, in agile teams where individuals are free to assign tasks to themselves, managers still facilitate task self-assignment by helping developers to find a balance between their personal task preferences and business priorities (Masood *et al.*, 2022).

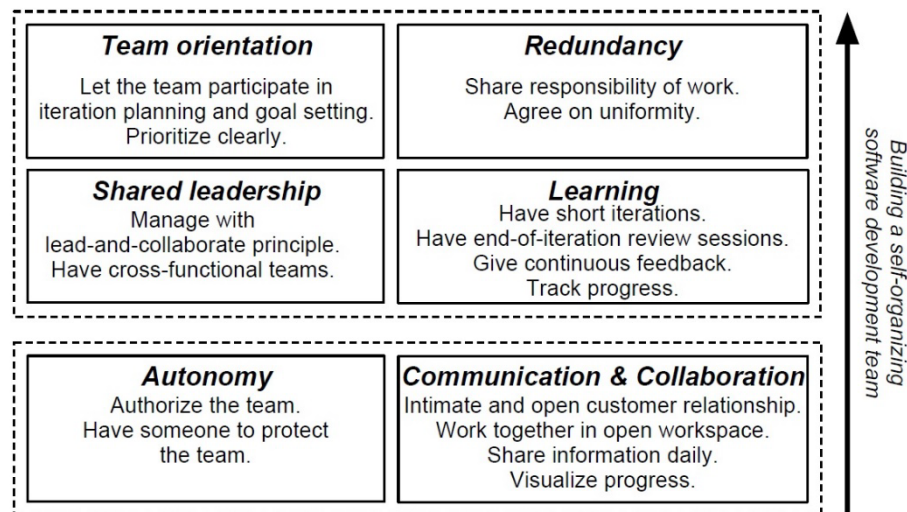


Figure 1: Building blocks for self-organised software teams (Karhatsu *et al.*, 2010)

In agile teams, which are principally self-governing (Beerbaum, 2022; Rigby *et al.*, 2018) and cross-functional (Barke and Prechelt, 2018), it is essential for team members to understand and embrace not only their individual roles (i.e., local role clarity), but also the roles of every other team member (i.e., team-wide role clarity) (Barke and Prechelt, 2019). Typically, a cross-functional team will have a range of roles (Barke and Prechelt, 2019), and to help ensure steady progress, it “ought to be complete, that is, able to solve all their problems without external help, by having all required expertise within the team at any time” (Barke and Prechelt, 2018, Introduction section, para. 4). Agile teams are “flexible and adaptable with team members

interchanging roles” (Drury-Grogan and O’Dwyer, 2013, p. 1097). Roles in agile teams tend to intertwine and change dynamically, and role clarity helps agile teams to function effectively and build the skills of their team members quickly, however, the lack of it complicates self-organisation and creates work-inhibiting friction and emotional distress that may result in high personnel turnover (Barke and Prechelt, 2019). Therefore, it is advisable that organisations and agile teams take measures to ensure role clarity. One of such measures is ensuring there is adequate PG, given that PG helps in defining the roles of project stakeholders and their relationships (Derakhshan *et al.*, 2019; Lappi *et al.*, 2018; Nyandongo and Khanyile, 2019; PMI, 2013; Song *et al.*, 2022). Hence, PG plays an important part in providing role clarity in teams and projects. The following section explores ASD in Nigeria.

2.3 Agile Software Development in Nigeria - Overview, Scale, and Maturity

2.3.1 Overview of the Nigerian ASD Context

From an Information and Communication Technology (ICT) perspective, Nigeria has the potential to be a significant player in the global software development (SD) landscape and an outsourcing option for other countries like those in Europe, considering that English is the official language, it shares almost the same time zone with Europe, and it is Africa’s most populous country (Casado-Lumbreras *et al.*, 2014)—with a population of about 223.8 million people as at 2023 (United Nations Population Fund, n.d.). Although the global enterprise software market is presently dominated by software products from Europe, Asia, and the United States, Nigeria is seen as the largest ICT market in Africa having up to 82% of Africa’s telecoms subscribers and internet usage of about 29% (International Trade Administration, 2023). According to Binuyo (2020), SD in Nigeria is influenced by several factors: research and technological development (RTD) activities, availability of RTD funds, licensing and linkages, human resources, on-the-job training, working experience, availability of funds for training, ownership structure, organisation size, access to technical information and support, competition with international market, access to professional skills from labour market, social factors, government support policy, and economic factors. Chukwuemeka (2016) lists eight critical success factors for software projects in Nigeria, viz., project management expertise, end user involvement, executive management support, suitability of process adopted, project scope, project execution capacity, security consideration, and availability of skilled resources. Ekanem and Peter (2020) identifies three key challenges facing

the Nigeria software industry, viz., low innovative index of indigenous software, inadequate governmental policies to foster the industry's sustainable growth, and low patronage of indigenous software by private and public sector organisations. According to Binuyo and Alimi (2017), the level of acceptance of locally developed software tends to be low in majority of African countries, particularly in Nigeria. Ekanem and Peter (2020) argue that indigenous software are not patronised in Nigeria because they bear similar features with software products already in use in private and public sector organisations, hence, they lack novelty value and are not built to tackle up-to-the-minute challenges in the ecosystem. Sowunmi *et al.* (2016) note that software quality assurance deficiencies also hinder patronage of indigenous software due to neglect of quality assurance practices, and misalignment between local quality practices and global best practices and standards.

Despite aforesaid impacting factors, challenges, and issues, the Nigeria ICT sector is experiencing rapid growth and development (International Trade Administration, 2023). The National Information Technology Development Agency (NITDA)—established in 2001 to implement the Nigerian National Policy for Information Technology ('USE IT') (Olatokun and Abduldayan, 2014)—has contributed towards the establishment of various regulatory instruments to drive ICT development in Nigeria, such as the National ICT Policy, Nigeria Data Protection Regulation 2019 (NDPR), and National Blockchain Policy for Nigeria (NITDA, n.d.). The skillsets of Nigerian developers have also significantly improved in recent years due to international certification programmes and trainings, which have positively impacted the quality of indigenous software because many developers are increasingly adopting quality assurance best practices (Ekanem and Peter, 2020). The ICT sector continues to play a key role in facilitating Nigeria's economic recovery from the COVID-19 pandemic, with a positive effect on the Nigeria financial industry (International Trade Administration, 2023). Generally, the effects of the pandemic and growth of digitisation in the Nigerian economy are spurring organisations to rely on ICT solutions to support business operations (Etim *et al.*, 2023). Moreover, the 21st century financial industry operates in a highly dynamic and diverse business environment defined by changes triggered by financial volatility and advancements in technology (Adetunji *et al.*, 2023). And against this backdrop, Nigerian financial technology (fintech) and digital financial services are gaining popularity and widespread adoption—with new service providers and products constantly entering the market—

bolstered by governmental cashless economy policy (International Trade Administration, 2023). In 2021, the Central Bank of Nigeria (CBN) launched eNaira, which is based on blockchain-like technology, to encourage digital currency adoption and financial inclusion (Sethaput and Innet, 2023). Onyekwere *et al.* (2023) confirms that Nigeria is a thriving market for blockchain technology given that cryptocurrency is widely accepted, with bitcoin having 97.5% acceptance and predicted to be the foremost digital currency within five years. On the artificial intelligence (AI) scene, commercial banks are developing and deploying AI software (e.g., chatbots) to improve service delivery and customer experience (Borokini *et al.*, 2023). A modus operandi that is increasingly being adopted in the finance industry globally is the agile approach (Kadenic and Tambo, 2023; Reunamäki and Fey, 2023), and Binuyo and Alimi (2017) found that ASD is one of the approaches commonly used in Nigeria to build indigenous software.

SD practitioners and scholars have focused much attention on ASD in the last two decades (Uludağ *et al.*, 2021), however, there is still a lack of targeted attention on ASD research in the Nigeria context (Yerokun and Anigbogu, 2017). According to the 17th State of Agile Report (Digital.ai, 2024), only 2% of the 788 respondents in an international ASD survey were located in Africa compared to 48% and 26% located in North America and Europe, respectively. Also, the 16th State of Agile Report (Digital.ai, 2022) notes that of the 3,220 respondents that were surveyed, only 1% of the respondents were located in Africa compared to 55% and 25% located in North America and Europe, respectively. The two State of Agile Reports do not indicate whether or not Nigerian respondents participated in the surveys. Similarly, in the State of Agile Africa 2021 report (wherein the majority of respondents represented the financial industry), respondents from Nigeria accounted for only 3% of the 278 respondents compared to 82% from South Africa (IQbusiness, 2021). Regardless, the report indicates that the top three approaches used in the African region are Scrum (most popular), Kanban, and hybrid approaches (IQbusiness, 2021). Empirical studies on ASD in Nigerian companies appear to be almost non-existent, and generally, research related to ASD in Nigeria is scant in the literature. Nonetheless, a few studies—summarised in Table 4—have attempted to investigate agile development in the Nigeria context with various foci.

Table 4: Studies on ASD in the Nigeria context

Authors	Study description	Industry
Ardo <i>et al.</i> (2023)	This grounded theory study investigated security challenges that agile practitioners encounter in Nigeria in connection with ASD. The study adopted interviews with agile practitioners involved in building secure software in Nigeria, and document reviews. The study sites comprised companies located in Lagos and Abuja, and operating in different sectors: financial services, IT/digital services, healthcare, educational software solutions, and manufacturing. The security challenges identified are (a) lack of collaboration between security and development teams, (b) poor cybersecurity culture, (c) inclination to use foreign software hosting service providers as opposed to local alternatives, (d) high cost of developing secure agile software, and (e) software security knowledge gap. The study identified tensions between the Nigerian regulatory environment and agile practitioners' compliancy. The authors developed the Policy Adherence Challenges (PAC) model, which highlights factors (i.e., unawareness, distrust, compromise, culture) that impede agile practitioners' adherence to the NDPR during secure ASD. The PAC model is proposed as a starting point to examine regulatory policy adherence in the Nigerian secure ASD environment.	General
Akingbotolu <i>et al.</i> (2023)	In this study, the authors seek to examine the relationship between agile methods, team motivation, and productivity within the SD industry in Nigeria. To achieve this, the authors propose a conceptual framework (based on literature review), which highlights autonomy, feedback, work-life balance, recognition, team collaboration, and skill development as factors that influence team motivation and productivity in the Nigerian ASD context. The study aims to offer insights and practical recommendations for adopting agile practices in a manner that is organisationally and culturally appropriate for SD companies in Nigeria.	Software
Ogbonnia and Brooke (2022)	The study reports on the design and development of a centralised online transcript verification system using ASD. The authors argue that current transcript verification processes of Nigerian tertiary institutions are time-consuming, decentralised and easy to compromise, lack transcript verification feedback from tertiary institutions, and result in delayed admission decisions for postgraduate candidates. Hence, the authors proposed a centralised online transcript verification software developed using Scrum. Although a study site was not stated in the study, it claims the proposed system, which uses primary key codes that are difficult to compromise, offers Nigerian tertiary institutions a transcript verification solution that is more secure, scalable, and effective.	Education
Ardo <i>et al.</i> (2022)	The study aimed to determine how various practices that cybersecurity practitioners adopt when developing secure software could be integrated for the development of a secured ASD process. To that end, the authors adopted interviews involving agile practitioners, and grounded theory. The study developed a practice-based ASD process model comprised of 26 security practices, which are linked to several agile roles in the model, viz., self-organising team, security specialist, penetration tester, and DevOps team. The security practices are mapped to the planning, requirements, design, implementation, testing, and deployment phases of the SDLC process for project delivery. To validate the relevance and novelty of the model, the authors employed a focus group comprised of agile cybersecurity experts. In their conclusion, the authors emphasise the need for improved software practices given the heightened dependence on software, increasing cybersecurity threats, and growth of agile methods adoption.	General

Authors	Study description	Industry
Onwuka <i>et al.</i> (2021)	The scholastic work draws attention to the operations of Bureau De Change (BDC) operators in the Nigerian foreign exchange market. It highlights the lack of quality assurance in the activities of BDC operators as well as inadequacies associated with foreign exchange allocations to the operators, their service provision, and regulatory monitoring. Areas of interest in BDC operator activities include customer identification, document verification, and customer transactions. In an effort to help address the issues, the authors highlight the importance of IT solutions and report on the design and implementation of a financial online system—using agile development—to enable monitoring and verification of BDC operator foreign exchange transactions. The study site is a BDC operator with 10-20 employees, located in Delta State, Nigeria. Although this work does not go into detail about the agile method employed, it adds to the minimal body of literature on the use of agile development in Nigeria.	Finance
Nwohiri and Sonubi (2020)	The study reports on the design and development of a financial software using ASD. The software uses data mining methods for classifying customer bank statements' data, running statistical analysis on same, as well as visualising, generating, and summarising reports for users of Nigerian banks. The authors argue that traditionally, bank statements appear in tabular form, showing basic credit and debit transactions of bank users over a given period. This fails to provide deeper analysis and detailed reports of bank users' finances. Hence, the study suggests that Nigerian bank users will gain enhanced financial services experience through the software in that it will help them “understand the nature and essence of their financial transactions better, faster and clearer” (p. 559). Although the study does not go into detail about the agile method employed nor study site, it still adds to the minimal body of literature on the use of agile development in Nigeria. The study in conclusion recommends (a) extensive deployment of data mining by Nigerian banks within their processes given the vast amounts of financial data they store on customer transactions, and (b) creation of easily accessible and open banking APIs to facilitate creation of financial software products for the Nigeria financial industry.	Finance
Yerokun and Anigbogu (2017)	The study aimed to investigate practitioners' perception regarding agile methods adoption for software projects in Nigeria. The study adopted interviews with agile practitioners—in two software companies—and online survey. The study sites were two software companies. Agile methods that participants employed included Scrum (most popular), hybrid, XP, DSDM, and Crystal family. The study found that reasons for adopting the agile approach were (a) keeping up with changing environments and trends, (b) enforcement by superior, (c) benefits associated with agile project management, and (d) whatever works for team members while on a project at any given time. The study noted agile adoption challenges as high cost, lack of team support, repetitive work, poor quality, time wasting, and others not specified. The authors argue that while ASD is well-established in western nations, it is nascent in Nigeria. Hence, findings from the study, according to the authors, may help spread awareness of agile methods usage in Nigeria, and help practitioners deal with adoption and/or adaptation challenges.	Software

It is fair to say the use of agile methods for IT/SD in the finance industry in Africa is promising (IQbusiness, 2021), especially in Nigeria. However, it is worth mentioning that organisations in the finance industry generally tend to be hierarchical (Beerbaum, 2021; Burga *et al.*, 2022), as well

as highly-regulated (Beerbaum, 2021; Briggs and Brooks, 2011). Also, traditional hierarchical culture is prevalent in Nigeria (Akingbotolu *et al.*, 2023), and this peculiarity can be challenging for agile adoption in software projects because management is expected to control the process (Yerokun and Anigbogu, 2017). To overcome this, Akingbotolu *et al.* (2023) recommends adopting a flatter organisational structure, which increases autonomy and empowers individuals to take ownership of their work. All in all, the Nigerian finance industry is germane for this study due to the growing use of agile development to create and deploy technology solutions for financial services in the region (Nwohiri and Sonubi, 2020; Onwuka *et al.*, 2021).

2.3.2 Agile Implementation Scale

The Nigerian ASD studies in Table 4 above appear to include small-scale agile development (i.e., Onwuka *et al.*, 2021), with none on large-scale agile development. Small and co-located teams that (a) comprise no more than 50 people, (b) build software products that are not life-critical, and (c) have unfettered access to people with sufficient user and business knowledge constitute the ideal setting for the application of agile methods in software projects—this setting is regarded as the ‘agile sweet spot’ (Uludağ *et al.*, 2021). A case study by Vakkuri *et al.* (2020) found that besides documentation practices, the small team size makes it easy to keep track of each developer’s actions even in an ad hoc manner. Small agile teams facilitate handling of changing requirements, customer satisfaction, reduced delivery time, and increased return on investment (Mishra *et al.*, 2023). Also, practitioners agree that smaller-size team is a success factor that significantly facilitates the adoption of agile methods (Mishra *et al.*, 2023). It is arguable that small-scale agile development may be prevalent in Nigeria given the emergent nature of agile adoption in the region. Moreover, most Nigerian software companies are small and medium-sized enterprises (Ardo *et al.*, 2023). Ultimately, the success of agile methods adoption in small Nigerian SD teams may well accelerate the establishment of agile practice in the country.

The success of agile methods adoption in small teams ushered in a broader level of adoption in which organisations began to adopt agile methods for large software project implementations—commonly regarded as large-scale agile development—and even going further to the extent of enterprise-wide adoption (Uludağ *et al.*, 2021). Adopting agile methods in a large-scale can be characterised as ‘large-scale agile transformation’, i.e., “a process where a large organization will

change the information systems development methods from a plan-driven process to an agile development on a large perspective including changes in how different teams involved in projects are organized” (Berkani *et al.*, 2019, p. 450). An organisation may have various motivations for embarking on an agile transformation, such as “alignment with the corporate strategy, dissatisfaction with the current way of working, and a need to enable rapid end-to-end deliveries of features and continuous deployment” (Paasivaara *et al.*, 2018, p. 2583). Nonetheless, it is noteworthy that small, nimble organisations are more satisfied with what agile can do for them regarding improving software quality, increasing collaboration, and achieving improved alignment with the business (Digital.ai, 2024). Medium-sized and larger organisations are not as satisfied—they have a strong tendency to adopt a bespoke SD strategy that comprises agile and other different approaches (Digital.ai, 2024). Regardless, agile transformation may be achievable through a gradual introduction of agile methods adoption within “a subset of the enterprise followed by a big bang approach imposed to the full enterprise” (Berkani *et al.*, 2019, p. 456).

2.3.3 Agile Maturity

The Nigerian studies on ASD (see Table 4 above) do not provide insight into agile maturity of Nigerian organisations involved in ASD. That notwithstanding, maturity levels will likely vary from organisation to organisation, and whether or not there is a prevalent agile maturity level in the Nigerian environment is not known. Be that as it may, scholars have proposed numerous maturity models with varying indicators to enable organisations and teams rate their agile capabilities, and based on the ratings, implement initiatives to improve maturity (Fontana *et al.*, 2014). However, Nurdiani *et al.* (2019), which compared several agile maturity models, criticises their efficacy. The authors found that while maturity models suggest that agile practices should be introduced incrementally in a particular order, practitioners assert that the order in which agile practices are introduced is not critical (Nurdiani *et al.*, 2019). Despite this criticism, maturity models can still be fit for purpose. For example, Ozcan-Top and Demirörs (2013) assert that the Agile maturity model (AMM) by Patel and Ramachandran (2009) is adequately fit for purpose, and it has been known to meet most criteria in other model evaluation research (Tuncel *et al.*, 2020). In the AMM (Figure 2), agile maturity is defined in five levels: from Level 1 (Initial) to Level 5 (Sustained). The model can serve as a tool to facilitate agile adoption in organisations, and help teams identify areas for improvement and growth in their SD process and agile practice.

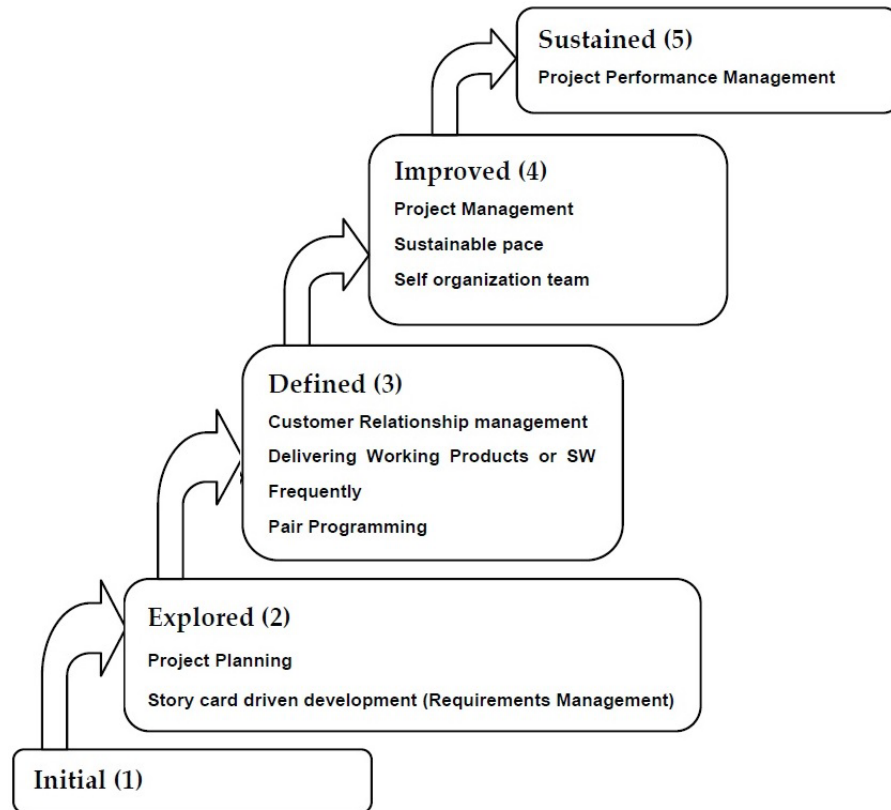


Figure 2: Agile Maturity Model (Patel and Ramachandran, 2009)

The success of ASD projects, according to Chow and Cao (2008), depends on three critical success factors, viz., (1) having the right delivery strategy, (2) having a high calibre and capable team, and (3) properly practicing ASD techniques. Although there are strong correlations between the maturity level of agile teams and agile practices they exercise (Moyo and Khoza, 2021), it should be noted that agile methods are not always used by organisations in their full extent due to specific needs and constraints (Campanelli and Parreiras, 2015). Majority of organisations either use a combination of agile and traditional practices (Chita, 2018) or adopt only specific practices from agile methods (Diebold and Dahlem, 2014). From their study on Scrum usage, Diebold *et al.* (2015, p. 50) found that the way teams use Scrum varies because some find their variation to be more efficient, and in other cases the variations are “more like a legacy from more hierarchical, non-agile processes”. Also, when teams are adopting the agile approach across an organisation at varying speeds, it may result in the use of hybrid practices with the risk of teams regressing to traditional practices when they encounter organisational impediments (IQbusiness, 2021).

Organisations may keep other practices they currently adopt in place and combine them with new adopted practices in order to be more successful (Campanelli and Parreiras, 2015). This relates to software method tailoring, which refers to “adaptation of the method to the aspects, culture, objectives, environment and reality of the organization adopting it” (Campanelli and Parreiras, 2015, p. 87). In essence, agile methods are tailored by organisations or development teams to satisfy their particular needs (Bass *et al.*, 2013; Ciancarini *et al.*, 2024). In the context of encouraging ASD for software projects in Nigeria, Yerokun and Anigbogu (2017) concur, arguing that an agile method that may be successful in one region may not necessarily be successful in other regions. Hence, they note that “to get the best out of Agile, it must be adapted to the people and organization of the adopters” (Yerokun and Anigbogu, 2017, p. 3).

The Nigerian studies on ASD (see Table 4 above) do not include studies on PG or MMgmt within the Nigerian ASD environment, which suggests a research gap. Consequently, this study contributes towards filling this gap by providing research that adds to a growing body of knowledge on Nigerian agile practice in general while also offering empirical insights into PG and MMgmt in ASD within the Nigeria context. The ensuing section explores PG in the ASD context.

2.4 Project Governance Theories in Agile Software Development

PG is an important activity in agile project delivery, with the capacity to advance project performance and success (Sithambaram *et al.*, 2021). It provides senior management with crucial information to make informed investment and risk decisions regarding projects, while allowing developers to build products iteratively and incrementally under conditions of uncertainty (Highsmith, 2014). PG in ASD projects enables operation of governance mechanisms, roles, and metrics, which allow project personnel to monitor project performance and risks in order to realise business value (Talby and Dubinsky, 2009). On account of its importance, previous research has focused on developing PG frameworks for ASD projects, however, research in this area is scant (Lappi *et al.*, 2018; Nyandongo and Khanyile, 2019). Several governance frameworks can be found in the literature which have not been developed specifically as PG frameworks for governing ASD projects as a whole. Some of these include cognitive digital twins governance framework for connected supply chain (Kalaboukas *et al.*, 2023), Salameh and Bass (2022)’s approach for

software architecture governance in ASD, and digital ecosystem cumulative governance framework (Thompson *et al.*, 2024).

With the proliferation of agile usage comes the need to re-examine and adapt orthodox PG principles. Moran (2015) highlights four PG principles that have been adapted and reimagined for agile project settings: (a) having a ‘single point of accountability’ PG function because ultimately, any agile undertaking (e.g., project) must be traced back to a single person who has access to the necessary resources and authority to direct activities and can be held accountable for performance and outcomes, (b) ensuring that PG and solution delivery are aligned, (c) ensuring there is separation of stakeholder management from project decision-making, and (d) ensuring there is separation of PG from the larger organisational governance. The bottom line remains that the nature and features of PG in a given setting are influenced and determined by several factors, such as “asset specificity of project deliverables, the relational nature of the undertaking and the prevailing business culture” (Moran, 2015, p. 124). In view of this, tailoring of PG arrangements may become necessary to ensure project relationships between participating stakeholders are properly managed—when agile approach is adopted, it will most certainly influence the way governance is performed in a given project (Moran, 2015).

The following subsection presents agile PG theories proposed by Lappi *et al.* (2018), Nyandongo and Khanyile (2019), and Vlietland and van Vliet (2015), which were incorporated into the development of the activity-oriented PG (APGov) conceptual framework adopted in this study.

2.4.1 Theoretical Overviews

As well as being an important activity, PG is complex and multifaceted, comprising various components, interactions, and practices regardless of the context—agile, traditional, IT, non-IT contexts. By way of illustration, Kujala *et al.* (2016) developed a PG framework—from a systematic review—to unravel the dimensions and mechanisms of PG with respect to the governance of safety critical projects in the nuclear industry, which are complex undertakings. Kujala *et al.* (2016) derived a six-dimensional framework comprised of key PG dimensions for the governance of traditional projects, viz., goal setting, incentives, monitoring, coordination, roles

and decision-making power, and capability building. Table 5 highlights the PG dimensions and their associated mechanisms.

Table 5: Kujala *et al.*'s (2016) key dimensions and mechanisms of PG

Key project governance dimensions	Mechanisms
Goal setting	<ul style="list-style-type: none"> • Joint performance goals • Clarity of objectives • Flexibility of objectives
Incentives	<ul style="list-style-type: none"> • Reward tied to performance • Risk allocation • Rewards tied to life-cycle performance • Ownership structure • Reputation and future business
Monitoring	<ul style="list-style-type: none"> • Formal control and monitoring • Third party monitoring and auditing • Informal monitoring
Coordination	<ul style="list-style-type: none"> • Formally defined project management practices • Shared culture, values and norms • Communication and information sharing • Change management • Conflict resolution
Roles and decision-making power	<ul style="list-style-type: none"> • Formally defined roles for each party • Management structure and decision making • Decentralized decision making
Capability building	<ul style="list-style-type: none"> • Tendering practices and decision making criteria • Training and continuous learning

Lappi *et al.* (2018) used Kujala *et al.*'s (2016) six-dimensional PG framework as a lens to review 42 agile studies (of which over 80% were empirical studies) and generate insights into agile PG. Notwithstanding that Kujala *et al.* (2016) focuses on traditional project delivery, Lappi *et al.* (2018) showed that Kujala *et al.*'s governance praxes are relevant to agile projects. By synthesising Kujala *et al.*'s framework with findings from their systematic review, Lappi *et al.* conceptualised and proposed their own six-dimensional framework for agile PG comprising goal setting, incentives, monitoring, coordination, roles and decision-making power, and capability building dimensions, along with PG-related practices that are performed in each dimension (see Table 6). They highlight some roles that are utilised and performed by various actors during agile PG—project manager (acting as coordinator or administrator of agile team), agile coach (overseeing

agile capabilities in agile team), and Scrum master (managing team performance and sprints), for example. However, the authors did not discuss them in the context of the organisational levels they belong to, hence MMgmt was not considered. Nevertheless, the authors call for further studies to better understand agile PG across organisational levels and its pervading effects in organisations; “from top management via projects to individuals” (Lappi *et al.*, 2018, p. 54).

Table 6: Key dimensions and practices of agile PG (adapted from Lappi *et al.*, 2018)

Key project governance dimensions	Practices
Goal setting	<ul style="list-style-type: none"> • Customer-team co-operation for initial and flexible requirements and team-level goals • Product backlog and vision guide prioritisation and iteration process • User story, preferably augmented with business value perspective, should be used as the deliverable definition • Flexible budgeting (short-term) and contracting (Time & Material) support agile projects
Incentives	<ul style="list-style-type: none"> • The philosophy of agile management serves as the best incentive in getting team members’ commitment • Peer recognition, project-based organisational structures, decision-making authority, and customer contacts support the establishment of team dedication • The role of monetary incentives and risk and opportunity-sharing schemes is only limitedly addressed in motivating the individuals and organizations, and risk management is approached in a traditional manner
Monitoring	<ul style="list-style-type: none"> • Monitoring is mainly done by the team, using sprint and iteration reviews with customer feedback focus • Measures are standardized and quantitative, and agile specific and qualitative • Visual tracking project progress through deliverables • Testing is important to validate deliverables and users’ stories, and is automated if possible
Coordination	<ul style="list-style-type: none"> • Real-time, informal communication mechanisms and removing communication barriers in and between empowered teams • Iterative project planning using product vision and backlogs • Ensuring infrastructure and practices for customer involvement and team autonomy • Managing change through continuous prioritisations • Facilitating mechanisms for frequent customer deliveries
Roles and decision-making power	<ul style="list-style-type: none"> • Agile project team with cross-functional roles and customer involvement • Agile project team has total autonomy in the decision-making process • Adaptive leadership by the project manager, i.e., administrator or coordinator of the agile project team • Agile coach oversees agile capabilities, Scrum master manages sprints and project team performance
Capability building	<ul style="list-style-type: none"> • Clients’ capabilities and their establishment are the key to ensuring agile project success

Key project governance dimensions	Practices
	<ul style="list-style-type: none"> • The optimal capability composition of an agile team needs to address the tensions between high- and low-skilled workers and specialisation versus cross-functionality logic • Knowledge exchange processes within the agile development team, with the key stakeholders and permanent organisation are central in capability building • Agile practices and tools support routinised and continuous learning

Nyandongo and Khanyile (2019) highlight the importance of PG arrangements in agile projects for ensuring project monitoring, control, responsibility, and accountability towards the achievement and delivery of intended project outcomes. However, they bemoan the minimal research on governance frameworks for the delivery of agile IT projects. They developed a four-dimensional PG framework—using literature review and survey research involving governance stakeholders in agile IT projects, viz., IT and business stakeholders—to support agile project delivery and making sure that (1) organisations are able to ascertain that defined business objectives are being achieved, (2) there is alignment between IT and business strategy, (3) metrics for measuring project progress are established, (4) compliance is maintained, and (5) continuous improvement is constantly performed. They identified continuous monitoring, transparency, enablement, and collaboration as key dimensions of PG in agile projects; each with underlying PG elements as indicated in Table 7. According to the authors, IT and business must always be aligned, and delivery of agile projects requires equal participation and input from IT and business stakeholders alike: it demands clear role and responsibility definition for project participants for project success.

Table 7: Conceptual agile PG framework (adapted from Nyandongo and Khanyile, 2019)

Project governance dimensions	Elements
Continuous monitoring	<ul style="list-style-type: none"> • Risk mitigation • Metrics strategy • Tools for monitoring • Return on investment (ROI)
Transparency	<ul style="list-style-type: none"> • Status reporting via daily stand-ups • Policies, guidelines and procedures
Enablement	<ul style="list-style-type: none"> • Decision making and rights • Knowledge sharing
Collaboration	<ul style="list-style-type: none"> • Product backlog management by business

	<ul style="list-style-type: none"> • Iteration demos • Retrospectives
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Vlietland and van Vliet (2015) developed a governance-related conceptual model (Figure 3) to address issues pertaining to coordination, alignment, prioritisation, automation, predictability, visibility, and strategic decision making, which multiple agile teams (e.g., chains of interdependent Scrum teams) encounter when working together to co-create product functionalities. Based on findings from their multiple-case study (involving interdependent chains of Scrum teams), which suggest that “the application of Scrum in an interdependent application portfolio needs to be governed”, the authors produced nine propositions (Table 8) as part of their conceptual model (Vlietland and van Vliet, 2015, p. 64). They propose the model as a basis for developing a governance framework for managing chains of Scrum teams and mitigating issues during agile project delivery. The authors, while recognising the potential of a governance framework to fulfil “the need for structure” in an agile project setting, also note that it may “lead to less agility”. On account of this, they recommend development of a governance framework that has “the right mix of plan-based and agile strategies” and conforms to the agile manifesto (p. 63).

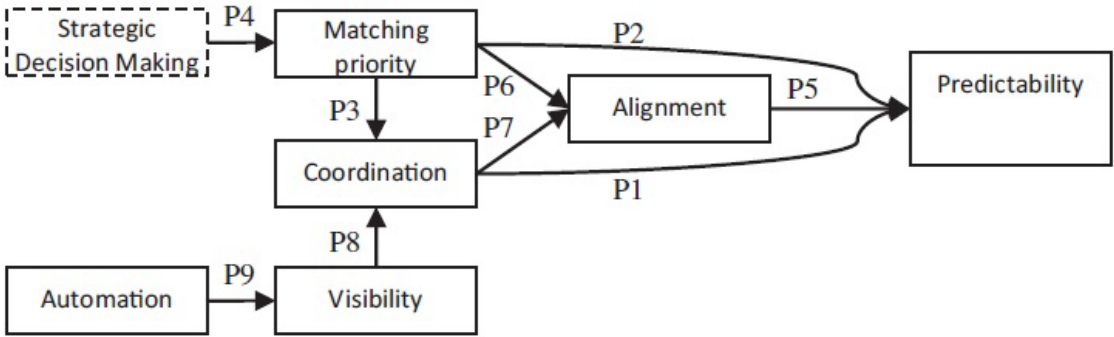


Figure 3: Vlietland and van Vliet's (2015) governance-related conceptual model

Table 8: Vlietland and van Vliet's (2015) nine propositions

Proposition	Description
Proposition 1 (P1)	Embedded coordination practices within and between Scrum teams positively impact delivery predictability

Proposition	Description
Proposition 2 (P2)	Matching priority over the front to back chain positively impacts delivery predictability
Proposition 3 (P3)	Matching priority improves front to back coordination practices
Proposition 4 (P4)	The implementation of decision making strategies improves matched priority setting
Proposition 5 (P5)	Alignment between Scrum teams positively impacts delivery predictability
Proposition 6 (P6)	Matched priority setting positively impacts the alignment between Scrum teams
Proposition 7 (P7)	Coordination practices positively impact the alignment between Scrum teams
Proposition 8 (P8)	Information visibility positively impacts coordination practices
Proposition 9 (P9)	Automation of status and progress tracking in the chain positively impacts information visibility

2.4.2 Comparing the Agile Project Governance Theories

A comparison of the agile PG theories by Lappi *et al.* (2018), Nyandongo and Khanyile (2019), and Vlietland and van Vliet (2015) suggests there are similarities and differences. Table 9 summarises the comparison in terms of development approach, project focus, target, and governance dimensions/propositions.

Table 9: Comparison of the three agile PG theories

Aspect	Lappi <i>et al.</i> (2018)	Nyandongo and Khanyile (2019)	Vlietland and van Vliet (2015)
Development approach	Systematic literature review	Literature review and survey	Multiple-case study
Project focus	All ASD project sizes	No clear indication of project size focus	Large-scale ASD projects
Target	All stakeholders	IT and business stakeholders	Chains of interdependent Scrum teams
Governance dimensions/propositions	<ul style="list-style-type: none"> • Six dimensions: monitoring, coordination, roles and decision-making power, capability building, incentives, and goal setting • Has dimension or practice related to continuous monitoring, collaboration, transparency, and enablement in Nyandongo and Khanyile’s (2019) work 	<ul style="list-style-type: none"> • Four dimensions: continuous monitoring, collaboration, transparency, and enablement • Has dimension or practice related to monitoring, coordination, decision making, capability building, and incentives in Lappi <i>et al.</i> ’s (2018) work • No dimension or practice related to roles and goal setting 	<ul style="list-style-type: none"> • Nine propositions: proposition 1-9 • Has propositions related to monitoring, coordination, decision making, and goal setting in Lappi <i>et al.</i> ’s (2018) work • No propositions related to roles, capability building and incentives

Aspect	Lappi <i>et al.</i> (2018)	Nyandongo and Khanyile (2019)	Vlietland and van Vliet (2015)
	<ul style="list-style-type: none"> • Has dimension or practice related to propositions 1-9 in Vlietland and van Vliet's (2015) work 		

All three theories have aspects related to monitoring. Lappi *et al.* and Nyandongo and Khanyile specify monitoring and continuous monitoring as dimensions, respectively, whereas Vlietland and van Vliet specify visibility in propositions 8 and 9. Visibility in ASD projects relates to monitoring. For instance, added visibility can be achieved in projects by adopting agile monitoring apparatus (Miranda and Bourque, 2010). Nyandongo and Khanyile's transparency dimension also relates to monitoring, as well as visibility. In Scrum for instance, transparency, visibility, and inspection (a monitoring practice) go hand-in-hand: Schwaber and Sutherland (2020, p. 3-4) note that,

“The emergent process and work must be visible to those performing the work as well as those receiving the work... Transparency enables inspection. Inspection without transparency is misleading and wasteful... The Scrum artifacts and the progress toward agreed goals must be inspected frequently and diligently to detect potentially undesirable variances or problems.”

The three theories have aspects related to coordination. Lappi *et al.* specify coordination as a dimension, whereas Nyandongo and Khanyile specify collaboration and transparency. Sharp and Robinson (2008, p. 517) suggest that coordination and collaboration in ASD are highly inter-related, as in XP teams where coordination can engender easy collaboration “because team members are very aware of others’ work, overall project progress, and the state of the code base”. Transparency also relates to coordination because lack of transparency can keep a team ‘in the dark’ when working with others stakeholders (e.g., vendor team), which can frustrate a team’s planning and its ability to coordinate work dependencies (Buchan *et al.*, 2019). Vlietland and van Vliet specify coordination practices in propositions 1, 3, 7, and 8, and alignment between teams in propositions 5 and 6. Team alignment relates to coordination because when there is work process misalignment between teams during ASD, it becomes a coordination issue (Buchan *et al.*, 2019).

All three theories have aspects related to decision making. However, two theories do not have aspects relating to roles. Nyandongo and Khanyile’s ‘decision making and rights’ practice in the enablement dimension and Vlietland and van Vliet’s proposition 4 relates to Lappi *et al.*’s roles and decision-making power dimension. However, there are no aspects in the works of Nyandongo and Khanyile (2019) and Vlietland and van Vliet (2015) that directly relate to roles. Nonetheless, Nyandongo and Khanyile stress that in project delivery, IT and business need to play an equal role. Vlietland and van Vliet on the other hand advocate a governance framework—using their model—that will extend the current Scrum structure by providing roles that hold authority and are accountable for the front to back chain to facilitate feature delivery for front to back business processes. The framework should also clearly state “(1) who is the decision making authority over priority setting, (2) who provides input about a decision and (3) how these roles are jointly held accountable” with respect to strategic decision making (Vlietland and van Vliet, 2015, p. 63).

The theories have aspects related to capability building and incentives, except one, and only two theories have aspects related to goal setting. Regarding capability building, Lappi *et al.*’s knowledge exchange processes in ASD team practice relates to Nyandongo and Khanyile’s knowledge sharing practice. As for incentives, Lappi *et al.*’s decision-making authority in incentives dimension relates to Nyandongo and Khanyile’s decision making and rights practice in enablement dimension. There are no propositions in Vlietland and van Vliet’s work relating to capability building or incentives. However, Vlietland and van Vliet’s propositions 2, 3, 4, and 6, which concern goal prioritisation, relate to Lappi *et al.*’s goal setting dimension. Nyandongo and Khanyile’s framework has no dimension or practice that relates to goal setting.

Comparison of the three theories suggests that dimensions/propositions from Nyandongo and Khanyile (2019) and Vlietland and van Vliet (2015) relate to dimensions in Lappi *et al.*’s (2018) agile PG framework. Based on this, the theories were used to develop the APGov framework as explained in Chapter Three.

2.5 Project Governance Challenges in Agile Software Development Projects

Despite agile methods uptake, governance-related issues have been identified with regards to their usage for project implementations, hence several authors (e.g., Gregory *et al.*, 2016; Lappi *et al.*,

2018) have called for further research on agile PG. Gregory *et al.* (2016) affirm that PG vis-à-vis agile projects is under-researched and call for further research given that findings from their empirical research suggest governance mechanisms in traditional projects for ensuring projects comply with legal or regulatory requirements may not be adequate for agile projects because they are “often process driven and bureaucratic” (Gregory *et al.*, 2016, p. 10), hence implying that PG vis-à-vis agile projects is not fully understood. Nyandongo and Khanyile (2019) argue that organisations tend to rely heavily on the utilisation of governance approaches that are designed for traditional projects because frameworks for governing agile projects are lacking.

Lappi *et al.* (2018) highlight weak organisation–project strategic connections as an agile PG issue and the need for further research to examine how PG structures and practices can help strengthen such connections. Strategy describes “either the plans made, or the actions taken, in an effort to help an organization fulfill its intended purposes” (Miller and Dess, 1996, p. 5). Strategic alignment is established when the objectives, strategies, processes and operational activities of an organisation are in harmony with support systems (e.g., projects) that have been put in place to enable the organisation’s success (Mashiloane and Jokonya, 2018). Projects are apparatuses in organisations that enable transformation of organisational strategies into achieved objectives (Loch and Kavadias, 2010; Pellegrinelli and Bowman, 1994; Musawir *et al.*, 2017). However, when projects are misaligned with organisational strategy, they may fail to support or contribute to strategic objectives attainment, hence their relevance and value are diminished (Mashiloane and Jokonya, 2018; Samset and Volden, 2016; Young and Grant, 2015).

PG in ASD projects is significantly impacted by role-related issues. Chita *et al.* (2020), in an empirical study investigating issues encountered in a large organisation adopting agile delivery practices, identified the governance and support activity as one of the agile activities beset with tensions and frictions. Issues encountered include those pertaining to roles and task allocation within project delivery teams. Similarly, empirical findings from Lappi and Aaltonen’s (2017) PG study revealed that the definition and organisation of roles to support project delivery in public sector ASD projects “were complex and confusing in all cases”, and this happened to be “one of the strongest findings that detracted the utilization of agile methodologies and negatively affected the agile project performance” (p. 285). In ASD, unclarity of role revolves around the role of

middle managers (MMs) (Ågren *et al.*, 2022; Bastiaansen and Wilderom, 2021; Dikert *et al.*, 2016), and this can be singled out as a PG issue with direct impact on project success. According to Schmidt *et al.* (2001, p. 16), one of the risks that can adversely affect software project success is “Improper definition of roles and responsibilities” whereby the project team members as well as other project stakeholders in the organisation “are unclear as to their roles and responsibilities”. It goes without saying that role-related issues, if left unattended, can potentially affect the efficiency, productivity, and performance of ASD projects, thereby leading to less-than-optimal results.

A recent systematic review by Sithambaram *et al.* (2021) identified several issues and challenges that significantly impact the governance and management of agile projects. These include “Lack of understanding of the Agile method values (and principles)”, which the authors categorise as an organisational challenge (Sithambaram *et al.*, 2021, p. 281), as well as those categorised as people challenges, such as lack of requisite skill sets (i.e., technical skills, people skills, and soft skills) and project management competence. Competencies are abstract tools that are leveraged by agile project teams (Dennehy and Conboy, 2017, 2019). The lack of necessary experience, expertise, technical and specialised skills is a factor that contributes to the failure of IT projects, and these deficiencies may be linked to PG inefficiencies (Mashiloane and Jokonya, 2018). To deal with the governance-related issues and challenges facing agile projects, current trends suggest a focus on enforcing and practicing PG in agile projects with adequate understanding of agile values and principles, by people that have “the right attitude, knowledge, skills, and the ability to work well with the team” (Sithambaram *et al.*, 2021, p. 266). The findings from Sithambaram *et al.* (2021) reinforce the importance of PG, the need for sound understanding of the agile way of working, as well as the need to give adequate attention to people-related factors that impact agile project success. Bearing this in mind, it is argued here that competencies of people involved in ASD projects—for example MMs (Annosi *et al.*, 2020; Dikert *et al.*, 2016; Russo, 2021)—are crucial for successful governance and implementation of such projects, and as such deserves attention in agile research so as to help advance our understanding of the human side of ASD for increased adoption. This is also important to improve overall agile project performance, as well as individual and team productivity. Besides, Boehm and Turner (2005) argue that the most critical issues to address to improve management of engineering and development workforce are people issues, and this is vital for ASD adoption. In addition, the focus on people in ASD is a critical factor that has

contributed to its success and widespread adoption (Whitworth and Biddle, 2007). Like Sithambaram *et al.* (2021), this present research recognises that “Competence of project stakeholders possessing the right attitude, with great collaboration and teamwork capabilities, and the ability to garner a close relationship with the customer and clearly articulate changing requirements is key to delivering successful agile projects” (p. 266). Hence, it seeks to ascertain what constitutes ‘the right attitude, capabilities, and abilities’ that can support and facilitate successful agile PG in the context of MMgmt project stakeholders.

2.6 The Middle Management Role

Middle managers (MMs) are the intermediary workforce that connect senior management (i.e., top or upper management) with other teams and workforce that operate in an organisation (Balogun, 2003). This thesis adopts this definition for MMs because it is consistent with the definition of MMs in agile literature (e.g., Christodoulou *et al.*, 2022; Russo, 2021; Tarakci *et al.*, 2023). Russo (2021, p. 52:30) identifies MMs as the “gatekeepers between the top management directions and the implementation efforts”. They are seen as the personnel ““in the trenches,” mediating between top management expectations to deliver working software and day-to-day both social and technical development challenges” (Russo, 2021, p. 52:28). MMgmt is regarded as “the decision-maker cadre linking the strategic apex and operating core of organizations” (Tarakci *et al.*, 2023, p. 1663). Still, Tarakci *et al.* (2023, p. 1671-1672) submit that as work processes and organisations become more agile, flexible, and digital, MMs should “act as ‘connecting leaders’... by being proactive as leaders and followers at once”, motivating “their followers often ‘at a distance’” and leading their peers and following their superiors. Christodoulou *et al.* (2022, p. 1, 3) notes that MMs are “positioned between the operationally focused frontline and strategically focused executive managers. This position allows them to develop and promote innovative and actionable ideas... increase the effectiveness in reaching companies’ targets... and execute strategic plans... they are positioned as linking pins coordinating top and operating-level activities”. In essence, MMs occupy the middle-level position in an organisation’s governance structure, reporting to senior management who provide strategic direction, and serving as nexus between senior management and the workforce that executes core tasks at project-level (Balogun, 2003). They receive, consume, and transmit strategic directives in top-down fashion, perform and oversee implementation activities, and communicate implementation reports to senior management. MMs

are also seen as line managers (Annosi *et al.*, 2020). Generally, MMgmt is defined by this responsibility, and they may have a range of formal titles including ‘Scrum master’, ‘project manager’ or ‘product owner’, but also ‘software developer’. According to Cheng *et al.* (2017), MMs are subordinate to senior management and supervise at least two layers of lower-ranking staff. Still, the positions ‘in the middle’ may vary depending on organisation size and context (Aucoin, 1989). For instance, several layers of people may be positioned ‘in the middle’ in large organisations, and in the wider organisation they are all regarded as MMs. However, in smaller organisations, there may be fewer organisational levels and few people in the middle.

2.6.1 Middle Management in Organisation Studies

MMgmt in organisations is a keen area of interest and a subject of debate for scholars, as well as an ambivalent phenomenon in organisations. In the first place, MMgmt is seen as both “a vertical mediator between management and operational levels”, and “a horizontal integrator that ensures the distribution of knowledge throughout the organization” (Parera and Fernández-Vallejo, 2013, p. 365). The MMs link the strategic and operational levels by engaging in mediation, negotiation, and interpretation efforts (Floyd and Wooldridge, 1997), and they help to ensure that organisational efforts are aligned with strategic intent (Balogun, 2003). In doing so, they perform a crucial role in the process of implementing change by playing the role of change implementors, however, they can also be the agents and targets of change (Balogun, 2003). Huy (2002) emphasises the beneficial role of MMs in advancing change projects because they express sensitivity and provide emotional support to help people—who are impacted by such projects—to deal with their change-related issues and concerns. This MMgmt behaviour may help minimise resistance to change and ease transition in change. In this sense, Huy (2002) suggests that the emotionally engaging role of MMs is one that is productive and crucial in projects, thus highlighting the importance of emotional intelligence competency in MMs. Balogun (2003, p. 70) suggests that MMs are change intermediaries who fulfil four mutually related roles within change implementations: “undertaking personal change, helping others through change, implementing necessary changes in their departments and keeping the business going”. Nevertheless, it is argued that MMs are often seen as inhibiting and change resistant, for example, towards ‘employee involvement’, which Fenton-O’Creevy (1996) describes as practices that seek to increase the

influence of employees over the decisions that determine how they organise and carry out their work, for example, work groups that are self-managing.

Despite pessimism over MMs on the one hand, given that MMgmt “is seen as at best unnecessary and at worst positively harmful to the successful operation of the new, more flexible organization”, there is also optimism in seeing MMs take “on a new, more strategic role” on the other hand (Procter *et al.*, 1999, p. 243). Regarding the latter, Floyd and Wooldridge (1992) developed a typology of MMs’ involvement in strategy by synthesising the actions and cognition peculiar to the MMgmt position (Figure 4). They argue that MMs act in ways that have upward influence as well as downward influence vis-à-vis strategy, and besides this, the ideas they bring may be divergent or integrative. Floyd and Wooldridge (1992) relate the MMgmt upward–downward influences and idea types with four roles that define MMgmt’s strategic involvement in organisations, viz., championing alternatives by persistently engaging and persuading senior management to adopt certain strategic choices (upward influence, divergent ideas), synthesising information by interpreting and evaluating same in specific strategic contexts for senior management (upward influence, integrative ideas), facilitating adaptability by promoting flexible organisational practices and arrangements (downward influence, divergent ideas), and implementing deliberate strategy by taking measures that ensure alignment of purposeful organisational activities with defined strategic goals (downward influence, integrative ideas).

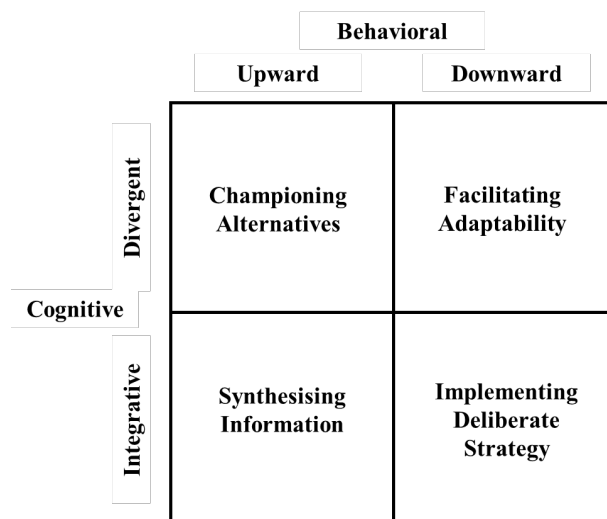


Figure 4: Typology of MMgmt involvement in strategy (Floyd and Wooldridge, 1992)

Floyd and Wooldridge (1997) outline the strategic influence activities of MMgmt within the four roles (Table 10), arguing that MMs are quite valuable and contributory to the process of defining and executing strategy in organisations, and their strategic influence stems from their boundary spanning position. According to Keszey (2018, pp. 1062–1063), boundary spanners are team representatives responsible for linking “the organisation with the environment to forge intra and extra-organisational boundaries”, serving as “interfaces between a unit and its environment”. Raman (2009, p. 58) highlights that involving MMs in the strategic planning process, which is seen as “the set of human interactions, formal and informal, that occur during the generation of a strategic plan”, adds value to the process, and also reinforces commitment to the elected action plan in the organisation.

Table 10: Strategic influence activities of middle management within the four roles (Floyd and Wooldridge, 1997)

<i>Upward</i>
Synthesising information: <ul style="list-style-type: none"> • Gather information on the feasibility of new programmes • Communicate the activities of competitors, suppliers, etc. • Assess changes in the external environment
Championing: <ul style="list-style-type: none"> • Justify and define new programmes • Evaluate the merits of new proposals • Search for new opportunities • Propose programmes or projects to higher level managers
<i>Downward</i>
Facilitating adaptability: <ul style="list-style-type: none"> • Relax regulations to get new projects started • ‘Buy time’ for experimental programmes • Locate and provide resources for trial projects • Provide a safe haven for experimental programmes • Encourage informal discussion and information sharing
Implementing deliberate strategy: <ul style="list-style-type: none"> • Monitor activities to support top management objectives • Translate goals into action plans • Translate goals into individual objectives • Sell top management initiatives to subordinates

By way of validating Floyd and Wooldridge’s (1992, 1997) four MM roles, Hermkens *et al.* (2020) found that the implementing and synthesising roles of MMs seem to be more important and relevant than their facilitating and championing roles within the continuous improvement initiatives context. Organisations can expect MMgmt to play a contributory role in the

accomplishment of continuous improvement within their environments (Hermkens *et al.*, 2020). Notwithstanding, it is important for MMs to see themselves as being fully involved in the early stages of continuous improvement efforts otherwise they may not become the agents of change they have the potential to become (Hermkens *et al.*, 2020). Hermkens *et al.* (2020) acknowledge that changes within an organisation are no longer seen as the exception but rather the norm. According to Weick and Quinn (1999), organisational change is caused by events in an organisation, which result in modifications to structures or processes therein. Hermkens *et al.* (2020) note that organisations are leveraging continuous improvement approaches and the agility concept as means to handle change and remain adaptive. Hence, they argue that MMs will remain instrumental to organisational agility, albeit this brings changes to their role. They therefore call for research to ascertain the impact of the agile approach on the MMgmt role and the roles of MMs that are most contributory to organisational agility (Hermkens *et al.*, 2020).

2.6.2 Middle Management in Traditional IS Delivery

From the IS perspective, MMs have been known to be front-and-centre in strategic exchanges and project implementations to drive digital transformation (DT) in organisations (Paavola *et al.*, 2017). However, in the IS domain, the role of MMs is rarely explored (Paavola *et al.*, 2017). Still, it is argued that MMs tend to be well aware of their areas of responsibility; therefore, they are capable of suggesting suitable solutions for business problems and can help increase the chances of success for implemented solutions to realistically satisfy business needs (Paavola *et al.*, 2017). Also, MMs are able to provide valuable inputs to strategy formation due to “their information sources and different interpretive schemes as compared to top management” (Paavola *et al.*, 2017, p. 4). Furthermore, Paavola *et al.* (2017) suggests that in DT project delivery, the role of MMgmt is threefold—the roles they play tend to change at various points during delivery:

1. MMs act as ‘implementers and negotiators’ by taking measures to promote business process digitalisation and use of innovative work practices in user organisations, at the same time influencing users in order to secure buy-in from them for new technology solutions.
2. MMs perform the role of ‘champions’ by engaging senior management and end users and championing the quest for and uptake of new digital services as well as the consequent changes.
3. MMs are able to think and act strategically and independently as ‘shakers and strategists’ to push and devise solutions to technical and operational issues and advance digitalisation

initiatives even when senior management support is lacking; drawing ideas from exchanges with other parties.

Despite the benefits they provide, MMs may oppose change initiatives, which can adversely affect an organisation (Paavola *et al.*, 2017). Such conflict situations make MMgmt—senior management dialogue essential to address concerns regarding opposed change initiatives (Paavola *et al.*, 2017).

2.6.3 Middle Management in Agile Project Delivery

The study of agile teams is an established research area backed by numerous studies. However, in agile research, the role of MMgmt is rarely addressed explicitly. Little is known about the role of MMgmt in ASD projects (Barroca *et al.*, 2019; Dikert *et al.*, 2016; Moe *et al.*, 2019), and the implications for PG. Nonetheless, agile teams have been examined from a range of role-specific perspectives including the product owner (Berntzen *et al.*, 2019), agile coach (Bäcklander, 2019), product manager (Tkalic *et al.*, 2022), software developer (Melo *et al.*, 2012), solution architect (Marić and Tumbas, 2016), UX professional (Bruun *et al.*, 2018), and project manager (Shastri *et al.*, 2016, 2021). It is noteworthy that the project manager role—albeit a traditional role—still exists in organisations that practice ASD (Drury-Grogan and O’Dwyer, 2013; Shastri *et al.*, 2016, 2021). An organisation may retain the project manager role due to (a) its hierarchical nature in which individuals have defined roles and duties (Drury-Grogan and O’Dwyer, 2013), or (b) its ongoing agile transformation (Shastri *et al.*, 2021). Shastri *et al.* (2021, p. 1) highlight “the continued presence of the role of the project manager in agile software projects as a part of the transition from traditional to agile ways of working”. Shastri *et al.* (2017) examined the ‘agile manager’ role in agile project management in a generic context without specifying the managerial level within which the role was being examined. Despite this exclusion, Shastri *et al.* (2017) affirm the important role of managers by identifying four key roles they play in agile teams: coordinator, mentor, negotiator, and process adapter. Hoda *et al.* (2013) examined self-organising roles in ASD teams and identified six informal roles that exist within agile teams, viz., mentor, coordinator, champion, promoter, translator, and terminator. The roles—which were implicit, dynamic, instantaneous, and transitory in nature—were taken up by various team members (e.g., developers, business analysts, agile coaches, team members with advanced agile experience) to meet project needs. The authors also highlighted positive influences of senior management in supporting agile

teams, however, the role of MMs was not considered in the study. Another study (Hoda *et al.*, 2011) explored senior management role in agile IT projects and highlights their importance and the support they give to agile teams. Lappi *et al.* (2018) reviewed 42 studies of which over 80% were empirical studies; however, MMgmt is not discussed.

For organisations seeking to transit to agile, inflexible personnel can make agile uptake difficult (Mahanti, 2006), and it can be argued that when an organisation is becoming agile, confusion may arise within the workforce regarding the role and future of MMs in the organisation. Even when facilitating implementation of the agile paradigm for project delivery, MMs often struggle “to make sense of the changes themselves”—they may experience “intense confusion” due to their perception of agile as being “too vague to provide guidance for the managerial tasks associated with properly reshaping the intraorganizational boundaries” (Annosi *et al.*, 2020, p. 66). A large-scale agile transformation study by Fuchs and Hess’s (2018, p. 7) highlighted a sense of uncertainty and perplexity felt by people regarding the impact of agile on existing structures and organisational roles: “Especially the middle management is having a hard time since they cannot identify their role in the new [agile] setting”. Along the lines of these experiences, several issues regarding MMgmt in ASD projects are reported in extant agile literature. Bastiaansen and Wilderom (2021), Dikert *et al.* (2016), and Moe *et al.* (2019) suggest there is a lack of clarity in the role of MMs in agile project settings, and Barroca *et al.* (2019) argue that this is one of the top ranked challenges affecting agile teams. Moe *et al.* (2019, p. 16) mentions “Redefining the managers [*sic*] role” and “Right level of responsibility” as major barriers to effective functioning of self-organising teams, thus highlighting issues in ASD projects, which are associated with MMgmt and governance. It is suggested that MMs need to give more support and appropriate authority to agile teams (Dikert *et al.*, 2016; Moe *et al.*, 2019). There is also the issue of lack of MMgmt involvement in agile activities, which adversely impacts ASD (Dikert *et al.*, 2016). Furthermore, there is a lack of understanding as to the decision-making power of MMs, and the legacy roles required in ASD projects (Moe *et al.*, 2019). These issues warrant targeted research on MMs in agile settings.

Clarifying the role of project participants in agile projects is impactful and needful as lack of it may have undesirable implications. MMs are expected to work alongside agile teams and play their part to ensure smooth delivery of ASD projects. However, when the roles of project

participants (including team members) are unclear during agile PG for instance, it has the potential to destabilise project relationships and productivity, as well as detract the use of agile delivery practices and adversely affect the performance of agile projects (Lappi and Aaltonen, 2017). Hence, it is needful to clearly define the role of MMs. Role clarity, which is “the extent to which each individual team member has a clear understanding of their task and has clear information associated with a particular role in the team”, is a key factor that helps to make agile software teams more effective (Buvik and Tkalic, 2022, p. 7332). One would think that because agile teams are expected to be generalists (Wildt and Prikladnicki, 2010), the need to specify the role of project participants becomes unnecessary. However, it should be borne in mind that agile methods specify roles (e.g., DSDM, Scrum), and the character of roles in agile projects varies in accordance with the methods, which express varying levels of granularity as regards generalism versus specialism (Moran, 2015). Wiedemann and Weeger (2017, p. 1409) argue that for optimal performance, agile teams need sufficient combination of generalists who “are more broadly oriented in various knowledge domains” and specialists who have embedded in-depth knowledge in specific domains. Moran (2015) concurs, arguing that a mix of generalists and specialists in agile teams is acceptable so long as teams collectively have the requisite competencies to do their work. Given that agile teams may comprise generalists and specialists, this study’s pursuit to determine the role of MMs in agile PG may uncover their concrete or potential generalist and/or specialist tendencies. Clarity regarding a person’s role in a team may also impact the team’s level of psychological safety—the held assurance that other team members will react favourably when a person voices personal views, for example, when a person asks questions, seeks feedback, reports an error, or proposes ideas (Buvik and Tkalic, 2022). This is because it should be easier for team members to ask questions, and speak out when they are confident that they know their role and duties in the team, thereby fostering a psychologically safe working environment (Buvik and Tkalic, 2022; Peeters *et al.*, 2022). Ambiguity in MMs’ roles can engender tensions and frictions within agile teams when performing duties—MMs may engage in policing their teams rather than supporting them, not to mention micromanaging developers (Dikert *et al.*, 2016). Role ambiguity can lead to confusion and resistance to agile practices by MMs due to fear of redundancy and perceived devolution of duties to subordinates (Kalenda *et al.*, 2018). The effect of MMgmt role ambiguity in ASD projects and teams may undermine PG, team performance, quality of project outcomes, and psychological stability, which according to Kuznetsova *et al.* (2018, p. 748) is

frequently associated with a person's ability "to perform professional activities in difficult and extreme situations as successfully as under normal conditions".

MMs have been known to make considerable impact in ASD projects. A recent large-scale agile transformation study by Russo (2021) reports that MMs were taking the roles of Scrum masters and product owners. MMs were hands-on in mediating between senior management software expectations and daily development issues to develop a desired system in the examined organisation. As Scrum masters, MMs were domain experts whose in-depth knowledge of the organisation was deemed critical for solving problems, such as those encountered by developers (non-domain experts). The domain expert role of MMs appears to be a specialist one (Wiedemann and Weeger, 2017). Senior management valued the domain knowledge and adaptability of the Scrum masters, who also served as gatekeepers that focused on agile values in the project environment. Scrum master leadership skills were also vital in dealing with various day-to-day project issues. The product owners represented stakeholders (e.g., users, customers) who they engaged for requirements definition, approval, or refinement. The product owners ensured alignment between stakeholder expectations and completed software features. The MMs were gatekeepers between senior management directions and delivery efforts (Russo, 2021). Gatekeepers, according to Heiskanen and Similä (1992, p. 11), are "organizational actors that sit at the junction of a number of communication channels in such a way that they can regulate the flow of demands and potentially control decision outcomes". Russo (2021) however de-emphasises the importance of the Scrum master and product owner MMgmt roles to project success when compared with lower-level developers, arguing that developers play the most critical role in project success due to their social and technical skills. Nonetheless, the author still acknowledged that product owner–developer close interaction and Scrum master leadership–gatekeeping roles are still crucial for agile project success—albeit of less criticality than the role of developers (Russo, 2021).

Essentially, Scrum masters and product owners contribute to agile leadership in agile teams and organisations (Modi and Strode, 2020; Moe and Dingsøy, 2008; Holtzhausen and de Klerk, 2018). The Scrum master in particular is often regarded as a servant leader—a person who "seeks to serve first and then to lead" (Holtzhausen and de Klerk, 2018, p. 874), and "facilitates team

empowerment and motivation and performs boundary spanning between the organisation and the team” (Modi and Strode, 2020, p. 3). According to the Scrum Guide (Schwaber and Sutherland, 2020), Scrum masters help teams to understand Scrum theory and apply it in practice. However, they have been known to hold additional roles in organisations, ranging from product owner, technical roles (architect/software designer, developer/senior engineer, team leader, and test lead), to management roles (project manager, project lead, head of department) (Noll *et al.*, 2017). In practice, it may be necessary for a Scrum master to act as project manager to help manage the progress of multiple projects (Diebold *et al.*, 2015; Moe and Dingsøyr, 2008). Product owners help teams to maximise the value of products they create and manage the product backlog, which includes development and communication of the product goal (Schwaber and Sutherland, 2020). However, similar to Scrum masters, they have been known to hold other roles like project manager, business expert, solution architect, and developer (Diebold *et al.*, 2015). Although the Scrum Guide does not specify who should fulfil the Scrum master or product owner roles, nor does it specify whether or not they are management roles, the way the product owner role is fulfilled in practice “varies widely by organization, and often deviates from theory” (Verwijs and Russo, 2023, p. 74:5). The same holds true for the Scrum master role (Diebold *et al.*, 2015).

Recently, Christodoulou *et al.* (2022) gathered findings from consultants regarding the role of MMgmt in DT projects within the banking industry. The authors argue that considerable attention is given to the supportive role of senior management and the role of end users in the implementation of technology solutions; however, robust research data regarding the role of MMs in DT is lacking—this issue motivated their study (Christodoulou *et al.*, 2022). According to them, a gap in extant research and knowledge regarding the strategic role of MMs in the development of DT projects remains. They confirmed five strategic roles that MMs perform during DT projects, as shown in Table 11 (each role is ranked according to its importance).

Table 11: Role of MMs based on its importance (adapted from Christodoulou *et al.*, 2022)

Role	Mean Importance (1 lowest – 7 highest)	Reasoning
Implementing deliberate strategy	5.5	Middle managers were identified to be crucial for the implementation of initiatives, and consultants are unable to do it solely

Role	Mean Importance (1 lowest – 7 highest)	Reasoning
Leadership	5.3	Leadership was identified as a key supporting role that enables successful strategy formulation and implementation
Championing alternatives	4.3	Consultants require MMs' collaboration to promote initiatives to higher-level managers
Facilitating adaptability	4.1	Support of middle managers in initiatives development is required to ensure that they will promote initiatives to higher-level managers
Synthesising information	1.7	Consultants act as synthesisers of information on such projects, and thus MMs' support is not required

Implementing deliberate strategy is highlighted as the most important role of MMs, thus making them vital for the implementation of DT projects to achieve strategic intents, whereas synthesising information is seen as the least important role. Christodoulou *et al.* (2022) also found that MMs played a significant role in facilitating the use of agile delivery practices in the DT projects, and though evidently contradictory, they also found that potential obstruction to the implementation of strategy arose when MMs that came from support functions failed to comprehend the agile paradigm. According to the authors, implementation of several projects produced unsatisfactory results, and a major source of the strategy implementation issue is lack of MMgmt involvement (which may also lead to unintended sabotage of the strategy process by MMs). Lack of involvement of MMs may not only undermine strategy implementation, but also the adoption of the agile paradigm to support project delivery in an organisation (Fuchs and Hess, 2018). Ultimately, Christodoulou *et al.* (2022) reinforce the importance of MMgmt involvement in the strategy development and implementation process. Along the same vein, Tarakci *et al.* (2023) call for further examination of MMs to understand their strategic role (from an affective perspective) in managing emotional processes in agile teams.

Agile transformation tends to engender redefinition of organisational roles and responsibilities, such as the MMgmt role, as in Annosi *et al.* (2020) where a case of large-scale agile transformation was examined over a five-year period. As an after-effect of agile uptake, the role of MMs was redefined to cover the following: (a) acting as change agents for teams they supervise; (b) securing suitable work environment for their team members; (c) establishing external interfaces between their teams and other stakeholders; (d) securing availability of external workforce; (e) ensuring

team composition consists of personnel with the right competencies and focus, (f) ensuring sprint 0 is organised in collaboration with the product owner and Scrum master, and (g) providing important information, such as strategy and upcoming features in the pipeline (Annosi *et al.*, 2020).

It is apparent that MMs are important constituents of the governance structure and delivery manpower in ASD projects, however further research will aid our understanding regarding the nature of their involvement in PG during ASD projects. One could argue that the minimal focus on MMgmt in agile research might be due to the uncertainty regarding their role and relevance in ASD projects, which has been called into question given that MMs are seen as outmoded. For example, Kalenda *et al.* (2018) argues that agile teams are no longer expected to be managed by MMs: they are seen as liabilities to organisational agility because they tend to resist change and agile transformation initiatives. However, it is noteworthy that there is ‘management’ and ‘leadership’ in agile settings. The study by Shastri *et al.* (2017) on the role of the manager in agile teams highlights four management roles that managers perform, which suggest that management in agile projects involves mentoring, coordinating, negotiating, and process adaptation. Besides helping to build an agile structure and organisational culture that adapts to changes, agile managers engage in fostering team performance and organisational changes that benefit teams, supervising, increasing team flexibility, motivating teams and individuals, and promoting the customer acceptance culture (Gandomani *et al.*, 2020). While it is argued that managers are optional in agile teams, whereas leaders are a must-have (Anderson *et al.*, 2003), Parker *et al.* (2015) argues that when a manager embraces and follows agile practices, the manager can become an adaptive leader while managing the agile team. The person becomes an agile manager and leader that sets the direction for the agile team to follow, establishes uncomplicated and generative rules of the environment in which the team operates, and encourages adaptation, continuous feedback, and collaboration in the agile team and environment. When managerial best practices are applied adequately and sensibly in ASD, rather than being limiting, they improve products as well as enhance team member job satisfaction and productivity (Anderson *et al.*, 2003). MMs are leaders, and the leadership they exercise in organisations is seen as a key element for the successful formulation and implementation of strategy vis-à-vis DT projects (Christodoulou *et al.*, 2022).

A recent survey study (Weichbrodt *et al.*, 2022)—which sought to understand leadership in ASD teams—suggests that in agile settings, a possibly complex and subtle interplay exists between hierarchical leadership (situated in individuals with formal authority and exercised by line managers and/or direct supervisors) and shared leadership (situated and distributed in teams). According to the authors, transformational and transactional styles of leadership can be found in ASD in the hierarchical and shared leadership loci. Transformational style of leadership is seen as “leader behaviors that transform and inspire followers to perform beyond expectations while transcending self-interest for the good of the organization” (Avolio *et al.*, 2009, p. 423). It represents “a relational contract rather than an economic one” and embodies acts like encouraging followers and providing emotional support (Weichbrodt *et al.*, 2022, p. 101). On the other hand, transactional style of leadership focuses on “leading people by designing and adjusting an economic contract between leader and follower. Labor and its output are traded for a salary or for opportunities for promotion” (Weichbrodt *et al.*, 2022, p. 101). It sets, monitors, and adjusts goals that need to be achieved, as well as expected results and incentives (Weichbrodt *et al.*, 2022). The authors found that as organisations become more agile, (1) shared-transformational and shared-transactional leadership increases significantly, (2) hierarchical-transformational leadership increases slightly, but (3) hierarchical-transactional leadership decreases. While shared and transformational leadership are more important as organisations become more agile, hierarchical leadership remains: “leadership executed by direct supervisors and/or line managers still holds relevance” (Weichbrodt *et al.*, 2022, p. 108). Hence, the authors call for more studies to examine the leadership that line managers/direct supervisors execute in ASD settings to further understand the contexts that underly their continued usage.

2.7 Understanding Competence and Competency

Competence is used to measure people’s performance, such as the performance of managers (Robotham and Jubb, 1996). Organisations make use of competence models for selection of individuals during recruitment to support organisational efficiency as well as minimising costs that may arise from on-the-job training (Škrinjarić, 2022). Information provided by competence models can be used by individuals to make themselves more employable as well as increase their salaries and minimise job hunting costs (Škrinjarić, 2022). Because managers’ decisions and the resultant measures they take ultimately play a role in resource utilisation and efficiency within an

organisation, the process of evaluating and developing the performance of managers is widely accepted as a crucial factor for an organisation's strategic management practice (Robotham and Jubb, 1996). However, a generally accepted and clear definition of competence is lacking (Robotham and Jubb, 1996; Škrinjarić, 2022). Various terms associated with competence are related and tend to be used interchangeably (Robotham and Jubb, 1996; Škrinjarić, 2022), not to mention that scholars offer various perspectives to elucidate competence and its associated terms.

Robotham and Jubb (1996, p. 27) suggest that competence relates to “any factor that directly, or indirectly, affects the job performance of an individual” and they present two perspectives. On the one hand, competence is seen as “the behaviour of particular individuals – that is, how they act and respond in the organizational environment in the course of doing their job” (p. 27). Taking this perspective, it may be possible, through observation of various managers, to determine a set of management behaviours that are effective as well as those that are less effective (Robotham and Jubb, 1996). On the other hand, rather than regarding competences as aspects of a particular job, they can be regarded as “identifiable characteristics of the people who do the job effectively”, which include skills, traits, social roles, motives, self-image views, and bodies of knowledge (Robotham and Jubb, 1996, p. 27). Medina and Medina (2015, p. 285) argue that “competence is based on knowledge, skills and personal characteristics but also related to a person’s demonstrable performance, which can be measurable”. IPMA (2015, p. 15) defines competence as “the application of knowledge, skills and abilities in order to achieve the desired results”. One can relate this definition of competence to the knowledge, skills, and abilities (KSA) framework, which is popular in the literature (Chang *et al.*, 2019; Cheney *et al.*, 1990; Jones *et al.*, 2018; Tripathi and Agrawal, 2014). The KSA framework regards knowledge as any content or technical information that is required to effectively perform a job, which is usually acquired through work experience, information resources, schooling, or other forms of learning (Cheney *et al.*, 1990). Skills refer to “the specific psychomotor processes necessary to meet the current requirements of a specific job” while abilities are the cognitive elements that reflect the current capabilities or proficiency levels of a person or entity (Cheney *et al.*, 1990, p. 238). Regarding competency, Boyatzis (1982, p. 21) argues that a “job competency is an underlying characteristic of a person in that it may be a motive, trait, skill, aspect of one's self-image or social role, or a body of knowledge which he or she uses”. According to Boyatzis (1982), the various competencies that a person has reflects the capability

of that person (which the person brings to job situations), and these competencies are causally related to job performance that is effective and/or superior. In differentiating competence, competency, and competencies, Moore *et al.* (2002, p. 316) defines these terms as, “an area of work”, “the behaviour(s) supporting an area of work”, and “the attributes underpinning a behaviour”, respectively. Similarly, Arifin (2021) proposed a diagram to differentiate between being competent, competence, competency, and competencies (Figure 5). Ultimately, it can be argued that being competent typically means a person has the ability to perform a given task or job, and the person’s competency “tends to cover anything that might contribute to job performance” (Crawford, 2006, p. 8-4).

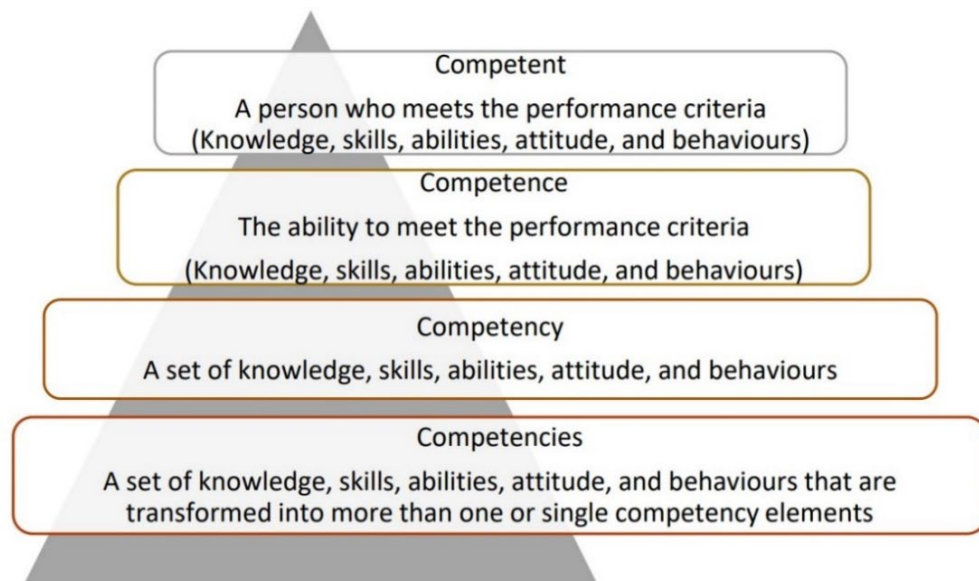


Figure 5: Competent, competence, competency, and competencies differentiation by Arifin (2021)

Notwithstanding the extant elusiveness associated with defining competence and associated terms, it is reasonable to accept that competence is multidimensional in nature and associated with elevated performance (Li *et al.*, 2020). Along the same line, Crawford (2005) develops and proposes an integrated and multi-dimensional competence model, which defines competence as a composite of *input competencies* (knowledge and understanding, abilities, skills [qualifications and experience]), *personal competencies* (personality characteristics [traits, self-concept, motives]), and *output competencies* (demonstrable performance). The model acknowledges that a person's overall competence is multifaceted; comprising multiple component parts that enable a

person to perform a job, rather than a singular construct. Crawford’s model reconciles the attribute-based and performance-based inferences of competence in order to establish a theoretical basis for identification and assessment of various competence aspects against set standards. The aspects of competence that are attribute-based consist of input competencies and personal competencies while the output competencies are classified as performance-based aspects (Crawford, 2005). In this study, I adopt Crawford’s (2005) integrated and tripartite model of competence (see Figure 6).

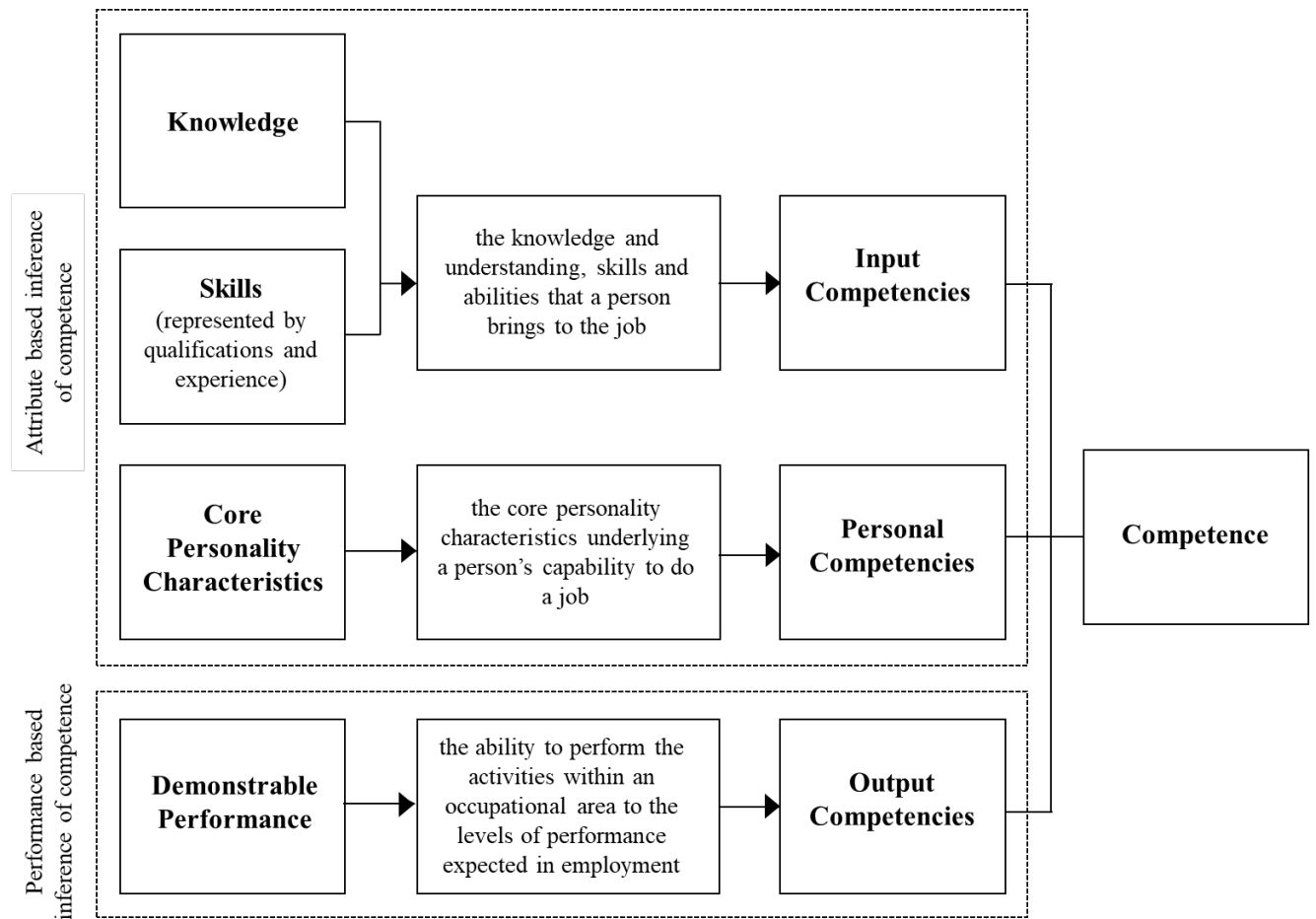


Figure 6: Integrated model of competence by Crawford (2005)

Exploring competencies from different angles can provide a more holistic view of the important and useful attributes, capabilities, and know-how needed for MMgmt to be effective and successful when working with agile teams in ASD projects. Crawford (2005, p. 8) regards knowledge and

skills as “the information a person has in specific content areas” and “the ability to perform a certain physical or mental task”, respectively. Being input competencies, they can be readily evaluated and built by means of experience and training, as against personality characteristics which may not be easy to evaluate and develop (Crawford, 2005). Gilli *et al.* (2022) concur noting that a person can learn and develop skills, as well as learn traits (a person’s attributes)—albeit traits are not easily changed and they may take some time to develop. The personal competencies in Crawford’s (2005) model are also regarded as “underlying enabling attitudes and behaviours” (Crawford, 2006, p. 8-6). Different individuals with varying personality characteristics can apply knowledge and approaches in different ways and still produce successful outcomes (Crawford, 2006). Despite personal competencies (i.e., personality characteristics) being deemed noteworthy in that they form a constituent part of overall competence of an individual, references in the literature implicitly imply that the importance of these competencies might not be highly regarded or even recognised in contrast to input competencies like skills, for instance.

Concerning personal competencies, Gilli *et al.* (2022) examined DT job advertisements and found that personality traits (proactiveness, willingness to travel, creativity, passion) were specified as job requirements. The authors found it “surprising that personality traits are mentioned at all in job advertisements relating to DT” (p. 10). Although findings suggest personality characteristics are important for job performance, the study highlights a surprising disparity and reality (Gilli *et al.*, 2022). Is the perceived lack of focus on personality characteristics influenced by the idea that they are hard to develop and change, even though they are learnable (Gilli *et al.*, 2022; Crawford, 2005)? Or could the explanation for this lie in Crawford’s (2006) argument that studies on personality characteristics (e.g., project managers’ personality characteristics) have not discovered strong correlations between successful performance and personality characteristics? In contrast, Yilmaz *et al.* (2017) examined agile and traditional software teams and found that teams that were effective had members who exhibited several personality traits—emotional stability, agreeableness, extroversion, and conscientiousness—and these traits were pronounced and elevated within their team apparatus. The extroversion trait in particular was more pronounced in the ASD teams (Yilmaz *et al.*, 2017). Also, Hung (2020, p. 907) acknowledges strong correlations between a person’s personality and job performance, claiming that “personality certainly influences job performance through both working-hard and working-smart work styles”.

Furthermore, there are strong correlations between personality traits of project team members in IT projects and their project implementations, whereby the type of personality team members possess corresponds with the personality type associated with the positions they occupy in IT projects (Wybraniak-Kujawa *et al.*, 2022). The above suggest that the ‘personality characteristics’ topic deserves renewed emphasis, which is why researchers (e.g., Yilmaz *et al.*, 2017) are calling for more empirical case studies in software organisations to explore this area. Hence, more contextual research should be encouraged to examine the relationship between personality characteristics and people’s job performance (e.g., agile MMs) in different organisational contexts and environments (e.g., agile PG), or at the very least, identify personality characteristics that are deemed important for their effective performance.

The competence-based approach, according to Robotham and Jubb (1996, p. 25), is seen as a means through which the performance of organisations can be optimised, supposedly, by allowing them “choose the right people for the right roles, assess individuals’ ability for new roles, and identify where an individual needs particular training”. However, the authors question whether competences are even measurable considering that a generally accepted and clear definition of competence is lacking. Employers in different geographical contexts may place varying levels of importance on a particular competence associated with the same job or occupation (Škrinjarić, 2022). Management behaviours which are believed to be effective in a particular industry may be regarded as inappropriate within another industry (Robotham and Jubb, 1996). According to Robotham and Jubb (1996, p. 26), “competences could be regarded as being situation-specific” due to varying preferences in the industry or organisation within which they are exercised. Despite the aforesaid, the competence approach is still beneficial for the evaluation and development of managers (Robotham and Jubb, 1996).

2.7.1 Competencies in Agile Project Teams

A team is seen as “a small number of people with complementary skills who are committed to a common purpose, performance goals, and approach for which they hold themselves mutually accountable” (Katzenbach and Smith, 1993, p. 45). Agile teams are “flexible and adaptable” (Drury-Grogan and O’Dwyer, 2013, p. 1097) and self-organising. It can be argued that agile team characteristics, such as ability to adapt to change and self-organisation, are important for collective

team success. According to Moran (2015, pp. 196–197) for instance, self-organisation is “a critical success factor in agile projects” that “requires adaptability, openness and a willingness to learn and change on the part of team members”. Schmidt *et al.*’s (2001, p. 21) Delphi study of software project risks reveals that one of the top five risks that can adversely affect software project success is the lack of “required knowledge/skills in the project personnel” in terms of business knowledge, technology, and experience, for example. Therefore, team member competency strengths or deficiencies will most likely affect a team and its collective efforts, which may affect the quality of ASD project outputs.

A recent study by da Costa Filho *et al.* (2022) provides findings of a systematic literature review aimed at determining and understanding competencies that are important in agile software teams for managing activities in ASD projects. The researchers’ findings list eight technical competencies and seven interpersonal competencies that are important for the management of activities in ASD project environments (Table 12). However, their review focused on competencies for agile teams in general and not particularly for MMgmt.

Table 12: Competencies for managing activities in ASD projects (adapted from da Costa Filho *et al.*, 2022)

Competency Dimension	Competency	Description
Technical (hard skills)	Activity planning	The ability to plan the necessary activities as well as identify the precedence between them for completing the iteration and delivering value to the customer
	Understanding activities	The ability to understand the context and the work required to perform the activity correctly, according to what was requested
	Activity measurement	The ability to measure the effort required to perform an activity and is developed during the iterations
	Abstraction capacity	From the understanding of the activities, it is possible to create generalisations and abstractions of requirements and thus develop the abstract requirements into tangible systemic functionalities
	Requirement analysis	Through knowledge about the context in which it operates, this competency makes it possible to break down the requirements into activities for becoming software features
	Activity monitoring	Concerns the knowledge in analysing tools for monitoring the backlog activities of an iteration
	Technology knowledge	Refers to knowledge in programming languages as well as in designing patterns and architectures aimed at developing technological solutions

Competency Dimension	Competency	Description
	Activity decomposition	It is the competence to dismember and group activities arising from the requirements and whose development is linked to the development of abstraction competency
Interpersonal (soft skills)	Negotiation	Ability to negotiate inclusion, exclusion or modification of requirements and activities in the backlog
	Influence	Ability to influence team members to achieve personal or organisational goals
	Effective communication	Ability to convey a message clearly and objectively without loss of information
	Sense of self-organisation	This competence concerns the ability of team members to self-organise according to their work routine so that they can perform their activities accordingly
	Adaptability to change	Ability to quickly adapt to changes occurring during iteration. By developing this skill, the team's member stops seeing changes negatively and starts to see change as a strategic action to achieve results and deliver value at the end of the iteration
	Development of team activities	Ability to work as a team, accept any constructive criticism of the work developed and thus exchange knowledge and experiences in both technical and business contexts
	Sense of importance	Concerns the ability to recognise the importance of team events, including activities and behaviors which can affect the iteration

Regarding competencies of agile leaders described in previous research, Neubauer *et al.* (2017) surveyed 1,042 executives and conducted in-depth interviews involving 19 digital leaders. From their global study, the authors found that agile leaders possess four distinctive and vitally important personality characteristics, which differentiate them from traditional leaders: agile leaders are engaged, humble, adaptable, and visionary (Table 13).

Table 13: Agile leader personality characteristics (Neubauer *et al.*, 2017)

Agile leader personality characteristics	Description
Engaged	They have a willingness to listen, interact, and communicate with internal and external stakeholders combined with a strong sense of interest and curiosity in emerging trends.
Humble	They are able to accept feedback and acknowledge that others know more than they do.
Adaptable	They accept that change is constant and that changing their minds based on new information is a strength rather than a weakness.
Visionary	They have a clear sense of long-term direction, even in the face of short-term uncertainty.

Mikhieieva *et al.* (2022) more recently proposed an agile mindset competency profile for project leaders, which they developed using a combination of semi-systematic literature review and survey. This agile mindset competency profile for project leaders that operate in agile project environments comprises a set of 14 competencies (Mikhieieva *et al.*, 2022). Table 14 highlights the 14 agile mindset competencies in descending order of importance. The authors see mindset as “the logical pattern [screen] with which people and communities record and sort information, but also with which they produce actions” (Mikhieieva *et al.*, 2022, p. 209). They define a project leader as “a project manager, product manager, etc., simply a person who is responsible for a budget and project goals”, and dependent on the size of an organisation, people in senior management or MMgmt can be project leaders (Mikhieieva *et al.*, 2022, p. 209). Hence, critically, the 14 competencies do not apply to MMs alone. All 14 competencies were rated to be of vital importance in the study. However, honesty, communication, flexibility, readiness to learn, and reliability were the top-rated competencies, while feedback culture, tolerance to ambiguity, self-reflection, interdisciplinarity, and assertiveness were the lowest rated competencies. Although vitally important as well, conflict resolution, cooperation, emotional intelligence, and innovation fostering were middle-rated.

Table 14: Project leaders’ agile mindset competency profile (adapted from Mikhieieva *et al.*, 2022)

Competency (in descending order of importance)	Description
Honesty	Ability to demonstrate a courage to speak openly about issues as well as to regularly check own job and oneself according to specific measurable criteria in order to learn more about own performance
Communication	Ability and willingness to communicate in various ways so that entire project team can work together well
Flexibility	Ability to change one’s own opinion, when it is requested by new information
Readiness to learn	Ability to be open to new experience, have thirst for knowledge and inquisitiveness and the ability to learn from mistakes
Reliability	Ability to inspire trust by one’s own behaviour and win trust of others
Conflict resolution	Ability to tackle conflicts in projects at an early stage and to resolve them openly and objectively and also to be willing to compromise
Cooperation	Ability to engage current and future interested parties by building a trusting environment that aligns their needs and expectations and balances their requests with an understanding of the cost/effort involved

Competency (in descending order of importance)	Description
Emotional intelligence	Ability to fathom perspectives of others, develop an understanding of different personalities, viewpoints and mindsets, and recognise and acknowledge ideas of others
Innovation fostering	Ability to contribute to a safe and trustful working environment by allowing everyone to experiment and make mistakes so that each team member can learn and continuously improve the way he or she works
Feedback culture	Ability to obtain feedback and to process it constructively, but also to give feedback professionally without creating social differences
Tolerance to ambiguity	Ability to handle ambiguous situations and even chaos
Self-reflection	Ability to constantly question one's own activities, whereby one examines one's own activities and decisions objectively and critically and not interpreting the giving up of a previously represented position as a loss of face
Interdisciplinarity	Ability to understand various concepts and processes over a complete landscape of company's handbook
Assertiveness	Ability to present possible improvements as well as convince others on its necessity for goal's achievement whilst interacting with others as equals

Mikhieieva *et al.* (2022) also identified four meta-components pertaining to the agile project leader profile, which are crucial for managing agile (or hybrid) projects successfully: possession of agile project experience, possession of agile hard skills (i.e., agile frameworks knowledge), possession of an agile mindset, and agile coaching skills (i.e., ability to perform agile coaching to ensure agile delivery practices are implemented successfully). According to their findings, possession of an agile mindset is the most important meta-component for an agile project leader, followed by agile coaching skills, agile project experience, and lastly agile hard skills (Mikhieieva *et al.*, 2022). Agile mindset competency profiles are tools that can be used to manage competence development of individual agile project leaders, hence Mikhieieva *et al.* (2022) suggest further research to juxtapose agile mindset competency profiles in various cultural contexts. They argue that national and cultural inclinations may determine the degree of relevance placed on different competencies.

Overall, several aforesaid competencies match transferable competencies for IT professionals—oral communication skills, problem-solving skills, leadership qualities, and flexibility, for example (Misra and Khurana, 2017). Transferable competencies “are relevant and helpful across different situations and areas of life” and they are “essential for professional competence” (Nägele and

Stalder, 2017, p. 748). Also, many employers attach importance to transferable competencies, hence they should be included in competency frameworks (Brown, 2020).

2.7.2 Competencies for IS Middle Managers

Kevor and Boakye (2022) conducted a recent Delphi study to investigate IS competencies that are required from IS MMs operating in sub-Saharan Africa (SSA) within the present-day IS landscape. The researchers argue that extant literature on the IS competencies that are “required by the industry has shown little or no emphasis on IS competency expectations of IS employees in mid-to senior-level management positions”, and besides, the extant literature is “replete with studies done in the UK and North America but provides significantly less evidence in regions such as sub-Saharan Africa (SSA)” (Kevor and Boakye, 2022, p. 389). The study involved a panel of 56 experts occupying various job roles (e.g., IS/IT managers, system analysts, HR manager, senior managers), and drawn from multiple industries (i.e., IT, media, consulting, banking, telecommunication, education) and countries (i.e., Nigeria, Ethiopia, Ghana, South Africa). As a contribution towards addressing the aforementioned research gap, the researchers identified top ten IS competencies—out of 49 IS competencies they identified—which IS MMs in SSA are required to embody and exhibit. However, their work did not have a specific focus on agile MMs. The competencies are grouped into individual foundational competencies, IS specific competencies, and domain of practice competency (Table 15). Results of the study suggests that more emphasis is placed on individual foundational competencies as against other competencies. Individual foundational competencies refer to competencies like collaboration, problem solving, and communication, which every knowledge professional in their respective professions requires (Topi *et al.*, 2017).

Table 15: Top ten IS competencies required from IS MMs in SSA according to Kevor and Boakye (2022)

Competency Category	Rank	Competency
Individual foundational competencies	1	Ability to collaborate and work with teams
	2	Ability to be flexible and adapt to change
	3	Ability to effectively make decisions
	4	Ability to negotiate with internal and external stakeholders
	5	Ability to demonstrate leadership skills
	6	Ability to demonstrate creativity
	7	Ability to solve problems independently

	8	Ability to think critically
IS specific competencies	9	• Monitor technology trends and innovate by exploiting an emerging method or technology
		• Manage IS projects and programmes and apply broadly used project management tools and techniques
		• Develop and implement IS/IT policies
		• Ability to manage and implement IS security and risks
Domain of practice competency	10	Demonstrate an understanding of the specific business or domain processes

Besides the top ten IS competencies, Kevor and Boakye’s (2022) identified other IS competencies required from IS MMs. For example, they identified ‘Manage IS development processes, including external systems development resources and contemporary practices such as DevOps’, ‘Ability to effectively manage time’, ‘Conduct IS strategic analysis and planning’, ‘Ability to manage business relationships’, ‘Ability to communicate orally’, ‘Ability to demonstrate written communication skills through reports’, ‘Ability to demonstrate high emotional intelligence’, and ‘Ability to resolve conflicts in a unit and the organisation’. Given that the MMs involved in agile software projects are indeed operating within the IS domain so as to create and deploy solutions to meet IS needs of organisations, it can be argued that the work of Kevor and Boakye (2022) may be applicable to them. Moreover, a comparison of Kevor and Boakye's (2022) top ten IS MM competencies with the agile mindset competencies of agile project leaders (Mikhieieva *et al.*, 2022) and competencies for managing activities in ASD projects (da Costa Filho *et al.*, 2022) suggests some similarities between these sets of competencies as Table 16 indicates.

Table 16: Comparing competencies from Kevor and Boakye (2022), Mikhieieva *et al.* (2022) and da Costa Filho *et al.* (2022)

Kevor and Boakye’s (2022) top ten IS competencies required from IS MMs			Mikhieieva <i>et al.</i> ’s (2022) project leaders’ agile mindset competency profile	da Costa Filho <i>et al.</i> ’s (2022) competencies for managing activities in ASD projects
Individual foundational competencies	1	Ability to collaborate and work with teams	Cooperation	Development of team activities (interpersonal)
	2	Ability to be flexible and adapt to change	Flexibility, tolerance to ambiguity	Adaptability to change (interpersonal)
	3	Ability to effectively make decisions	Nil	Nil

	4	Ability to negotiate with internal and external stakeholders	Assertiveness	Negotiation (interpersonal)
	5	Ability to demonstrate leadership skills	Reliability	Influence (interpersonal)
	6	Ability to demonstrate creativity	Innovation fostering	Nil
	7	Ability to solve problems independently	Conflict resolution	Nil
	8	Ability to think critically	Self-reflection	Nil
IS specific competencies	9	• Monitor technology trends and innovate by exploiting an emerging method or technology	Innovation fostering, readiness to learn	Nil
		• Manage IS projects and programmes and apply broadly used project management tools and techniques	Nil	Activity planning, understanding activities, activity measurement, abstraction capacity, requirements analysis, activity decomposition, activity monitoring, technology knowledge (all technical)
		• Develop and implement IS/IT policies	Nil	Nil
		• Ability to manage and implement IS security and risks	Nil	Nil
Domain of practice competency	10	Demonstrate an understanding of the specific business or domain processes	Interdisciplinarity	Understanding activities (technical)

Additionally, ‘Ability to communicate orally’, and ‘Ability to demonstrate written communication skills through reports’, which are outside Kevor and Boakye’s (2022) top ten IS MM competencies, are similar to the ‘Communication’ and ‘Effective communication’ competencies found in Mikhieieva *et al.* (2022) and da Costa Filho *et al.* (2022), respectively. Also, Kevor and Boakye’s (2022) ‘Ability to demonstrate high emotional intelligence’ competency is similar to Mikhieieva *et al.*’s (2022) ‘Emotional intelligence’ competency. Furthermore, Kevor and Boakye’s (2022) ‘Manage IS development processes, including external systems development resources and contemporary practices such as DevOps’ competency fits into da Costa Filho *et al.*’s (2022) technical competencies, while their ‘Ability to resolve conflicts in a unit and the organisation’ competency is akin to Mikhieieva *et al.*’s (2022) ‘Conflict resolution’ competency. Kevor and Boakye (2022) highlights the importance of the ‘Ability to be flexible and adapt to change’ competency, by emphasising that IS managers tend to operate in technological environments that are fast-changing, hence they are required to not only have an understanding

and appreciation of situation change requirements, but also to undergo change themselves, or embrace changes in their organisations or job demands without resistance. Therefore, in order to satisfy new expectations, IS managers also need to adapt other competencies accordingly. Hence, it is safe to say that being able to exercise flexibility and to adapt and handle changing or disruptive situations is a vitally important competency for contemporary IS managers, such as agile MMs.

Besides benefits that MMs may gain by developing and exercising competencies to enable them function effectively in ASD projects, there is the impact that the lack of such competencies can have on their teams and projects. Dikert *et al.* (2016) identify barriers impacting ASD projects and highlight the lack of required competency in MMs (e.g., good understanding of agile principles). Deficiency in agile competence in MMs creates resistance to agile approaches, thus contributing to conflicts and frustrations within teams (Dikert *et al.*, 2016). Managers may lack the ability to coach autonomous agile teams (Stray *et al.*, 2018). In employee empowering environments, managers may feel they do not have the competencies to satisfy the demands of situation change, which may require them to work differently by substituting “facilitation for control, coaching and development for detailed specification of subordinates’ jobs” (Fenton-O’Creevy, 1998, p. 71). This issue suggests a need for targeted attention and in-depth investigation to determine competencies that are important for MMgmt to function productively and thrive in agile project environments. Indeed, the lack of skills by managers is seen as a major contributor to the failure of projects (Russo, 2021). For this reason, despite Russo’s (2021) suggestion that developers—due to their skills—are more critical to agile project success compared to MMs, the author yet acknowledges that MMgmt still plays an important role in agile delivery and recognises the supportive competencies they bring to the project environment. For instance, a high value is placed on the leadership skills of the MMs as Scrum masters because the skills “were essential to deal with daily difficulties” (Russo, 2021, p. 52:28). Findings from Russo (2021) suggest that leadership exercised by MMs in the Scrum master role is an aggregate of their knowledge of the organisation (i.e., domain knowledge), facilitation skills, and problem solving skills (Figure 7), and these constitute success factors in the agile project environment.

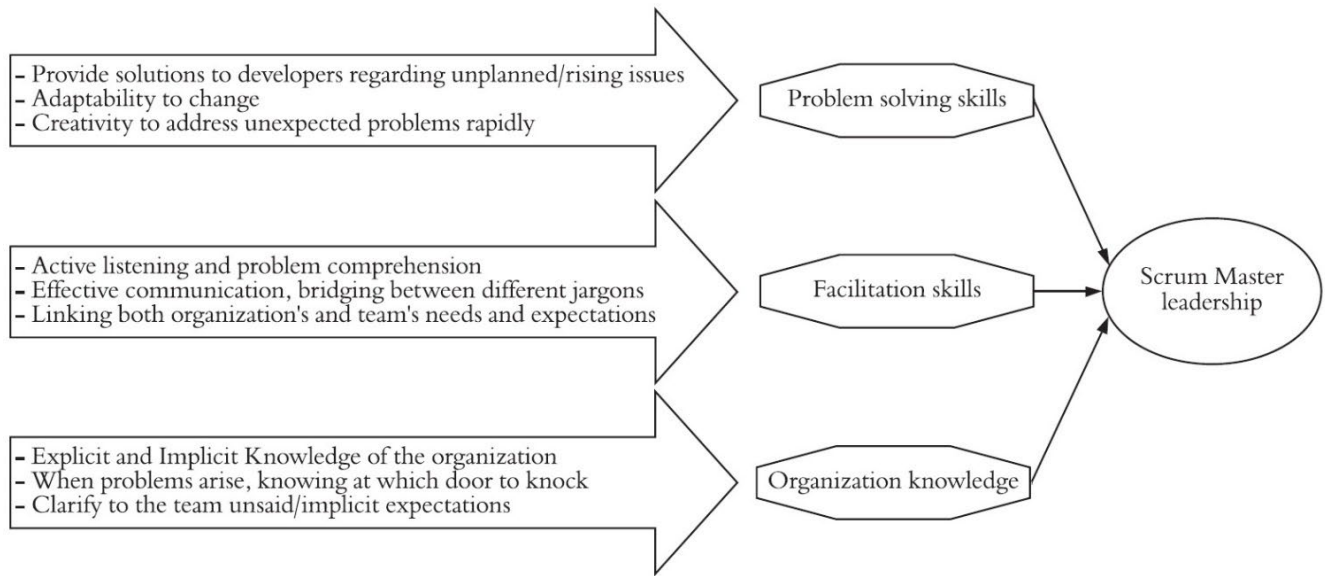


Figure 7: MMgmt competencies in the Scrum master role (adapted from Russo, 2021)

Ultimately, having empowered MMs enables successful agile project delivery. Russo (2021, p. 52:32) echoes this view asserting that “the sense of empowerment provided by the top management to the mid-management layer was a crucial success enabler. Middle managers had moral and material support to carry out their tasks”. Therefore, one should bear in mind that if MMs are to adequately support agile teams, develop and exercise their competencies for project implementation, and fully thrive in agile environments, they too need support. When organisations provide enabling environments for managers to function effectively, the managers are more likely to provide enabling environments for their co-workers to function (Fenton-O’Creevy, 2001).

2.8 Synopsis of Literature Review Findings

To the best of my knowledge, studies that have explicitly examined MMgmt in ASD project environments are minimal, particularly from a PG perspective. This present study aims to contribute to filling this research gap and exploring the nature of agile MMgmt. PG is important to deliver ASD projects that are consistent and compliant with organisational strategy and business goals. The review of the literature suggests that PG in ASD projects is under-researched. The literature also suggests there is minimal research on ASD in the Nigeria context. Existing Nigerian ASD studies point out a prevalence of traditional hierarchical culture in the region. Also, it is

arguable that small-scale agile development may be prevalent in Nigeria given the emergent nature of agile adoption in the region. In addition, the Nigerian ASD studies do not include studies on PG or MMgmt within the Nigerian ASD environment. This is a research gap. Consequently, the present study makes a contribution towards filling this gap by providing research that offers empirical insights into PG and MMgmt in ASD in the Nigeria context. PG ensures that necessary support is available to agile teams to enable them accomplish projects. This includes MMgmt support. However, the role of MMs in ASD projects is unclear, which is problematic for agile project teams. Unclear role is a risk that can adversely affect software project performance and success: it can potentially destabilise project relationships and productivity, as well as diminish the value and potency of agile delivery practice. MMs constitute important actors in ASD teams and projects; hence it becomes important to bring clarity to the role they play. Further research will help clarify our understanding regarding the nature of MMgmt involvement in PG during ASD projects. Literature suggests that unclear roles and a lack of competencies are contributing factors to project failure, and such deficiencies in the project environment are suggestive of inadequate PG. MMs often lack competencies to function effectively in agile project teams and project settings. This also creates challenges for teams. Therefore, there is a need to ascertain what competencies are pertinent for MMs to work effectively in ASD environments so as to adequately support team productivity and meet project demands. For this, an integrated set of input, personal, and output competencies would help to shed light on what constitutes a competent agile MM. In conclusion, there is a need for a targeted and theory-centric research to determine the roles and competencies of MMs in ASD projects from a PG perspective in order to help preserve team stability and project congruence for better governance and project outcomes.

Chapter Three: Research Methodology

Software engineering “is a fundamentally socio-technical domain” where “phenomena that are neither exclusively social nor purely technical” abound (Hoda, 2021, p. 3809). Qualitative and interpretive research (e.g., Heeager and Nielsen, 2013; Lappi and Aaltonen, 2017; Melo *et al.*, 2013; Wale-Kolade, 2015) has been used to investigate socio-technical phenomena in ASD practice. The application of appropriate research approaches is an essential and contributory factor in achieving research quality and impact (Dybå and Dingsøyr, 2008). Hence, this chapter describes the qualitative research design for this research in order to address the RQs—*What are the roles of middle managers in agile project governance within small-scale agile software development projects in Nigerian organisations?* (RQ1) and *What competencies are important for middle managers to function effectively in Nigerian small-scale agile software development projects?* (RQ2). The chapter presents the research process and interpretive worldview, as well as descriptions of AT (the principal theory underpinning the APGov conceptual framework), the APGov framework development process, and the case study methodology adopted in this study. The chapter also describes the data collection and analysis approaches that were deemed suitable to support the study in line with the qualitative and interpretive research tradition.

It is worth noting that the developed APGov framework was only partially applied in this study because the investigated roles and competencies of MMs only belong to the ‘Division of labour’ and ‘Tools’ components of the APGov framework, respectively. A focus on other components of the APGov framework would have been out of scope considering the RQs. Nonetheless, it is still useful to explain the various components and concepts of AT so as to facilitate use of the APGov framework in future research to investigate various aspects of agile PG activities.

3.1 Research Process

This research aimed to achieve the aforementioned Objectives 1-6 (see Section 1.2 above). To this end, the overall process of the research followed a set of 18 guidelines proposed by Atkins and Sampson (2002) for the conduct of IS interpretive case study research (see Table 17). The guidelines were developed to support an interpretive study (Sampson and Atkins, 2002) by synthesising best practices applied in interpretive research, thus resulting in a unified set of

guidelines. The guidelines are organised into five dimensions, viz., way of thinking, way of controlling, way of working, way of supporting, and way of communicating. Figure 8 illustrates the research process I followed to accomplish the research objectives, and highlights the various stages involved and guidelines (G1-G18). The Atkins and Sampson (2002) guidelines and summaries of their application in this study are presented in Appendix B. The guidelines cover key aspects of the case study research process: from defining research scope and direction in the form of RQs, choice of philosophical perspective, choice of data collection and analysis methods to trustworthiness and dissemination of findings.

Table 17: Atkins and Sampson (2002) guidelines

Dimension	Guideline ID	Description
Way of Thinking	G1	Provide an argument for why a case study is appropriate.
	G2	State philosophical stance and perspective. Take account of bias when performing data analysis.
Way of Controlling	G3	Define and use some form of quality control measures.
	G4	Ensure that the results are credible.
	G5	Determine how to draw conclusions and justify the results through the appropriate use of theory.
Way of Working	G6	Construct a clearly formulated question that describes an important IS issue or problem of interest.
	G7	Create a first cut conceptual framework.
	G8	Devise first cut case study questions.
	G9	Make explicit the research approach.
	G10	Perform a pilot case study.
	G11	Determine criteria for selecting the appropriate case and participants.
	G12	Refine the case study questions based on lessons learnt from the pilot study.
Way of Supporting	G13	Revisit the research purpose/question and modify the conceptual framework as necessary.
	G14	Choose appropriate methods for collecting data. Ensure that these are described in enough detail.
Way of Communicating	G15	Employ a systematic way to analyse the data. Ensure that these are described in enough detail.
	G16	Create a plan for the final report.
	G17	Determine how the case study findings might be transferable to other settings.
	G18	Determine how to present the findings to the academic and practitioner communities.

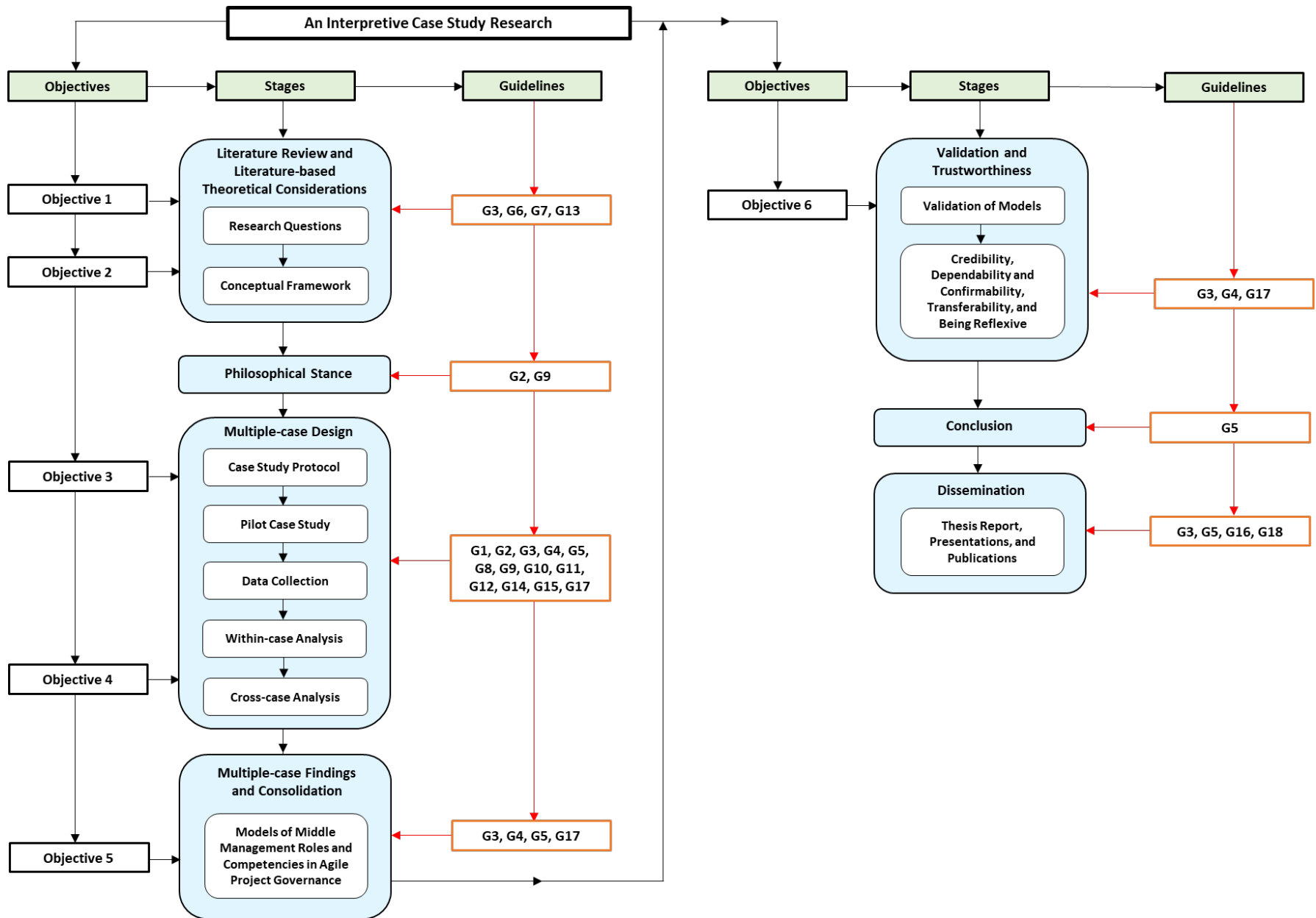


Figure 8: The research process

3.2 Interpretivism Research Paradigm

Research paradigms represent researchers' basic beliefs or worldviews that guide their methodological choices, as well as their fundamental ontological and epistemological leanings (Guba and Lincoln, 1994). Interpretivism, also regarded as a form of constructivism by Mills and Birks (2014), is a theme of knowledge that assumes reality should be studied and understood through the subjective views and interpretations of people who experience a given reality (Bhattacharjee, 2012). Interpretivism is an alternative to the positivism paradigm, and both paradigms contrast significantly in their underlying principles. Positivists assume an objective social reality which exists in more or less a fixed state, independent of the people that observe or experience such reality, and that by applying bias-free investigations and observations, bona fide scientific truth can be known (Willis, 2007). Interpretivists on the one hand embrace a subjective attitude towards the study of reality, whereas positivists on the other hand hold firmly to the belief that objectivity is the most ideal and valid lens through which reality can be studied (Corbetta, 2003; Willis, 2007). By taking such a stance, positivists tend to exclude key aspects that make up the human dimension of reality in the existing world around us, which in contrast to positivism, interpretivism embraces (Lee and Baskerville, 2003). These human dimensions include the people with lived experiences, their opinions and insights, perspectives, actions, values, and other qualitative aspects.

According to Corbetta (2003), the ontology of interpretivism is that of constructivism and relativism. Constructivism argues that reality is knowable, however, reality is constructed by those who experience it. According to constructivists, reality is a product of the perceptions, cognition and interpretations of social actors, i.e., the constructors of social reality and researchers who study it (Orlikowski and Baroudi, 1991). Because reality is constructed, it can evolve and change based on individual or community lived experiences. Relativism maintains that there are multiple versions of reality which are subject to human experiences, interpretations, perspectives, beliefs and/or culture (Corbetta, 2003). Relativists believe reality is subjective, dynamic and contextual.

Epistemologically, interpretivism is non-dualist, non-objectivist, and does not seek to uncover associated natural laws when studying an area of interest (Corbetta, 2003). Being in direct contrast with positivism, an observing researcher and the observed reality have a symbiotic relationship

(Corbetta, 2003). In such non-dualist and non-objectivist relationship, a researcher is able to examine the reality subjectively in close proximity to its observed state. A social reality that is believed to be the product of human lived experiences and perspectives would warrant a subjective epistemological approach, thus requiring a researcher's engagement to be emic (as an insider) in order to elicit and understand the views of people involved (Mills and Birks, 2014; Willis, 2007).

Methodologically, interpretivism is empathetic, inductive (Corbetta, 2003), and emic. Inductive approach begins with collecting data by eliciting information from people involved in the reality under study. Subsequently, theories, which refer to all forms of research construction (Gregor, 2006), are then proposed to interpret observed reality based on underlying occurrences, patterns and regularities that emerge from collected data (Corbetta, 2003). Interpretive research primarily entails qualitative approaches (Corbetta, 2003), which do not require the use of objective or statistical measurements, but rather the use of methods and techniques that are compatible with the subjective nature of qualitative research. However, interpretivists may also use quantitative methods/data to supplement qualitative data for subjective interpretations (Willis, 2007).

3.2.1 Justification for Interpretive Research

The RQs of this study warrant an empirical investigation of the phenomena under study. Electing an interpretive approach is most appropriate to allow me to interpret accounts and perspectives of the embedded participants in their ASD project context. This is because knowledge, practice, lived experiences, and personal viewpoints are constructed over time by the embedded participants. Therefore, to properly understand their realities, it is necessary to consider and understand individual perspectives. The interpretive approach puts me in the environment of those living the PG and MMgmt experience, thereby making it possible to obtain information that aids comprehension and interpretation of the socially constructed realities of the people involved. Orlikowski and Baroudi (1991) in their review of IS studies assert that the goal of interpretive research is to comprehend the way by which participants in a social system construct, live out, and assign meaning to their realities, and to convey how such meanings, convictions, beliefs, perspectives, and perceptions that are linked to their realities influence and shape their actions. This assertion fits closely with this research because variations are possible in the environments, realities, and lived experiences of people in ASD projects. For example, an interpretive study by

Lappi and Aaltonen (2017) investigated PG in ASD projects across three Finnish public sector organisations. The study revealed both similar and varying PG experiences. One similarity was that each project had a pre-analysis process for business case formation. However, the underlying process for setting up the pre-analysis team had varying aspects between the projects in the three organisations. The study also showed that reasons for project initiation, the demand request source, and project requirements were different for each project. Besides this, interpretivism is a well-known paradigm for IS research (Liu and Meyers, 2011; Orlikowski and Baroudi, 1991; Walsham, 1995, 2006). It is a well-known philosophical basis and perspective from which agile studies are pursued to investigate and understand the nature and state of affairs of agile-related real life phenomena (Lappi and Aaltonen, 2017; Melo *et al.*, 2013; Wale-Kolade, 2015).

3.3 Choosing a Principal Theory: Activity Theory

According to Walsham (2006), the process of choosing one or more theories in interpretive IS research is subjective; it depends on the researcher's personal experiences, background, and areas of interest. Walsham (2006) also stresses that it is advisable for researchers to elect theories that appeal to them personally and research-wise in terms of insightfulness and usefulness. In order to examine the phenomena of interest and deal with the RQs of this study, it was necessary to adopt a suitable theoretical mainstay in the form of a socio-technical conceptual framework. To develop a tailored conceptual framework for agile PG—considering the scope of this study—I required an established and tested theory for analysis that helps to unravel, interpret, and explicate human-driven and multi-dimensional activities. Activity theory (AT) 'fits the bill'.

3.3.1 Justification for Activity Theory

AT was elected as the principal theory for this study because of its efficacy to facilitate the description and analysis of activities in breadth and depth by considering different factors and aspects associated with activities (Crawford and Hasan, 2006; Foot, 2014). It has been used in various studies to identify and better understand the roles of activity actors, tools employed (e.g., competencies), and the interplay therein (Dennehy and Conboy, 2017, 2019; Li *et al.*, 2019; White *et al.*, 2016). This made AT a good choice to help answer the RQs of this study.

Also, AT is versatile—it can amalgamate with other theories. For example, studies have amalgamated AT with social capital theory (Gleasure and Morgan, 2018), institutional theory (Ogawa *et al.*, 2008), actor-network theory (Jørgensen, 2017), and structuration theory (Canary and McPhee, 2009; Nyandiere *et al.*, 2012).

PG in ASD projects is a complex and multifaceted activity that involves multiple actors, processes, mechanisms, tools, and socio-technical interactions (Lappi and Aaltonen, 2017; Lappi *et al.*, 2018). Consequently, this study demanded a flexible socio-technical theoretical framework with expansive analytical and interpretive power to aid investigation of the agile PG activity and MMgmt therein; AT lends itself to this demand (Crawford and Hasan, 2006; Iyamu, 2020; Karanasios, 2014).

Furthermore, PG is a growing field which has been examined through several theoretical lenses, but not including AT (Musawir *et al.*, 2020). As a descriptive and analytical lens for inquiry into various IS topics of interest (Forsgren and Byström, 2018; Gleasure and Morgan, 2018; Karanasios, 2014; Mwanza, 2001), the application of AT in this study to identify and better understand the roles and competencies of MMs in PG activities within ASD projects (by means of the APGov conceptual framework) has the potential to offer interesting findings and perspectives towards development of the IS field. For more than four decades, AT has been instrumental in advancing research pertaining to human activity and the contextual realities therein. It stands out as a proven research approach that has gained prominence in understanding heterogenous and complex human activities and the interrelationships between the human and non-human elements. Indeed, AT makes it possible to link the human aspects of IS with the technological aspects to form a more integrated and encompassing IS research approach (Ditsa, 2003). It can be challenging to study these human-technology interactions in IS, however, AT paves the way to overcome this challenge, which is one of the reasons it is appealing to IS researchers (Karanasios and Allen, 2018).

3.4 Understanding Activity Theory

AT is a well-known analytical theory for qualitative research, which can facilitate contextual understanding of human activities by explicating various aspects of an activity from multiple

perspectives (Foot, 2014; Hashim and Jones, 2007; Karanasios, 2014). AT has been used as a theoretical lens in ASD (Chita *et al.*, 2020; Dennehy and Conboy, 2017, 2019), human-computer interaction (Mwanza, 2001), and IS research in general (Iyamu, 2020; Karanasios and Allen, 2018). It has also been used in other fields, such as education (Jonassen and Roher-Murphy, 1999), tourism (Jørgensen, 2017), management (Jarzabkowski, 2003), healthcare (Wiser *et al.*, 2019), and construction (Hartmann and Bresnen, 2011). This suggests its usefulness and versatility regarding research in various domains.

AT has evolved through the years by drawing on the pioneering works of Vygotsky (1978), Ilyenkov (1977), Leont'ev (1978), and Engeström (1987) to become an accepted contemporary and internationalised social theory (Karanasios and Allen, 2018). Rather than detailing a historical and developmental account of AT at this point, I refer the reader to the works of Engeström (1987), Leont'ev (1978), Blunden, (2010), and Spinuzzi (2020) for such accounts.

3.4.1 Composition of an Activity

According to AT, an activity—also referred to as an activity system (Foot, 2014; Karanasios, 2014)—consists of six components depicted as intersecting nodes (Figure 9), viz., subject, object, division of labour, rules and norms, tools, and communities of significant others (Engeström, 1987, 1992, 2001; Foot, 2014). Its members (actors) share and act upon an object by performing interconnected tool-mediated actions to produce an outcome (Foot, 2014; Karanasios, 2014; Vakkayil, 2010). In Figure 9, the upper part of the triangle states that a *subject* (which may be a person or group of people) with one or more *motivations*, performs *actions*, and *operations* upon an *object* (the focus of the activity) using *tools*—physical or abstract tools (Allen *et al.*, 2011; Mishra *et al.*, 2011)—with the aim of transforming or influencing the object to produce an *outcome* (Karanasios, 2014). The lower part of the triangle in Figure 9 states that the subject follows a set *rules and norms* when acting upon the object. The subject interacts with members of the *community of significant others* when acting upon the object. Interactions with the community of significant others may influence the actions that the subject performs on the object at any given time based on the *division of labour* which informs who in the community is responsible for various tasks and the roles they play (Allen *et al.*, 2011; Foot, 2014). Table 18 further describes the six components of an activity as well as motivation, outcome, action and operation concepts.

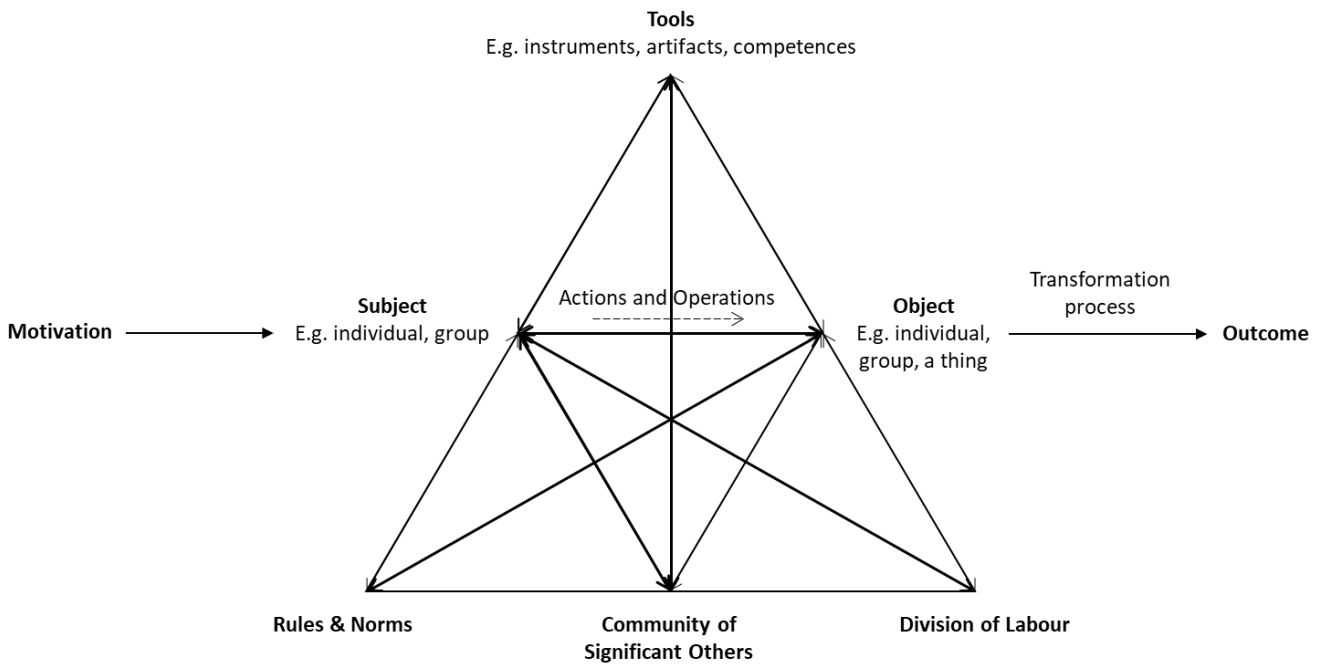


Figure 9: Composition of an activity
 (Adapted from Allen et al., 2011; Dennehy and Conboy, 2019; Engeström, 1987; Foot, 2014)

Table 18: Activity components, outcome, motivation, action, and operation

Activity Concept	Activity framing questions	Concept Description
Activity	What is the activity I am interested in?	The system comprised of people and entities that share and act upon a common focus of attention by performing interconnected tasks, using tools, and following processes and guidelines to produce an outcome.
Subject	Who is involved in carrying out the activity?	The individual or group who is undertaking the activity, and whose viewpoint informs the analysis.
Object	Why is the activity taking place?	The problem situation or focus of the activity. An object can be a person, group of people, material thing, or intangible thing. It is an objectified motive, the thing-to-be-acted-upon.
Rules and norms	Are there any cultural norms, rules, laws and regulations governing the activity?	Regulations, norms, conventions (explicit and implicit) that constrain/govern the activity. They include standards, requirements, policies, culture, principles, procedures, processes, methods, practices that the subject is expected to follow, comply with, or refer to when acting on the object. Mediates and regulates the subjects' activity and actions towards the object, and their relations with other members of the activity (community).
Community of significant others	What is the environment in which the activity is being carried out? Who are the other actors in the activity?	Individuals or groups other than the subject who have the same general object, but are distinct, and with whom the subject interacts, i.e., stakeholders.
Division of labour	Who is responsible for what when carrying out the activity and how are the roles organised?	The way tasks are divided, and roles and hierarchies structured. Mediates the subjects' relations with other members of the activity (community).

Activity Concept	Activity framing questions	Concept Description
Tools	By what means is the subject carrying out the activity?	Tools refer to artifacts, instruments, signs, symbols used by the subject (or community) to act on the object and achieve the outcome. Mediates the subjects' activity, actions, and operations, towards the object. Tools can be physical (material) or abstract (non-material, conceptual). Examples include software, competences or expertise, language, methods, documents, experience, models, protocols, procedures, policies, and frameworks.
Outcome	What is the (desired) outcome from the activity?	The outcome (expected results) of the activity, which is the transformed object.
Motivation	What is the reason or stimulus for the activity?	The reason(s) or stimuli for the activity taking place. Activities can be poly-motivational, implying that motivations behind activities can vary. Activity participants may also have different motives or reasons for their actions and involvement. This can also lead to contradictions. Motives are linked to a person or group's need.
Action	What is the conscious goal-driven deed or occurrence that is enacted on the object?	A conscious goal-driven deed or occurrence targeted at and performed upon an object in order to achieve an outcome. It is essentially a deed or occurrence that is not unconscious, routinised or automatic.
Operation	What is the nonconscious, routinised or automatic deed or occurrence that is enacted on the object?	An unconscious, routinised or automatic deed or occurrence, which is subject to conditions, and targeted at and performed upon an object in order to achieve an outcome.

Adapted from Allen et al., 2011; Dennehy and Conboy, 2017, 2019; Engeström, 1992; Foot, 2014; Karanasios, 2014; Mwanza, 2001

3.4.2 Contradictions

A fundamental tenet of AT relates to its view on contradictions, which it recognises as triggers for wider understanding and development of an activity (Foot, 2014). According to AT, contradictions refer to imbalances, disturbances, tensions, or misfits that manifest within components of an activity, between components, between different evolving phases in a given activity, or between one activity (a central activity) and a neighboring activity (Foot, 2014; Karanasios, 2014). Each of these instances correspond with four types of contradictions, which Table 19 describes. Contradictions may manifest within an activity as problems, breakdowns, clashes, ruptures, and conflicts that impact the stability of the activity (Foot, 2014, Karanasios, 2014). AT holds that contradictions at the various levels should not only be viewed as problems or points of failure that should simply be tackled, rather they should also be viewed as opportunities to learn, reflect on current ways of doing things, and take necessary measures to improve an activity system (Foot, 2014; Karanasios, 2014).

Table 19: Four types of contradictions

Contradiction Type	Description
Primary contradiction	<ul style="list-style-type: none"> • Represents internal contradictions that is found in one component of an activity system, e.g., division of labour, object, community of significant others, subject, etc. (Foot, 2014; Forsgren and Byström, 2018). • It occurs when a component contradicts itself, thus seemingly possessing two or more roles (or value systems) that conflict with each other within the same component (Dennehy and Conboy, 2017, 2019; Marken, 2006).
Secondary contradiction	<ul style="list-style-type: none"> • It occurs when a component in a central activity system conflicts with another component in the same activity system (Foot, 2014; Forsgren and Byström, 2018).
Tertiary contradiction	<ul style="list-style-type: none"> • It occurs between different developmental stages of a central activity system (Foot, 2014; Forsgren and Byström, 2018). • Such contradiction occurs between the pre-intervention stage and post-intervention stage in an activity system (Karanasios and Allen, 2013) or as Marken (2006, p. 33) puts it, “between the old way of doing things and the new way”.
Quaternary contradiction	<ul style="list-style-type: none"> • It occurs between two or more activities, which may be interdependent (Foot, 2014; Forsgren and Byström, 2018). For instance, where an intervention to address a contradiction in an activity is successful, however, the said intervention creates issues for another neighboring activity.

3.4.3 Zone of Proximal Development

An activity may experience a state known as ‘zone of proximal development’—a concept that originated from the work of Vygotsky (1978). In AT, zone of proximal development is the condition whereby an activity experiences a contradiction in a certain aspect, and consequently, an intervention (e.g., assistance, solution, or change) is needed to resolve or manage the contradiction in order to achieve a more advanced and congruous state of the activity (Engeström, 1999; Foot, 2014; Marken, 2006). Basically, zone of proximal development in AT is the state between the pre-intervention state of an activity with a current contradiction and its future post-intervention state when the contradiction has been addressed or managed (Engeström, 1999; Foot, 2014).

3.4.4 Limitations of Activity Theory

Several limitations of AT have been noted by activity theorists (e.g., Karanasios, 2014; Wiser *et al.*, 2019). Karanasios (2014) maintains that AT is a theory for analysis (which can effectively help to investigate, describe, understand, and explain the specifics of activity systems), however, AT has limited predictive power. This limitation does not impact this study because the aim is not to predict, but rather to address the ‘what’ about the roles and competencies of MMs in agile PG. Wiser *et al.* (2019) identify several limitations of AT relating to theoretical nature, abstract nature,

applicability, missing context, activity networks, scope, and time dimensions (see Appendix C for descriptions). Despite its limitations, researchers continue to use AT in various domains (Karanasios and Allen, 2018), and its adoption continues to increase (Iyamu, 2020; Spinuzzi, 2020). Theories have imperfections (Weber, 2012), therefore they are subject to regular scrutiny, evaluation, refinement and development (Spinuzzi and Guile, 2019; Weber, 2012; Wiser *et al.*, 2019). In Chapter Six (Section 6.3), I reflect on AT application in this study to help advance AT development and adoption for IS research.

3.5 Activity-Oriented Project Governance Conceptual Framework

According to Carroll and Swatman (2000, p. 237), every researcher brings “some kind of conceptual structure to the research process. It would be unrealistic to suggest that researchers could or should enter the field devoid of a framework or ideas about the important concepts in their area of interest”. Therefore, the ensuing pages describe the development process of the conceptual framework that underpins this study.

3.5.1 Conceptual Framework Development

AT can be applied by constructing subject-specific instantiations or prototypes of the AT framework to focus research inquiries (Crawford and Hasan, 2006; Karanasios, 2014; Singh, 2015). This may require incorporation of other theories, depending on research goals (Gleasure and Morgan, 2018; Jørgensen, 2017). For this study, an activity-oriented project governance (APGov) conceptual framework was developed, which more adequately supports research needs for (1) data collection and analysis (helping me to clarify and direct research efforts before, during, and after fieldwork by first identifying the agile PG activity elements to be studied from the outset), and (2) facilitating interpretation and discussion of findings to answer the RQs. The conceptual framework brings together various AT components (e.g., *Division of labour* and *Tools*) and concepts. The APGov conceptual framework is fundamentally based on AT but incorporates other theories. The framework development steps are described in the following subsection.

APGov Conceptual Framework Development Steps

The APGov framework development involved four main steps illustrated in Figure 10 below.

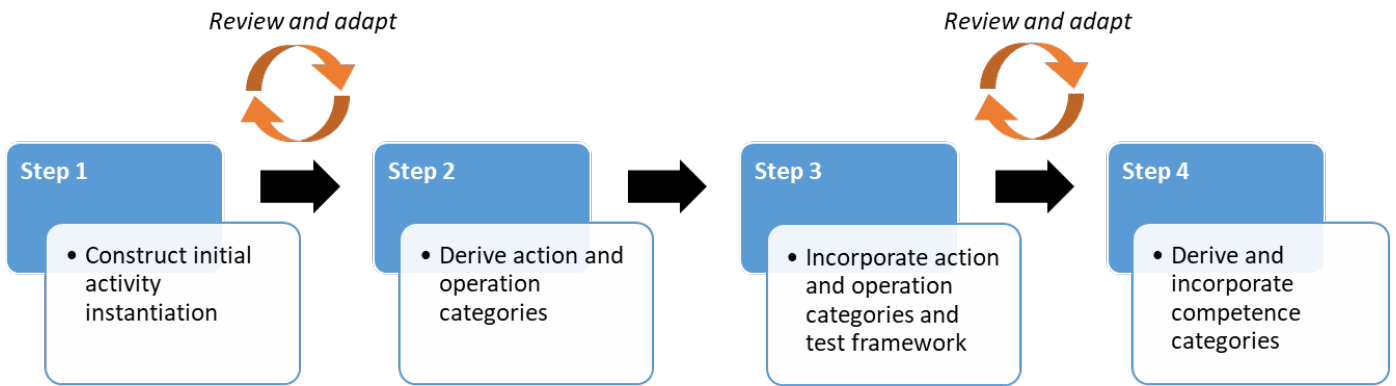


Figure 10: APGov conceptual framework development steps

Step One – Construct Initial Activity Instantiation

Following the literature, an initial instantiation (prototype) of PG in the ASD project context was constructed to depict a conceptual agile PG activity (the unit of analysis) that contains the AT components and concepts. The ASD project under study was the prime governance *object* of the agile PG activity. As the object, the ASD project is the central focus of the activity that needs to be governed and completed so as to achieve the expected activity *outcome*, i.e., expected results from the activity. Different stakeholders (agile project team, senior management, MMgmt, developers) who are considered to be actors within the agile PG activity based on the case selection criteria for this study (detailed in Subsection 3.6.4 of Section 3.6 below) were represented in the instantiation. These stakeholders were described as the activity *subject* because at any given time during the agile PG activity, they can perform specified project tasks in the activity, either individually or collectively. Another PG stakeholder that was included in the initial instantiation were customers because ASD projects must have customers who expect to derive benefits and value from commissioned projects. The customers were described as members of the *community of significant others* that interact with the subject to ensure customer requirements and expectations are satisfied. Figure 11 illustrates the first version of the APGov conceptual framework with other AT components and concepts depicted.

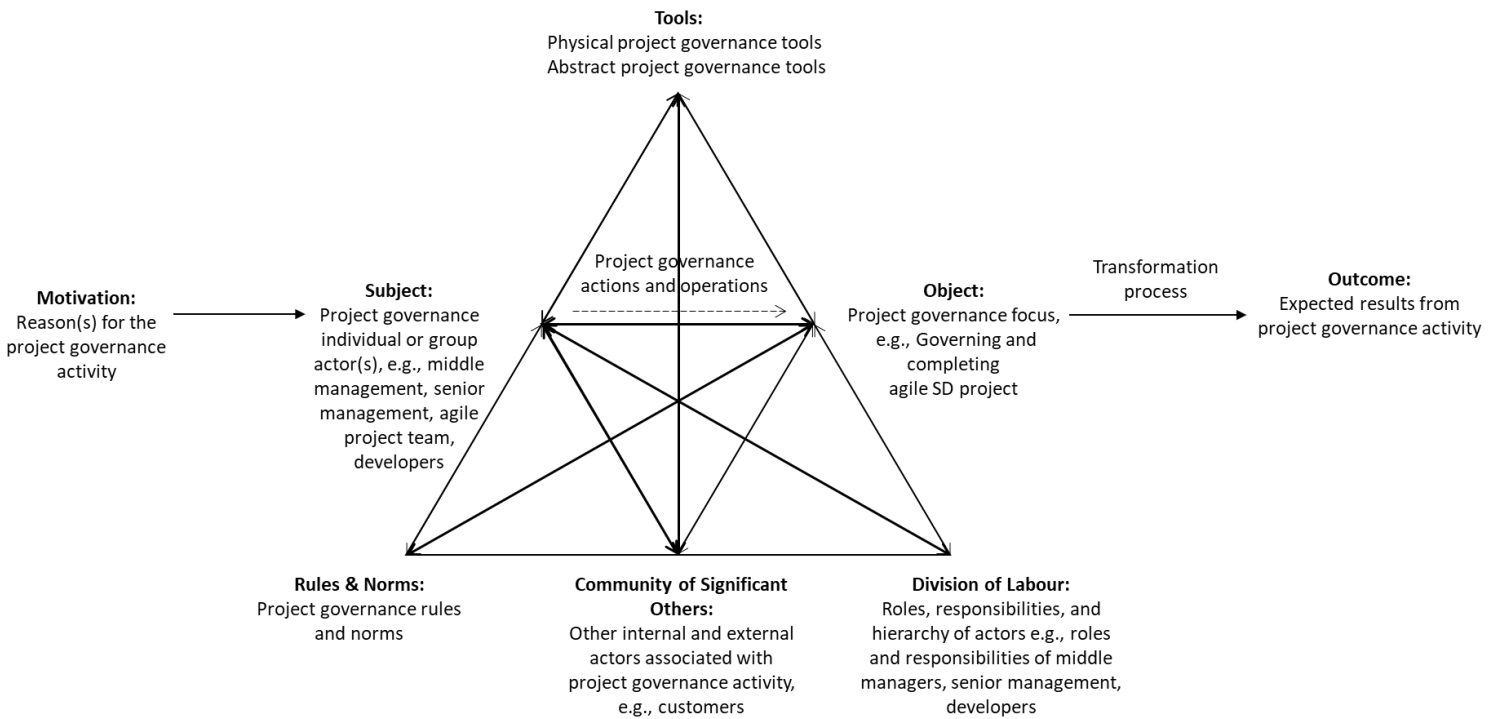


Figure 11: First version of APGov framework

Step Two – Derive Action and Operation Categories

I adopted one of Atkins and Sampson (2002)’s guidelines (i.e., G13 in Appendix B) to review and revise the initial instantiation of the APGov framework. The guideline recommends that an adopted conceptual framework should be revised and adapted as needed to fit research needs. This resulted in the need to introduce categories to serve as initial indicators to facilitate identification and analysis of PG actions and operations occurring at research sites. Consequently, four PG theories (Kujala *et al.*, 2016; Lappi *et al.*, 2018; Nyandongo and Khanyile, 2019; Vlietland and van Vliet, 2015) were used to derive possible overarching categories of actions and operations in agile PG activities.

Essentially, I brought Lappi *et al.*’s (2018) agile PG framework dimensions into the APGov framework and juxtaposed them with the other three PG theories in order to identify any other overarching actions and operations category that was relevant to the APGov framework. Hence,

seven overarching action and operation categories were derived from the four theories (see Appendix D). Kujala *et al.*'s (2016) PG framework was subsumed in the APGov framework development because it is an encompassing framework, which Lappi *et al.* (2018) used to conceptualise agile PG. Given that Lappi *et al.*'s (2018) agile PG framework dimensions—goal setting, incentives, monitoring, coordination, roles and decision-making power, and capability building—emerged from a systematic review of 42 agile studies, they were deemed sufficient to represent initial overarching actions and operations categories to produce an initial theoretical framework of agile PG in the form of the APGov framework. Nonetheless, I still chose to consider other PG frameworks—i.e., Nyandongo and Khanyile (2019) and Vlietland and van Vliet (2015)—to ascertain whether more action and operations categories could be identified. The juxtaposition suggested that the dimensions of PG from Lappi *et al.* (2018) were all-encompassing to represent initial overarching actions and operations categories in an agile PG activity. For granularity, I slightly adapted Lappi *et al.*'s (2018) framework by dividing the 'roles and decision-making power' dimension into two discrete categories (i.e., 'identification, definition, and assignment of roles and responsibilities' and 'decision-making') so as to distinguish actions and operations associated with them. I acknowledge that other actions and operations categories may emerge from future research, thereby providing opportunities to build on the initial APGov framework.

Step Three – Incorporate Action and Operation Categories and Test Framework

Building on the previous step, the overarching action and operation categories were then incorporated into the first version of the APGov framework to form a second and updated version of the framework. The updated version of the framework was subsequently used to frame PG activities reported in Lappi *et al.* (2018) and Vlietland and van Vliet (2015) and subsequently identify PG elements therein, like the examples shown under *Tools, Rules and norms*, and *Outcome* in Figure 12. It should be noted that incorporation of the action and operation categories into the framework only involved indicating that the PG actions and operations, which the subject performs on the object in the PG activity, come under those indicated in the box as shown in the figure. The box bears no particular meaning.

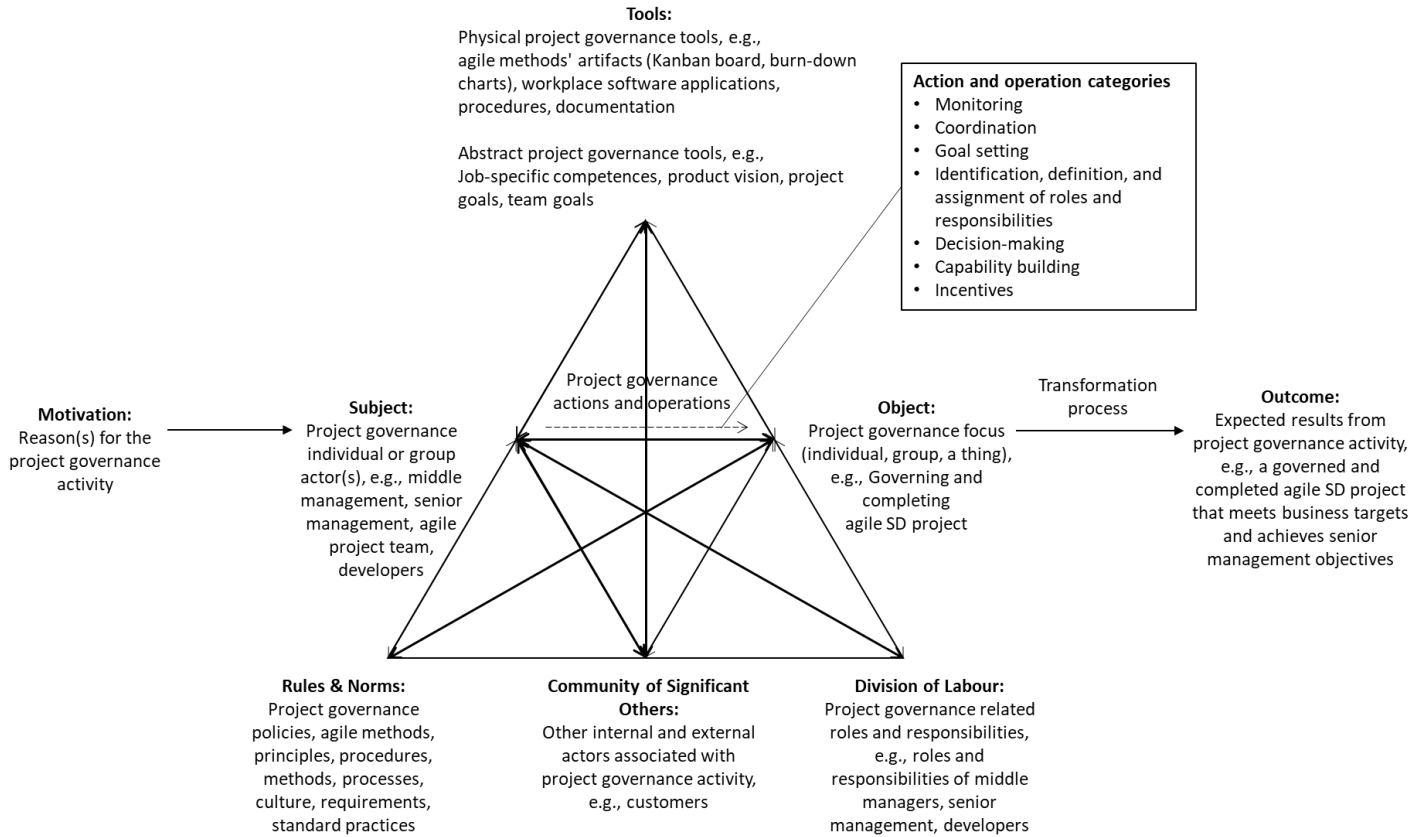


Figure 12: Second version of APGov framework

The PG activities in Lappi *et al.* (2018) and Vlietland and van Vliet (2015) were framed by asking the activity framing questions outlined in the aforementioned Table 18 (see Subsection 3.4.1 of Section 3.4 above). The framing exercise served as a sort of cursory conceptual framework validation test to ascertain and confirm the APGov framework's ability to enable organisation and description of research data (in this instance secondary data) to conceptualise PG in ASD projects.

Step Four – Derive and Incorporate Competence Categories

Further review of the APGov framework revealed the need to further breakdown the 'Job-specific competences' tool into discrete categories to facilitate identification, description, and analysis of different types of MM competencies that might be found at the research sites to address RQ2. An accepted tripartite view of competence formed the basis for the Job-specific competences' categories. Crawford (2005) proposed a competence model, which defines competence as a

composite of *input competencies* (knowledge, skills, understanding, abilities), *personal competencies* (personal characteristics, attributes), and *output competencies* (demonstrable performance). This tripartite categorisation was incorporated into the APGov framework to form the third version (Figure 13).

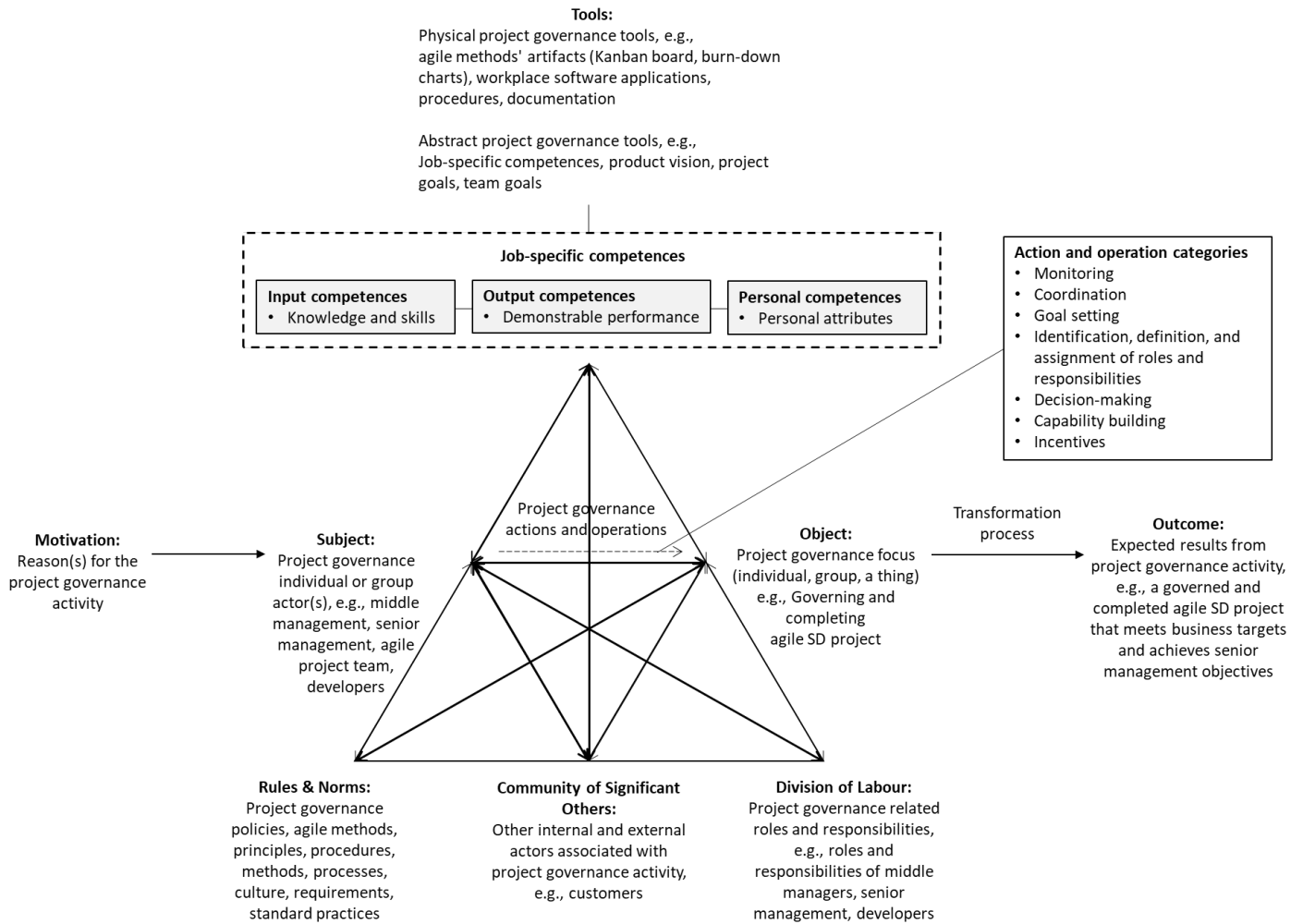


Figure 13: Third version of APGov framework

Incorporating Crawford's (2005) model allowed the determination of various categories of competencies that are important for MMs to function effectively in agile teams, and proposal of a competency profile for MMs in ASD projects. Incorporation of the tripartite view of competence from Crawford's (2005) model is appropriate because agile software projects are people-oriented,

where the competence of people involved in project delivery are critical for project performance and success (Cockburn and Highsmith, 2001). Step Four concluded the process that developed the theory-based APGov framework (Figure 13), which is composed of *Subject, Tools, Object, Community of significant others, Division of labour, Rules and norms, Motivation, Outcome, Actions, Operations, Contradictions, and Zone of proximal development*. Appendix E provides descriptions of the concepts in the framework.

3.6 Case Study Methodology

3.6.1 Research Methodologies in IS Studies

Liu and Myers (2011) report that case study research is one of the top two methodologies used in IS studies, second only to survey research. Other methodologies that follow include lab experiment, action research, and field experiment in descending preferential order. Surveys tend to be a preferred choice for quantitative studies, involving remote and distant engagement to investigate domains of interest, not necessarily requiring close engagement with study participants (Bhattacharjee, 2012; Corbetta, 2003). Lab and field experiments tend to be quantitative in nature, and in addition, experimental data is analysed quantitatively (Bhattacharjee, 2012; Corbetta, 2003). Action research was not the best option to help answer the RQs within ASD project settings because I sought to identify the roles and competencies of MMs therein, and not to change them.

3.6.2 Case Study Research

Case study research is a comprehensive, versatile, and context-specific research strategy that allows researchers to follow different paradigms to investigate phenomena in depth in their natural settings, as well as adopt different research methods, techniques, and levels of analysis (Masud, 2018). The flexibility of case study research in allowing use of diverse data collection methods makes it a powerful and effective research strategy for researchers to study and unravel complexities in dynamic research and practice fields like IS (Benbasat *et al.*, 1987). Case studies provide contextual and rich real-world insights (Dalcher, 2003; Yin, 2014), and they are popular in agile studies (Dennehy and Conboy, 2017, 2019; Lappi *et al.*, 2018). For instance, out of 42 papers reviewed by Lappi *et al.* (2018) to understand and conceptualise agile PG, 21 papers (50%) were case studies. Case study research is a well-accepted methodology for qualitative and interpretive research in the agile field (Heeager and Nielsen, 2013; Lappi and Aaltonen, 2017;

Melo *et al.*, 2013; Wale-Kolade, 2015) and IS research stream (Liu and Myers, 2011; Walsham, 1995). Walsham (1993, p. 14) asserts that “the most appropriate method for conducting empirical research in the interpretive tradition is the in-depth case study”. Case study research is recommended when prior research is limited and under-researched (Benbasat *et al.*, 1987). It is suited for practitioner-oriented studies aiming to address “practice-based problems where the experiences of the actors are important and the context of action is critical” (Benbasat *et al.*, 1987, p. 369), which applies to this study. It is also well-suited for this study because it put me in the world of the study participants living the PG and MMgmt experience in the ASD project settings, thereby allowing me to interpret the views and experiences of the participants (Walsham, 1995).

AT is commonly used as a descriptive lens in case study research to analyse, understand, and describe real life phenomena (Gleasure and Morgan, 2018; Marken, 2006; Mwanza, 2001). Hence, this research comprises descriptive case studies, as in Marken (2006, p. 36) where the “descriptive case seeks to tell what was as it was, using tools (in this case Activity Theory) to lay open the rich structure of a real-life phenomenon”. A descriptive case study (also referred to as intensive or focused case study) is employed to examine real life phenomena using a descriptive theory as a lens to generate detailed insights and in effect promote theory development (Mills *et al.*, 2010). The case studies in this study are descriptive because the roles and competencies of MMgmt in agile PG are examined using AT (by means of the APGov conceptual framework) as the descriptive lens to generate detailed insights and in effect promote theory development regarding the phenomena being examined in their natural settings. In essence, descriptive studies aim to “reveal patterns and connections, in relation to theoretical constructs, in order to advance theory development”, and a researcher’s use of a descriptive theory helps in specifying case boundaries and contributes immensely to rigour in a case study (Mills *et al.*, 2010, p. 288).

Multiple-case Design

Case studies that adopt multiple-case design involve several case studies that are conducted either in parallel or sequentially, aiming to investigate and understand areas of interest in the locales of study (Mills *et al.*, 2010). In this study, the case study design involved two parallel case studies of PG activities in ASD projects within two technology-enabled companies: HOLDCOY and BANKCOY (pseudonyms), in order to address the RQs. Multiple-case design was elected over

single-case design because with the former, a researcher is able to study phenomena in different case sites to determine similarities and unique occurrences therein, while being attentive to conditions in the study settings and the influence of such conditions and contextual factors on the phenomena under study in each case (Lappi and Aaltonen, 2017; Mills *et al.*, 2010). A multiple-case study allows for cross-case analysis (Benbasat *et al.*, 1987). The multiple-case approach provides broader picture of realities and issues in the various case organisations, which strengthens evidence that support and anchor research claims, as well as generalisability of findings (Benbasat *et al.*, 1987; Mills *et al.*, 2010). It is also preferable to employ multiple-case design when a study is geared towards description or building of theory (Benbasat *et al.*, 1987), as in this study.

I employed a case study protocol (Mills *et al.*, 2010) to facilitate planning and coordination of case study investigations in the field. It included the following artifacts:

- a) Ethics approval (Appendix F), which approved the steps and procedures for contacting, recruiting and engaging participants in the field.
- b) A participant information sheet (Appendix G), which was used to explain the nature and requirements of the study to participants, emphasising that participation was voluntary.
- c) Interview and observation consent forms (Appendix H).
- d) Interview protocol (Appendix I).
- e) Observation protocol (Appendix J).
- f) *Company Profile and Project Profile Questionnaire* for extracting company and project background information (Appendix K).

It merits mentioning that case studies with small sample sizes, as in this research, are justifiable. Robinson (2014) concurs, asserting that a small sample size of even one case study is justified when the case study has at least one function, which may include theoretical insight. In this research, the function of the case studies is theoretical insight given that data from each case has been used to identify and propose roles and competencies of MMs in agile PG through the partial operationalisation of the APGov framework. The case studies generated insights (reported in Chapter Four) regarding these phenomena.

3.6.3 Unit of Analysis

In light of the RQs and in keeping with the tradition of AT studies (Allen *et al.*, 2013; Karanasios and Allen, 2013), the unit of analysis of this study is the PG activity, which has ASD project as the prime governance object, and MMgmt as one of the activity actors. AT (by means of the APGov conceptual framework) was applied in this study to identify and better understand the roles and competencies of MMs in PG activities within ASD projects. I used the APGov framework to focus research efforts during data collection, analysis, interpretation and discussion of findings in order to address the RQs by focusing on the roles and competencies of MMs, which relate to the *Division of labour* and *Tools* components of the framework, respectively. As an activity, PG in ASD projects may involve various project tasks and multi-level interactions between actors, and may span across intra- and inter-organisational boundaries (Lappi and Aaltonen, 2017). The project work efforts and interactions by different people in the PG activity usually rely on various competencies, work-enabling artifacts, processes and cultural norms, and other people that act in various capacities with varying degrees of influence and power to effectively support and orchestrate the end-to-end governance and delivery of the project. Applying AT (Allen *et al.*, 2013; Foot, 2014; Karanasios, 2014; Mwanza, 2001) to this narrative, the people that perform project work at any given time in the PG activity are the *subject*, while the project being the ultimate purpose and objectified motive of the activity is the *object*. The competencies and work-enabling artifacts, processes and cultural norms, and role organisation and responsibilities are all mediators of the PG activity i.e., the *tools, rules and norms*, and *division of labour*, respectively. The other people and entities in the environment where the PG activity is being carried out are the *community of significant others*. Although the six activity components and their relationships can be analysed separately, “the greatest meaning and knowledge can be generated” when they are analysed collectively as a single unit of analysis (Karanasios, 2014, p. 6).

3.6.4 Case Selection

A case selection criteria was defined for choosing appropriate case settings and participants that meet contextual specifications of the study. Choosing information-rich and relevant research sites is essential for gaining thorough understanding of the experiences of participants regarding the phenomena being investigated (Atkins and Sampson, 2002). The selection criteria are as follows:

1. The case study organisations should be technology-enabled companies that have in-house ASD project teams, or those that use agile methods for software projects.
2. The companies should be situated in Nigeria.
3. The organisational structure in the companies must include MMgmt level.
4. The agile methods should have been used in the companies for at least one year.
5. The agile methods used in the companies can be known agile methods, a combination of agile methods, a uniquely created agile method, or agile methods with modifications that has been tailored to meet the needs of the respective companies.
6. Participants from these companies must have at least one of the following:
 - a) ASD experience
 - b) Experience using agile methods in IT projects
 - c) Experience managing and/or working with agile IT teams.
 - d) Involved in making decisions that promotes the use of agile methods in the companies.
7. ASD projects to be studied should be small-scale and can be underway or recently completed.
8. Participants should include senior management, MMgmt, and lower-level workforce (LOW) to capture a variety of perspectives.

Pilot Case Study

In keeping with Atkins and Sampson (2002) guidelines, a pilot case study was undertaken in January 2020 as a dry run to review and fine-tune the case selection criteria, interview protocol and observation protocol before commencing the actual two case studies. It provided an ideal low-risk environment (Sampson and Atkins, 2002) to evaluate and finalise my data collection strategy for the ensuing fieldwork. I identified a pilot study participant—an agile practitioner who had circa five years' experience using agile methods and worked in a technology-enabled organisation in MMgmt—suggested by academics in my research network. The participant and case organisation were selected using the case selection criteria above. It was considered unnecessary to collect further information about the participant and pilot case organisation because the purpose of the pilot study was not to collect data on the phenomena under study for analysis in relation to the pilot case, but rather to ascertain the viability of the data collection procedures and instruments and obtain critical feedback.

The pilot study participant was asked the set of questions in the interview protocol in the form of a pilot interview. As regards to the observation protocol, the participant was asked to review the list of behaviours and aspects that I intended to observe in the actual case settings, and confirm if he felt they were adequate from the perspective of an observer. The pilot interview and observation discussion were not recorded, however, I took some notes to record the participant's feedback in order to make necessary adjustments to the data collection strategy and instruments. The pilot study was a unique opportunity to find out what was satisfactory or deficient about the interview and observation protocols, and also what should be removed or added accordingly. The pilot study engendered the following outcomes:

1. The pilot study confirmed the questions were tactful to avoid causing discomfort or offense.
2. Questions were revised to improve the wording to enable easier comprehension by participants.
3. Interview questions that were deemed irrelevant were removed because the data they would elicit would not help to address the RQs, rather they would obtain excessive unnecessary data.
4. The pilot interview lasted for 90 minutes, which was used as a baseline to estimate the duration of an interview session for the actual case study interviews.
5. Additional interview questions, which were deemed relevant to elicit data to help address the RQs, were added. Examples were 'What personality traits and attributes should middle managers possess in order to work effectively in agile IT projects? Please explain with specific examples.' and 'Why do you carry out coordination in your agile IT project?'
6. Observation protocol was adjusted by removing and adding possible aspects that needed to be observed so as to shed light on PG and MMgmt dynamics in the target case study setting.
7. A *Company Profile and Project Profile Questionnaire* was developed to cover questions about company and project background.

Sampling

Sampling is the selection of a small number of representative study participants from a larger population of interest for data collection (Baltes and Ralph, 2022). It is vital for interpretive research because selection of poor research settings can engender data collection that is problematic, misplaced, and erroneous, which can compromise theory development (Baltes and Ralph, 2022). The case organisations and participants in this study were selected using non-probability (non-random) sampling, which is an accepted practice in software engineering research

(Baltes and Ralph, 2022). The non-probability sampling techniques I employed were convenience and purposive sampling.

Firstly, I applied convenience sampling, which is based on selecting study participants because they are accessible, available, or less difficult to study (Baltes and Ralph, 2022). I identified a sample population of companies that I could have easy access to from within my Nigerian professional networks, including those in my LinkedIn professional connections. I considered companies that were more likely to be interested in the study and willing to participate based on pre-existing relationships with them (e.g., previous employment relationships, professional interactions). I employed this strategy to facilitate quick recruitment of companies considering the limited time period of a PhD study, albeit this could have also biased participants' opinions regarding the research subject. A disadvantage of convenience sampling is that it threatens research generalisability, however, it is still a quick and inexpensive sampling strategy that does not require a sampling frame (e.g., for a software case study, a researcher does not need to have a list of all software companies in a given region in order to choose a particular software company as the case study site) (Baltes and Ralph, 2022).

Secondly, I applied purposive sampling to select organisations and participants that satisfied the aforementioned case selection criteria to address the RQs. When a researcher is intentionally selecting suitable study participants based on some defined rationale, criteria, categories, or strategy in a non-random manner, the researcher is adopting purposive sampling (Baltes and Ralph, 2022). Regarding advantages, purposive sampling allows researchers to apply expert judgement (Baltes and Ralph, 2022), such as leveraging theoretical and practical understanding of the research area to determine the right companies, projects, and participants, which is what I did in this study. Baltes and Ralph (2022) also assert that purposive sampling ensures selected participants are aptly representative of the larger population of interest, and a sampling frame is not required. However, the authors note that it is an opportunistic and subjective sampling strategy. I applied the case selection criteria to the identified convenient companies to further identify companies that satisfied the selection criteria, which led to selection of two Nigerian companies. Also, my application of purposive sampling entailed selecting participants that represented three categories of participants for data collection: senior management, MMs, and LOW that performed core tasks in the lower

echelon of the organisation. I verified that the companies satisfied the case selection criteria through online research (i.e., checking company websites and LinkedIn profiles) and my interactions with contact persons in each company.

Overview of Case Organisations and Participants

Fieldwork was performed in the two companies for two case studies, viz., Case study 1 (CS1) and Case study 2 (CS2). The organisational context of both companies were similar because they were Nigerian financial companies that had fairly hierarchical management structures, and used a mix of agile and traditional practices. Although both companies have been using agile methods for several years, they were still undergoing agile transformation evidenced by a culture of specialisation in teams (Nerur *et al.*, 2005) and use of project manager roles (Shastri *et al.*, 2021). Table 20 below summarises profiles of the two case organisations. Details of participants from each company are summarised in Appendix L. In the following pages, the background overviews of the two case organisations and participants are presented.

Table 20: Profiles of case organisations

Company Aspect	HOLDCOY	BANKCOY
Company type	Fintech holding company with five divisions (operating companies)	Microfinance bank
Year established	2008	2008
Industry	Technology, financial and banking services	Financial and banking services
Organisational structure	Hierarchical and divisional organisational structure with MMgmt	Hierarchical organisational structure with MMgmt
Geographical distribution	Multiple countries with headquarters located in Lagos, Nigeria	Multiple branches in Nigeria
Global workforce	142	> 1000
Years using agile methods for software development	Eight	Three
Project studied	ASD project involving bespoke development of a software solution to be used by financial services providers for their customers' inter-banking services	ASD project involving bespoke development of a solution that allows customers to transfer funds from other banks to their BANKCOY bank accounts
Project status at the time of data collection	Ongoing	Completed
Project duration	Two and a half years	9 weeks; between April and July 2019

Company Aspect	HOLDCOY	BANKCOY
Agile methods used for project delivery	Scrum, DSDM, and Kanban principles and practices. Practices included daily Scrum meetings, weekly/biweekly sprints, sprint planning, sprint reviews, monthly retrospectives, and ‘home-grown’ approach, such as Monthly Performance Review (MPR) sessions	Scrum and Kanban principles and practices. Practices included daily stand-up meetings, sprint planning, monthly sprints, sprint reviews, and retrospectives
Agile project team	<ul style="list-style-type: none"> • TECHCOY agile project team was the team executing the ASD project under examination • Comprised of thirteen (13) people: one senior manager, three MMs, and nine LOW • Comprised of specialised sub-teams • Co-located and cross-functional • Comprising mostly junior developers with limited competency and industry domain knowledge • Head of Technology and Scrum master (a MM in the team) is a senior developer 	<ul style="list-style-type: none"> • BANKCOY agile project team was the team executing the ASD project under examination • Comprised of twelve (12) people: one senior manager, six MMs, and five LOW • Comprised of specialised sub-teams • Co-located and cross-functional • DevOps Lead (a MM in the team) is a senior developer

First Case Organisation

The case organisation for CS1 was HOLDCOY; a Nigerian fintech company that was established in 2008. The company was selected because it satisfied the aforementioned case selection criteria which was defined to aid case and participant selection. The company operates in the technology, banking and finance sectors as an IT software and services company with a core focus on software solutions that enhance service delivery between businesses and their customers. The company provides specific products for external customers by developing bespoke software and providing support services for software products. HOLDCOY’s corporate customers include banks and other financial services providers. It has in-house software development teams to support the operations of the organisation by carrying out their own bespoke development, as well as customising software purchased from outside sources. The company implements projects as a strategy to build and release mission critical software solutions for customers in Africa. It has five divisions, and several functional areas (e.g., Operational Excellence team, Network infrastructure and security team, Office admin team, Graphics & design team), which provide shared services to all the divisions. The company characterised itself as involved in ASD. It has a hierarchical and divisional organisational structure that includes MMgmt (see Figure 14 for organisational structure diagram). As at the time of data collection it had used agile methods to implement and govern software projects for eight years.

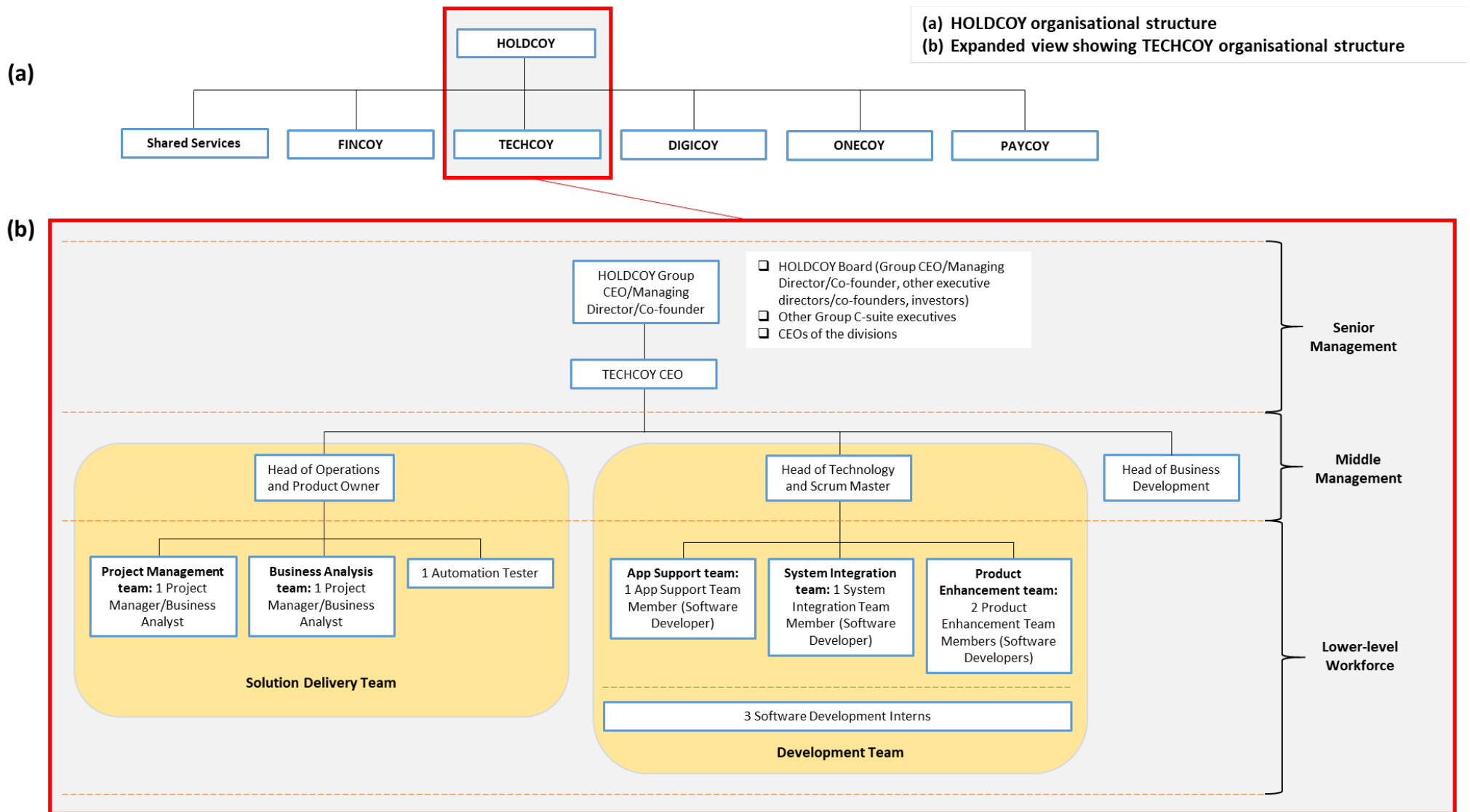


Figure 14: Case study 1 organisational structure

The research in HOLDCOY was limited to analysis of the PG activity and MMgmt in one of its divisions: the TECHCOY division, which was the agile project team executing the ASD project under examination. As a division, TECHCOY focuses on developing innovative software solutions to optimise inter-bank transaction processing services through multiple channels. The division's customers (clients) include banks and other financial services providers. The ASD project under examination (in which PG was practiced) involved the development of a software solution to be used by financial services providers for inter-banking services to their customers. This project had been ongoing for two and a half years. The project used Scrum, Kanban, and DSDM principles and practices in its project delivery with modifications tailored to suit the company. Participants from the company mentioned that the stated agile methods were used in their SDLC during project delivery. However, they did not expressly state for instance that they used 'Scrumban' as a distinct project management framework. Hence, I presented the agile methods as they relayed it. The TECHCOY agile project team performed agile ceremonies, such as daily Scrum meetings in weekly/biweekly sprints, sprint planning, sprint reviews, and retrospectives (which were formally done on a monthly basis). They also performed MPR sessions, which are used for monthly goal setting and reviews for the team. As at the time of data collection, HOLDCOY had over 140 employees situated in multiple countries, with its headquarters in Lagos, Nigeria, which is where all participants were located during the study.

The TECHCOY agile project team was co-located and cross-functional, comprised of 13 persons (ten full-time employees and three interns), which included three MMs: Head of Operations (P1), Head of Technology and Scrum Master (also a senior software developer) (P6), and Head of Business Development (P7). It was led by a divisional chief executive officer (CEO) (P9), who is not a MM but a member of HOLDCOY's senior management, which includes the Board, Group C-suite executives, and CEOs of the other divisions. The agile project team comprised of several sub-teams. Although the TECHCOY agile project team followed the 'whole-team approach' and operated as one team, the members belonged to respective sub-teams. The Project Manager and Business Analyst belonged to both the project management sub-team and business analysis sub-team. Developers in the agile project team were mostly junior-level developers who had limited competency and industry domain knowledge. This was a major concern in the agile project team.

The developers were not competent to the point where they could perform their tasks unsupervised, hence MMgmt closely monitored the project (using code reviews for example) to ensure the quality and integrity of software outputs were not flawed. The agile project team spent project time travelling between their onsite office and offsite customer offices in order to collaborate with the external customer teams and implement project outputs in customer environments.

Second Case Organisation

The case organisation for CS2 was a Nigerian microfinance bank; BANKCOY. The bank was established in 2008. The company was selected because it satisfied the aforementioned predefined criteria for case and participant selection. The company operates in the banking and finance sector. It implements internal software projects to build and release business critical applications for financial services it offers to its customers in Nigeria. The bank characterised itself as involved in ASD for its IT services. As at the time of data collection, it had used agile methods for software project implementation and governance for three years. It uses technology and agile methods to support its business operations for providing financial services to its corporate and non-corporate customers. The bank has a hierarchical organisational structure, which includes MMgmt level. As at the time of data collection, BANKCOY had a workforce of over 1000 employees spread across various branches in Nigeria, including an IT team of 40 staff that provides various IT services, such as in-house bespoke software development, IT infrastructure and networking services, and IT helpdesk services to support the operations of bank. The IT team is led by a Chief Information Officer (CIO), who is supported by seven MMs. The bank has its headquarters in Lagos, Nigeria, which is where all participants were located during the study.

At the time of data collection, BANKCOY had completed an ASD project where PG was practiced. This was the project under examination in CS2. The BANKCOY project was an internal ASD project to build a solution that allowed customers to transfer funds from other banks to their BANKCOY bank accounts. It was completed in nine weeks in 2019—between April 2019 and July 2019—through monthly sprints. The project used Scrum and Kanban principles and practices in its project delivery with modifications tailored to suit the company. The BANKCOY agile project team performed agile ceremonies, such as daily stand-up meetings, sprint planning, monthly sprints, sprint reviews, and retrospectives. The agile project team was co-located and

cross-functional. It comprised of 12 full-time employees, which included the CIO (P21) and six of the seven MMs: Project and Change Coordinator (P11), E-channels Manager (P12), DevOps Lead (also a senior software developer) (P13), IT Operations Manager (P14), Information Security and Assurance Lead (P16), and Head of Service Delivery (P18). Other members of the BANKCOY agile project team were part of the lower-level work-force (LOW): Enterprise Solution and Service Desk Lead (P15), Senior E-channels Officer (P17), IT Application Administrator (P20), Database Administrator (P19), and Information Security Officer. The Information Security Officer did not participate in the study. Figure 15 illustrates the organisational structure of BANKCOY's IT department. The CIO (P21) is not a MM; he is part of senior management. The BANKCOY senior management team includes the Board; comprised of CEO/Managing director, other directors, investors, and C-suite executives. Although the BANKCOY agile project team followed the 'whole-team approach' and operated as one team so as to deliver on the ASD project, the various team members belonged to respective sub-teams in the IT department.

It is worth mentioning that the MMs were part of the agile project team in each case organisation. The three MMs in HOLDCOY and six MMs in BANKCOY—all senior management direct reports—were the people officially recognised by senior management in each company as the MMs in the respective agile project teams based on each company's organisational structure.

A study to determine the agile maturity levels of the two organisations was not conducted. The use of agile maturity models tends to involve eliciting responses from participants using dedicated and sizeable questionnaires (Ozcan-Top and Demirörs, 2013). An agile maturity study would not have been feasible within the PhD timeframe due to potential complexities in preparation and execution, which would have impacted on research efforts aimed at addressing the RQs. However, a cursory determination of each organisation's agile maturity level was made using Patel and Ramachandran (2009)'s 5-level AMM and collected data. Therefore, the maturity level of HOLDCOY was determined as Level 3 (Defined) because of maintenance of customer relationship practice, coding and testing practice, coding standards, collective code ownership, refactoring, frequent releases, code reviews, team collaboration, experienced developer (P6) supporting and working alongside other developers to complete tasks, continuous integration and continuous delivery practice, and use of user stories. However, there was no indication of structured risk assessment practice.

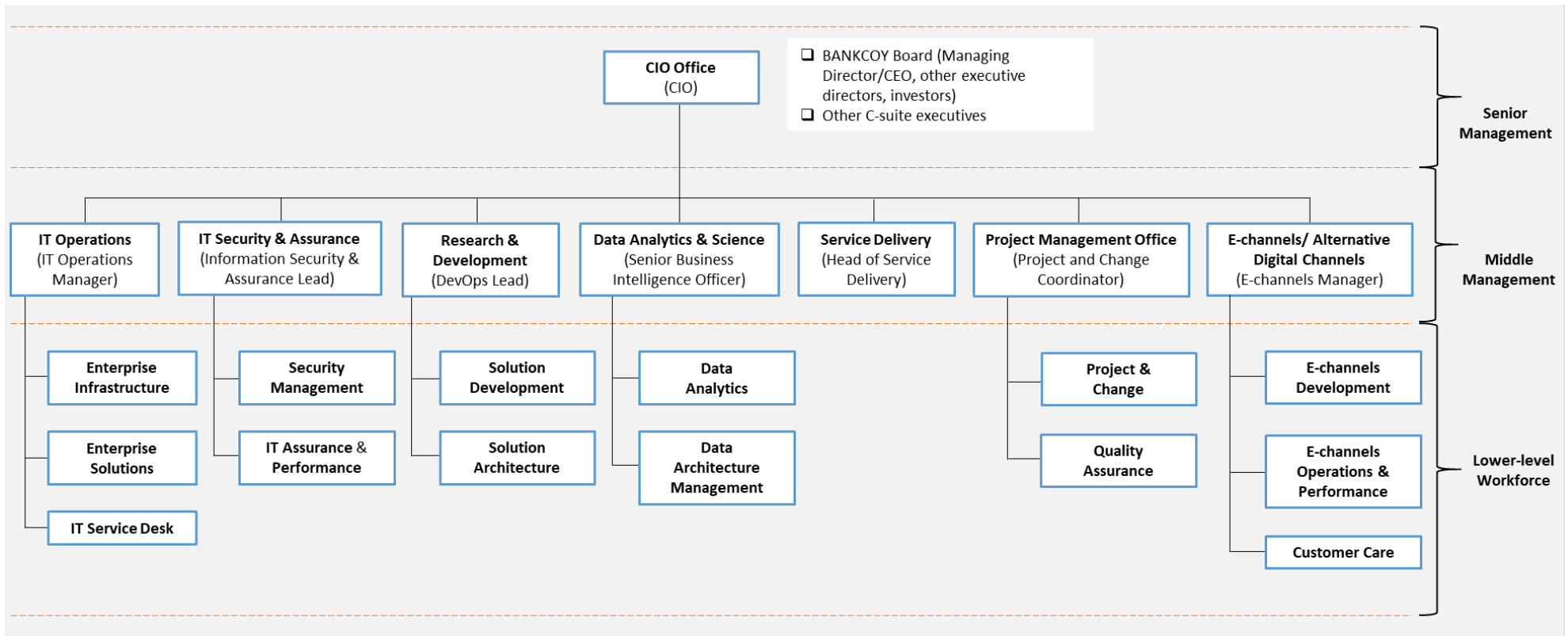


Figure 15: Case study 2 organisational structure

Regarding BANKCOY, the agile maturity level was determined as Level 2 (Explored) because their ASD process is repeatable and defined. The organisation also has a release and deployment management policy, which defines how the release management life cycle of software products is performed and how it interacts with other SDLC processes, such as change management and configuration management. Although there was no indication regarding their use of user stories for software project delivery, BANKCOY practices sprint planning (whereby requirements and tasks are prioritised in a backlog and task timelines are estimated) and release planning.

The remaining chapter sections describe the data collection methods and analysis approach employed in the study. Figure 16 summarises the data collection and analysis sequence.

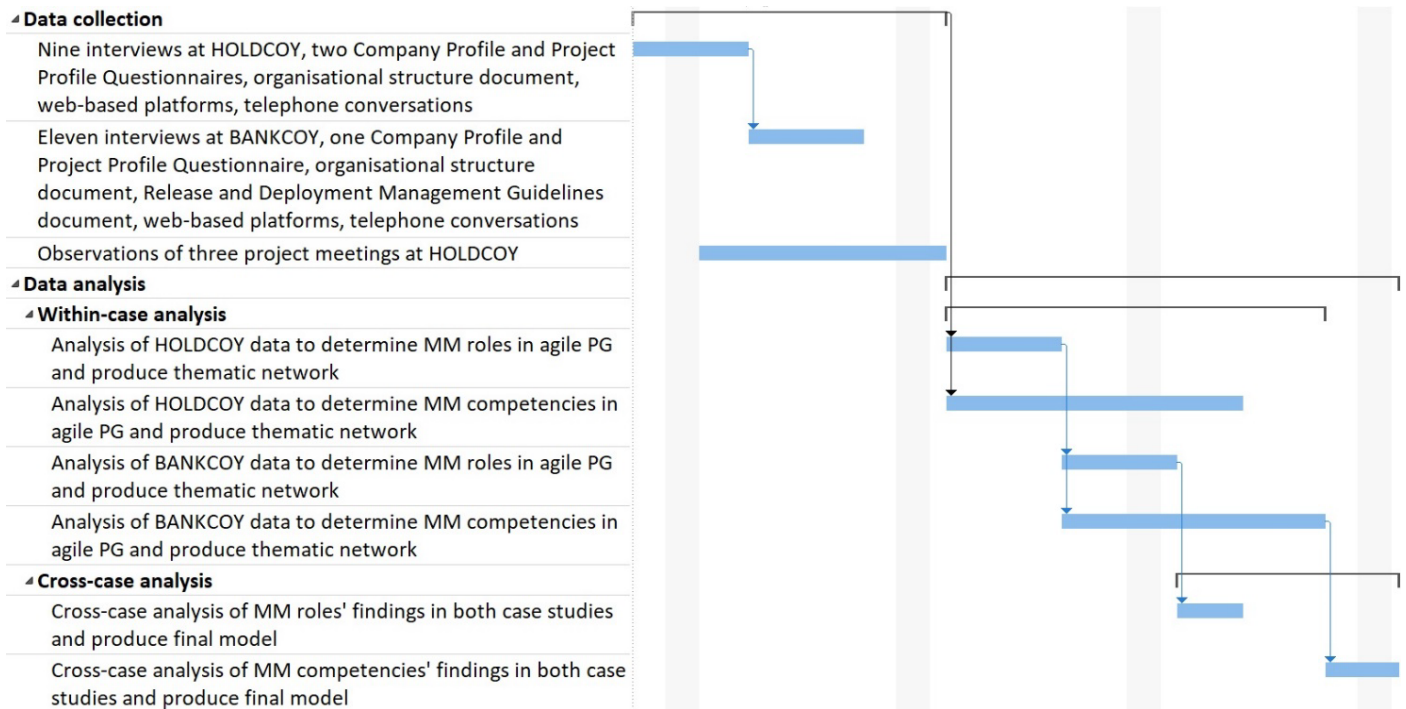


Figure 16: Data collection and analysis sequence

3.7 Data Collection

Fieldwork was conducted over four weeks in the two case studies: between February and March 2020. Due to the COVID-19 pandemic, fieldwork was reduced to four weeks. Nonetheless,

fieldwork can be completed in a short period for an interpretive IS study, as in Ponelis (2015) where data collection was completed within four weeks. Data was collected using semi-structured interviews, observations, company documents associated with PG and MMgmt in the case organisations, and questionnaire to collect company and project information. Bhattacharjee (2012) and Walsham (2006) encourage the use of multiple data collection methods for interpretive studies. Walsham (2006) recommends using observations and internal documents to supplement interview data, including online data sources, such as websites and emails. Besides the formal interviews and observations, I interacted with participants using instant messaging, email, and telephone, and also referred to company websites and LinkedIn profiles for information. Appendix L summarises the various data sources, which were used to obtain background information, corroborate findings, and strengthen research credibility (Lincoln and Guba, 1985).

Prior to the start of data collection in the field, a contact person in each case organisation was sent copies of the participant information sheet, interview and observation consent forms, and *Company Profile and Project Profile Questionnaire* to inform participants of the research essentials. The contact person in HOLDCOY was the Group CIO (P4), while that of BANKCOY was the CIO (P21). I arranged data collection kick-off meetings with the contact persons to finalise the list of interviewees, as well as project meetings that would be observed. I was introduced to the agile project teams in each case organisation by the contact persons. Throughout the fieldwork, the contact persons helped to coordinate the internal interactions and schedules to support the data collection activities in their respective organisations.

3.7.1 Interviews

I employed face-to-face and online semi-structured in-depth interviews to obtain accounts from participants regarding PG and MMgmt experiences in the two cases. Interviews were necessary to elicit information from participants because they help to probe for more details as needed, which may reveal interesting insights (Bhattacharjee, 2012). They are a means to acquire deeper understanding and perspective about interview topics from participants' viewpoint. Interviews are used in research relating to varying philosophical assumptions, including interpretive research (Orlikowski and Baroudi, 1991; Walsham, 2006). Semi-structured interviews are common in interpretive studies (Melo *et al.*, 2013; Lappi and Aaltonen, 2017; Orlikowski and Baroudi, 1991),

and in case studies (Dennehy and Conboy, 2019; Karanasios and Allen, 2014; Lappi and Aaltonen, 2017). Semi-structured interviews allowed for flexible interactions with the study participants (Lappi and Aaltonen, 2017), which allowed them to express their views without restriction.

I produced the interview protocol comprising semi-structured interview questions to serve as frame of reference that guided the interview sessions focusing on the agile PG activities. The interview questions were formulated based on the RQs, as well as the APGov framework. Aligning the interview questions with the RQs and the APGov framework was important to ensure that (a) the interview questions were being formulated correctly, (b) the right interview questions were being asked, and (c) information was being elicited from the right people in the study. The questions were asked in the context of the PG activity and ASD project under study in each company. When responding to various questions, interviewees were encouraged to provide specific examples of actual instances from their PG activity and ASD project to buttress their statements. Occasionally, interviewees would digress and talk about matters regarding other topics, however, I made effort to ‘pull them back’ and urge them to focus on the interview topics and ASD project of interest.

Interviews were the main forms of data collection in this study due to the volume and richness of data obtained from various participant accounts. Twenty interviews were conducted in English involving three members of senior management, ten MMs, and seven members of LOW so as to obtain a variety of perspectives regarding the domains of interest under investigation. Each interview was digitally recorded. The interviews essentially involved several steps, which are detailed in Appendix I.

I used P1 to P21 to indicate the interview participants. In HOLDCOY, nine participants (P1-P9), which include seven TECHCOY project team members (P1-P3, P5-P7, P9), were interviewed with an average interview duration of 80 minutes. This included eight face-to-face interviews (P1-P8) and a virtual interview (P9) that was conducted using the GoToMeeting software. In BANKCOY, 11 project team members (P11-P21) were all interviewed face-to-face with an average duration of 50 minutes, and they were asked to reflect on events that transpired during their completed ASD project when responding to questions (Lappi and Aaltonen, 2017). Details regarding the interview sample population and durations are summarised in Appendix L.

3.7.2 Observations

Observation is a known data collection method for qualitative research and case study research (Ciesielska *et al.*, 2018; Karanasios and Allen, 2014), as well as interpretive research (Orlikowski and Baroudi, 1991; Walsham, 2006). Observations are instrumental for discovering subjective and subtle feelings, opinions, behaviors, and actions in natural settings (Benbasat *et al.*, 1987). Using a variety of data collection methods can help provide richer insights and strengthen research evidence (Bhattacharjee, 2012; Walsham, 2006).

I performed face-to-face observations of project meetings and of agile PG practices in-situ in HOLDCOY. I developed and employed an observation protocol (see Appendix J), which indicated possible behaviours and aspects to be observed. These behaviors and aspects served as a guide to help focus the observations and understand the PG and MMgmt dynamics in the observed case setting. The observation protocol was useful for recording observed occurrences. For the observations, I employed the direct non-participant observation approach (Ciesielska *et al.*, 2018) and I took up an observer-as-participant (or outside observer) role (Gold, 1958; Takyi, 2015; Walsham, 1995). In the observer-as-participant role (a) the researcher engages in direct non-participant observations, observing the social actors in their activities without taking part, (b) the researcher's identity is known to the social actors, and (c) it involves limited interactions with social actors (Gold, 1958; Takyi, 2015). This approach was elected because by employing it, social actors tend to view the observer as an impartial actor, thereby encouraging them to be open; acting freely and engaging genuinely in the activity of interest, which according to Walsham (1995) is a key benefit. However, a drawback with this approach is the limited access and invitation: an observer may not have access to certain confidential activities and conversations due to the 'outsider' status, hence the observer may be absent in many instances (Walsham, 1995). Also, there is the major drawback that observer-as-participant role tends to limit a researcher's depth of engagement and exposure to the realities and happenings in the natural setting being observed (Gold, 1958; Takyi, 2015). The 'brief contact' and 'detached' nature of this observer role may limit the amount of observational data a researcher can obtain, as well as understanding of the phenomenon under study—poor understanding may result in misunderstandings and misconceptions (Gold, 1958; Takyi, 2015). In this study, I addressed these observational issues by

observing several project team meetings for considerable periods of time. This is in addition to rich data obtained from in-depth interviews conducted, which the observations supplement.

Three project meetings were observed in HOLDCOY for approximately 8 hours in total duration. The project meetings, which involved the agile project team, were one daily Scrum meeting (30 minutes observation), one weekly sprint planning meeting (observed for 3 hours and holds every Monday), and one Monthly Performance Review (MPR) executive session (4 hours 40 minutes observation). The purpose of the MPR is for senior management to review, provide feedback, and grade the performance of TECHCOY (as a division) and other divisions in the company. In the MPR sessions, which holds on the first Saturday of each month, senior management reviews the performance of agile project team as a whole, as well as the performance of sub-teams therein and individual team members. It is also used to set, plan, and continuously review monthly project goals in collaboration with the TECHCOY agile project team. Performance is measured against business goals and senior management expectations that are set in the previous month so as to ascertain the extent to which the agile project team has achieved these goals, and their compliance with organisational policies and procedures. The observed daily Scrum and sprint planning meetings were attended by the TECHCOY agile project team members only. The MPR was presided over by the Group CEO and attended by the agile project team and other stakeholders.

I employed observations to supplement and enrich other data sources and facilitate discovery of occurrences, subtleties, and what study participants did in the cases (Benbasat *et al.*, 1987). The observations followed several steps (see Appendix J). The observations provided direct illumination on instances where members of the TECHCOY agile project team (particularly MMs) would participate in agile PG, perform various roles, and demonstrate competencies. All in all, observations offered an empirical perspective that provided triangulation by allowing me to verify details in interview accounts with observed findings (Karanasios and Allen, 2014). The observations in HOLDCOY were limited to three project team meetings due to the COVID-19 outbreak. Each project meeting was organised in a co-located fashion. For example, Figure 17 illustrates the physical layout of the sprint planning meeting setup. The case study in BANKCOY did not involve observations because the BANKCOY project that was investigated was already completed at the time of data collection.

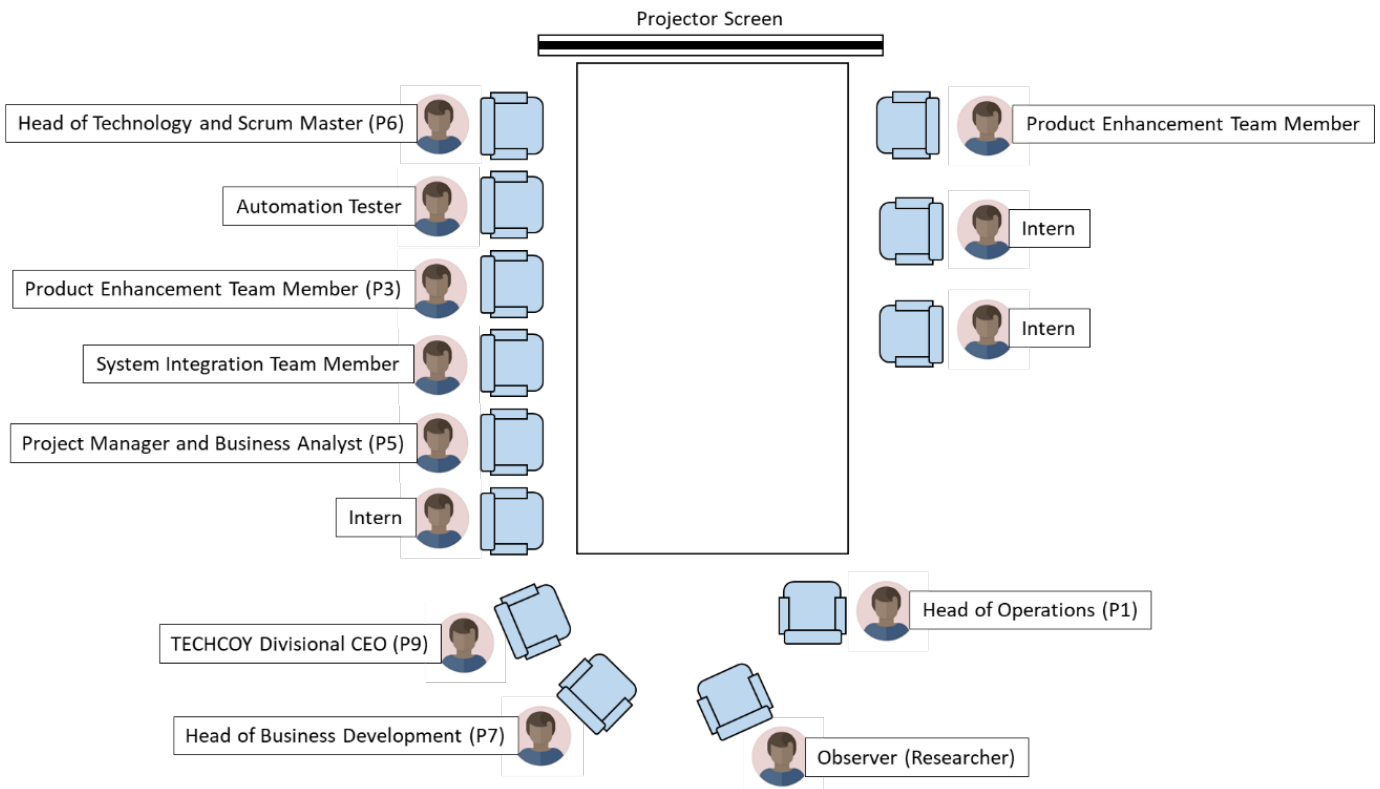


Figure 17: Physical layout of observed sprint planning meeting at HOLDCOY

3.7.3 Documents

Data was collected from internal company documents, which were secondary data sources (Bhattacharjee, 2012). Use of documents as a data collection method is common in qualitative case study research (Bhattacharjee, 2012; Forsgren and Byström, 2018; Walsham, 2006). Three internal documents were obtained from the two companies, viz., organisational structure documents from both cases, and a ‘Release and Deployment Management Guidelines’ document from BANKCOY. The documents were used to obtain relevant background information and gain deeper understanding of the cases, but they were not formally analysed. The ‘Release and Deployment Management Guidelines’ document describes how the release management life cycle of software products is performed in BANKCOY and how it interacts with other important SDLC processes.

3.7.4 Questionnaire

A questionnaire (Appendix K) was developed to supplement other data collection forms in this study. The questionnaire, i.e., *Company Profile and Project Profile Questionnaire*, was not for quantitative analysis—it was used to facilitate collection of qualitative data for describing the case organisations and ASD projects under study in order to establish the industrial context information relating to the case studies. Such information may affect how research conclusions are generalised and utilised (Kitchenham *et al.*, 2002). The questionnaire served as a means to shorten interview time by collecting company and project data that would have otherwise prolonged the interviews.

I developed the questionnaire by considering contextual factors that need to be considered when specifying industrial context information in empirical software engineering studies (Kitchenham *et al.*, 2002). Examples of contextual factors in empirical software engineering studies include (1) industry where the company products are used, (2) nature of SD service in the company under study, (3) experience and skills of SD personnel, (4) type of software products employed, and (5) SD processes employed (Kitchenham *et al.*, 2002). The questionnaire was developed prior to fieldwork and administered in the two case organisations.

Considering the aforesaid contextual factors, I adapted two case study questionnaires developed by Strode (2012)—for collecting project background and agile practices data—to produce the *Company Profile and Project Profile Questionnaire*. Information relating to some of the aforementioned contextual factors were collected through the questionnaire (e.g., industry, SD service, agile methods). The questionnaire was divided into two sections to obtain information about general company background (Section 1) and project description regarding the ASD project in each company (Section 2). It needed to be filled by a research participant who was either a manager, supervisor, team leader, or had a similar role.

Three copies of the questionnaire were administered and completed in the two companies. In HOLDCOY, two questionnaires were filled by TECHCOY's Head of Operations (P1, MM) and HOLDCOY's Head of Human Resources (P10, senior management) respectively. The Head of Human Resources was not considered an agile practitioner in this study, therefore his profile details are not included in Appendix L (Data Sources of Case Studies). However, P10 provided

useful company profile information. In BANKCOY, the questionnaire was filled by the Project and Change Coordinator (P11).

3.7.5 Web-based Platforms and Telephone Conversations

Supplementary data was collected from several web-based platforms and services, viz., corporate websites and LinkedIn profiles belonging to HOLDCOY and BANKCOY, as well as follow-up emails and instant messaging correspondence with participants to clarify and validate collected data. The corporate websites and LinkedIn profiles were useful resources to obtain background information and learn about the two companies. The range of information accessed from these channels included company history, organisational structure, types of job roles in their workforce, and locations and regions of operation. The corporate websites in particular provided information on the types of industries the companies operate in, products and services, and customer base. Data collection through these channels was useful because collected data helped me to understand the industrial context settings of the two case organisations and subsequently describe them. Supplementary data was also obtained in the form of unrecorded telephone conversations with participants during fieldwork to clarify and validate collected data. This was a convenient method particularly during times when I needed to engage participants for quick clarifications.

3.8 Data Analysis

3.8.1 Within-Case Analysis

The objective of within-case analysis is to facilitate not only thorough understanding and description of a phenomenon being examined (Mills *et al.*, 2010), but also thorough analysis. Interview and observation data collected from the two cases were analysed iteratively to discover interpretations and patterns that could be used to draw conclusions. As a quality check during data analysis, collected data were shared with participants to obtain clarifications. Responses were duly noted and helped clear up misconceptions. Analysis findings were also shared with participants. Data analysis was performed using thematic network analysis (TNA): a thematic analysis technique for identifying, structuring, and describing themes in qualitative data (Attride-Stirling, 2001). Thematic analysis facilitates derivation of themes, patterns, and interpretation of qualitative data (Attride-Stirling, 2001; Braun and Clarke, 2006). It can be applied for both deductive and inductive data analysis (Braun and Clarke, 2006). The APGov framework complemented analysis

by facilitating interpretation, reporting, and discussion of the findings. In this study, I followed Attride-Stirling’s (2001) six-step TNA process embedded in three main analysis stages (summarised in Table 21).

Table 21: Thematic network analysis (Attride-Stirling, 2001)

Analysis Stages	Steps
Analysis stage A: Reduction or breakdown of text	<p>Step 1. Code material (a) Devise a coding framework (b) Dissect text into text segments using the coding framework</p> <p>Step 2. Identify themes (a) Abstract themes from coded text segments (b) Refine themes</p> <p>Step 3. Construct thematic networks (a) Arrange themes (b) Select Basic Themes (c) Rearrange into Organising Themes (d) Deduce Global Theme(s) (e) Illustrate as thematic network(s) (f) Verify and refine the network(s)</p>
Analysis stage B: Exploration of text	<p>Step 4. Describe and explore thematic networks (a) Describe the network (b) Explore the network</p> <p>Step 5. Summarise thematic networks</p>
Analysis stage C: Integration of exploration	Step 6. Interpret patterns

The use of TNA (Attride-Stirling, 2001) in the study enabled the systematic application and description of the thematic analysis process. Findings addressing the RQs are represented as thematic networks showing *basic themes*, *organising themes*, and *global themes*. In thematic networks, a *basic theme* is the lowest-order premise found in the data, while an *organising theme* is a higher-order theme (a category of grouped *basic themes*) summarising main discoveries contained in the data (Attride-Stirling, 2001). A *global theme* is the superordinate theme, which encapsulates “the principal metaphors in the data as a whole” (Attride-Stirling, 2001, p. 389). The analysis stages and steps are exemplified in Figure 18 and described below.

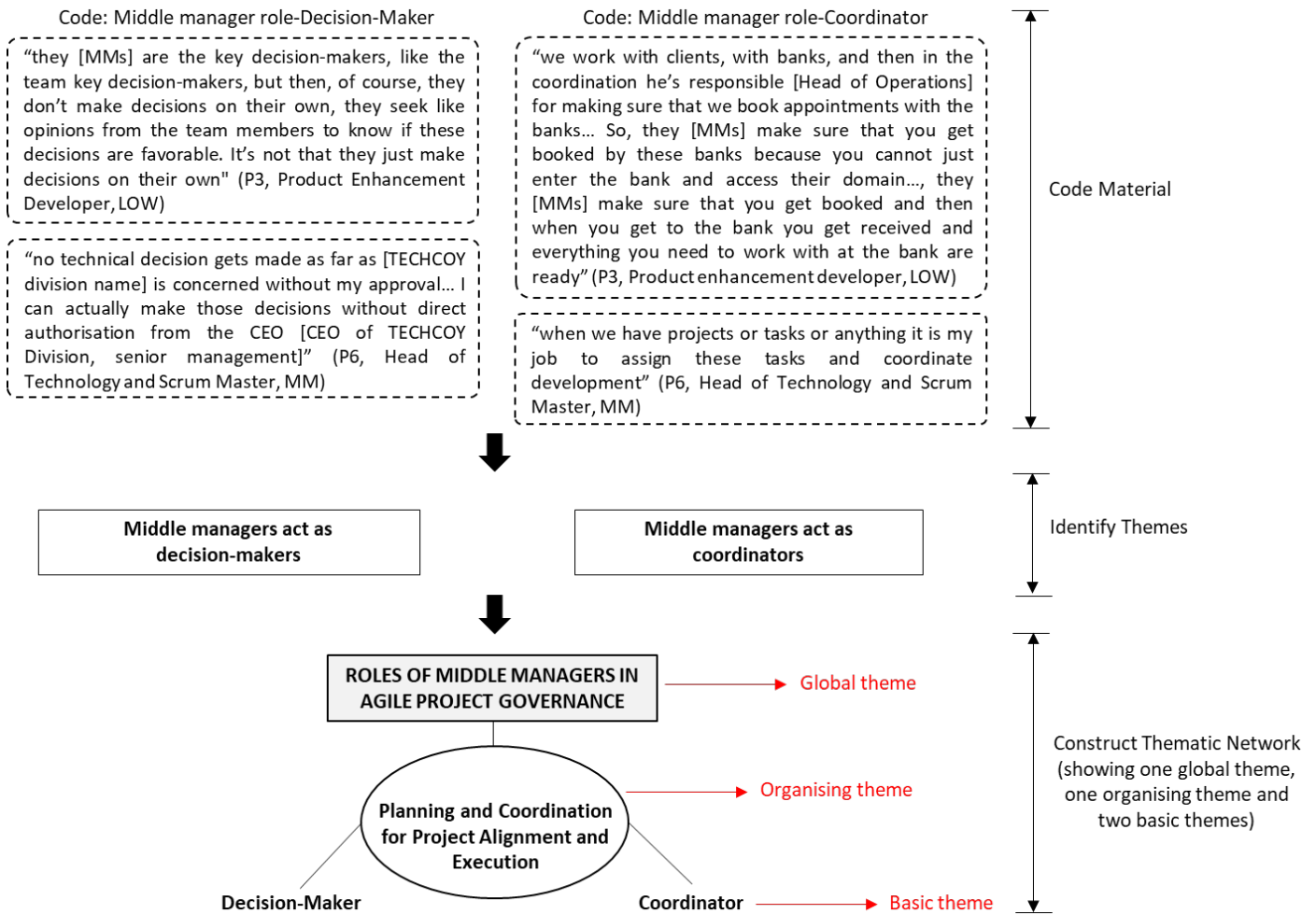


Figure 18: Example of analysis stages in TNA

Analysis Stage A – Reduction or Breakdown of Text

Step 1: code material The TNA process begins with reducing the original data or ‘coding the material’. This can be achieved by dissecting the textual data into manageable and meaningful text segments through the application of a coding framework. A coding framework is a derivative of existing theory, theoretical interests, and/or emerging issues from textual research data that are relevant to the scope of a study (Attride-Stirling, 2001). For this study, the coding framework (see Table 22) is a derivative of components of the APGov framework and RQs’ interests. The use of coding frameworks (or coding schemes) is a common practice in qualitative research (Li *et al.*, 2019; Melo *et al.*, 2013). Using the coding framework, I was able to identify and code what was

being revealed and expressed in textual data relevant to the RQs. The coding strategy involved applying the coding framework to data by coding texts (e.g., quotations) primarily relating to the roles of MMs and competencies of MMs in the *Division of labour* and *Tools* components of the APGov framework, respectively. NVivo and Microsoft Word were used to support analysis and organise text segments into respective codes which later formed themes for construction of the thematic networks. I used NVivo early on for data analysis but it was time-consuming and cumbersome. Consequently, I switched to Microsoft Word for data analysis. See Appendix M for excerpts of the coding.

Table 22: Coding framework for data analysis

S/No.	Code	Description
1.	Subject	The individual or group that is undertaking the PG activity (e.g., MMs, senior management, agile project team as a group), and from whose viewpoint the activity is analysed.
2.	Object	The problem situation or focus of the PG activity (i.e., governing and completing ASD project). It is an objectified motive: the thing-to-be-acted-upon.
3.	Division of labour - Middle manager role	The roles and responsibilities performed by MMs in the PG activity.
4.	Tools - Job-specific competences of middle manager - Input competences	Represents the knowledge, skills, understanding, abilities, expertise, and experience of MMs, which they bring to their job—including those developed and acquired in the course of doing the job—in order to perform their jobs in the PG activity.
5.	Tools - Job-specific competences of middle manager – Output competences	This concerns demonstrable performance, i.e., the ability to apply and demonstrate held knowledge, skills, expertise, experience, personality characteristics when performing a job in the PG activity. It is the demonstration of abilities and capabilities by MMs in performing their job to acceptable levels of job performance in the PG activity.
6.	Tools - Job-specific competences of middle manager – Personal competences	The personality characteristics that enables MMs to do their job in the PG activity. The personal attributes, character, personality of MMs as the subject (or members of community of significant others), which they bring to the job in order to perform it in the PG activity.

All interviews were transcribed for data analysis. The 20 interviews from the two cases produced 536 pages of transcripts, while observations from HOLDCOY produced 12 pages of observation notes. The textual data (i.e., interview transcripts, observation notes) was read several times and then coded line-by-line to capture meanings, premises, and patterns by applying the coding

framework. This was helpful in gaining thorough understanding of the data and uncovering interesting findings, the interpretations of which are grounded in data. For instance, all possible roles of middle managers (MMs) referenced in the textual data were identified and coded. For example, the code 'Middle manager role-Product Owner' included text segments such as, *'I'm also more of representing the stakeholders... so whatever the developers are saying, we must also ensure that it aligns with the expectation of the stakeholders'*. This expression was then interpreted as a role that MMs take on to protect stakeholder interests and ensure project efforts and outputs by project team members were aligned with stakeholder expectations and directed towards achieving same. In line with TNA, it was still necessary to limit and focus coding on the scope of the RQs to avoid coding every string of text in the original data. The analysis process involved reviewing generated codes against the original data to ensure they were relevant, appropriately labelled, and non-repetitive as much as possible. In general, while some ideas, meanings, and patterns regarding MMgmt roles and competencies were identified from explicit mentions and specific references in the original data, others were identified by 'reading between the lines' and examining the project experiences and scenarios that the participants described in their accounts for instance, and identifying instances therein that were relevant and related to the areas of interest being investigated.

It is worth mentioning that several interview transcripts were fully proofread, while others were not for the following reason. I reviewed interview transcripts, listened to interview recordings, and made corrections to transcripts because some transcriptions were incorrect and some interviewee statements in the recordings were missing in the transcripts. I was making corrections to every incorrect interviewee statement regardless of whether it related to the RQs or not. Apart from making corrections, I was coding the texts and making notes simultaneously as I reflected on the data. Also, for each transcript, I was piecing together what the interviewee said with what other interviewees said to make sense of the findings and facilitate interpretation. This process was time-consuming. Therefore, in an effort to accelerate analysis, I changed my approach. This new approach involved listening to the interview recordings and subsequently correcting and coding only interviewee statements and references that were deemed relevant and related to the research interests being investigated. This approach helped to quicken analysis considerably.

Step 2: identify themes The next step in the TNA process involves abstracting and refining data-based themes from the coded text segments. I achieved this by going through the text segments in the respective codes (or group of related codes) and extracting themes—salient, common or significant themes—contained in the coded text segments. I reread the coded text segments within the context of the respective codes they were labelled under. This allowed me to reframe the reading of the textual data and consider the data intensely, thereby helping to identify underlying meanings, patterns, and structures in the original text. Following this, I examined the themes and made further refinements. According to Attride-Stirling (2001, p. 392), theme refinement is important to ensure the themes are “(i) specific enough to be discrete (non-repetitive), and (ii) broad enough to encapsulate a set of ideas contained in numerous text segments”. It helps to reduce the original data into a set of significant themes that is more manageable and concisely summarises text segments. For example, the data coding process produced 32 codes relating to MM roles in HOLDCOY, which were reduced to 24 codes (forming 24 *basic themes* that interpret the multiple roles of MMs in agile PG within HOLDCOY). The refinement process resulted in merging, relabeling, and discarding of several codes relating to the identified themes. These identified themes in *Step 2* are the *basic themes*, which formed the basis for the thematic networks.

Step 3: construct the thematic networks This next step involves assembling themes to create the thematic networks. In this study, the thematic networks created are those interpreting multiple roles and competencies of MMs in agile PG (see Chapter Four) in order to address the RQs. I arranged the *basic themes* into groupings that are similar and coherent to form thematic networks. For example, various MM roles (*basic themes*) relating to *Monitoring (organising theme)* during agile PG are grouped together and placed under *Roles of middle managers in agile project governance (global theme)*. Each grouping consists of clusters of *basic themes*, which are grouped under shared *organising themes* and linked to distinct *global themes* that condense and summarise ideas and concepts conveyed in the thematic networks. To interpret the middle-order *organising themes*, I considered related and relevant contexts in the data. For example, to interpret *organising themes* for the thematic network regarding MM roles in agile PG, I identified role categories by considering the contexts in which MMs performed the roles in the ASD projects based on the data.

After the thematic networks were determined, I illustrated them as web-like representations. To ensure the *basic themes*, *organising themes* and *global themes* reflected the data, I reread the text segments associated with each *basic theme*. This allowed me to verify the networks and refine them by making few changes (e.g., changes to theme labels to align with data). The themes were developed independently for each case study. However, coincidentally, there were commonalities.

Analysis Stage B – Exploration of Text

Step 4: describe and explore thematic networks This step involved (a) describing contents of the thematic networks with supporting text segments from original data, and (b) exploring the data to identify and document underlying meanings and patterns. I achieved this for the respective thematic networks by returning to the original text and reading it repeatedly using the networks as a tool to help interpret the text, such that meanings and patterns in data began to emerge. This step ensures that evidence in data agrees with the ideas and concepts conveyed through the thematic networks—it links the interpretation of findings with the data.

Step 5: summarise thematic networks The objective of this step is to explicitly and succinctly summarise the main themes and related underlying meanings and patterns that emerged from describing and exploring the thematic networks. I summarised the thematic networks by presenting the contents of the networks in a clear and succinct manner with each description supported by text segments (evidence) from original data based on *Step 4*.

Analysis Stage C – Integration of Exploration

Step 6: interpret patterns This final step involved bringing together the deductions in the summaries of the various thematic networks and the relevant theory so as to explore principal themes, concepts, ideas, structures, and patterns that emerged from the original data in relation to the research interests. The aim here is to return to the RQs and address them with arguments predicated on the themes, ideas, concepts, patterns, and structures that emerged from exploring the original data. I implemented this step through the Discussion chapter of this thesis (Chapter Six).

3.8.2 Cross-Case Analysis

Cross-case analysis was performed to help determine commonalities and differences in findings across the two case studies (Eisenhardt, 1989; Lappi and Aaltonen, 2017). This level of analysis enhances the accuracy and reliability of constructed research outputs (e.g., theories, models) by helping to establish a tight link between the constructed outputs and the data (Eisenhardt, 1989).

According to Eisenhardt (1989), one of the ways to perform cross-case analysis is for a researcher to select cases in pairs and then identify and list the commonalities and differences between the cases. I followed this approach, which involved comparing the MM roles and competencies found in each case study (and represented in thematic networks) to determine aspects that appear to be common in each case and those that differ. I juxtaposed the MM roles and competencies found in each case in tables (see Section 4.3 of Chapter Four) and also read through related evidence from original data to determine similarities and differences in the cases. Comparing and combining the identified themes from respective thematic networks in the two cases produced the *Model of middle management roles in agile project governance* (M1) and *Model of middle management competencies in agile project governance* (M2), which are presented in Chapter Four. M1 and M2 formed the centrepiece for the opinion-based validation study (reported in Chapter Five), which aimed to evaluate the models with industry-based agile practitioners and obtain critical feedback.

Chapter Four: Multiple Roles and Competencies of Middle Managers in Agile Project Governance

This study has utilised the APGov framework to investigate MMgmt in ASD projects from a PG perspective. Consequently, the study has identified multiple roles and competencies of MMs as ‘division of labour’ and ‘abstract tool’ components in agile PG, respectively. The objects of the agile PG activities investigated in HOLDCOY and BANKCOY entailed governing and completing the respective mandated ASD projects. The PG efforts enacted by a project team and other participating stakeholders are ultimately channeled towards the project itself in order to produce desired outputs and meet stakeholder expectations. The MMs in both cases facilitated this.

The subject of the agile PG activity comprises the actor(s) undertaking the activity. In the agile PG activity of the HOLDCOY ASD project, the subject was the TECHCOY agile project team. In applying AT to understand a multi-voiced activity, it is important to consider the viewpoints of as many embedded activity actors as possible in order to obtain a broad view of the components, experiences, and intricacies that exist therein (Foot, 2014; Karanasios, 2014). Therefore, in addition to the TECHCOY agile project team, the Group CIO (P4) and Operational Excellence (OpEx) Manager (P8) were also considered part of the subject. Hence, their viewpoints also provided contributory inputs for analysis. It is worth noting that P8 was the MM in charge of the HOLDCOY OpEx team, which was external to the core TECHCOY agile project team as part of the shared services in the company. In the agile PG activity of the BANKCOY ASD project, the subject was the BANKCOY agile project team.

The following sections present findings on the roles and competencies of MMs in the agile PG activities of the HOLDCOY and BANKCOY ASD projects, based on data analysis. To avoid overexpanding the thesis, I will be referring the reader to the Appendices for examples of original data regarding some roles and competencies.

4.1 The HOLDCOY Case

The first case organisation was HOLDCOY; the Nigerian fintech holding company. MMgmt played an integral part in nurturing and supporting an enabling PG environment to ensure the agile project team were successfully building and releasing a financial software in the shortest possible time, through a project where resources were purposefully maximised. The following sections describe various roles and competencies of MMgmt that were uncovered following data analysis.

4.1.1 Roles of Middle Managers in Agile Project Governance

Evidence from data analysis suggests that MMs were crucial for effective PG in the HOLDCOY ASD project based on various roles they played in the division of labour of the HOLDCOY agile PG activity. Results suggest that MMs performed 24 roles (Figure 19) during the governance of their ASD project.



Figure 19: Thematic network of 24 MM roles in agile PG in HOLDCOY

The figure above illustrates the thematic network interpreting 24 identified MM roles in HOLDCOY. Twenty-four *basic themes*, which represent the MM roles in the agile PG activity's division of labour, are grouped into five *organising themes* (role categories), which are linked to the *global theme - Roles of middle managers in agile project governance*. The five role categories under which the roles were performed are *Planning and coordination for project alignment and execution*, *Continuous improvement and organisational change*, *Agile and technical leadership*, *Monitoring*, and *Capability building*. I identified and named the role categories and roles by considering the contexts in which MMs performed the roles in the ASD project as contained in data. The role categories and corresponding roles of MMs are described in the pages below.

Planning and Coordination for Project Alignment and Execution

In ASD projects, stakeholders need to work together in order to be successful and accomplish project tasks and goals. Planning, coordination, and maintaining alignment between and with stakeholders, timelines, and business strategy throughout project delivery are important for project success. The MMs in HOLDCOY supported these practices through 13 roles, viz., *Coordinator*, *Strategist*, *Adviser and Negotiator*, *Project Manager*, *Decision-Maker*, *Resource Maximiser*, *Supervisor*, *Goal Definer and Interpreter*, *Auxiliary Resource*, *Motivator*, *Product Owner*, *Subject Matter Expert*, and *Foreseer*. These roles are described below.

- **Coordinator**

In the *Coordinator* role, MMgmt coordinated project work through agile delivery. They acted as intermediaries between the agile project team and other stakeholders (e.g., senior management, other internal stakeholders, external customer personnel). They communicated progress and situational reports to senior management.

“whether it’s the daily Scrum or whether it’s the retrospective that is at the end of each iteration, that’s when you have the retrospective, I’m the one that always facilitates this communication... we have a monthly meeting in which we meet with [names of senior management members]... in that meeting, I talk from the operational aspect... updates on..., in terms of operational stuff. So, based on one: the first thing is projects” (P1, Head of Operations, MM).

MMgmt coordinated different aspects of project work and assigned tasks. For example, P1 coordinated project management, business analysis, and testing aspects of project delivery, while P6 (Head of Technology and Scrum Master, MM) coordinated the technical development aspects.

“coordination of the testing... project management, business analysis part I do that, as Head of Operations I do that, but coordination in terms of the development work item the actual like maybe oh you’re supposed to do it this way in terms of the code, the writing of the code, Head of Technology does that, but the facilitation of the Scrum meeting I do that as well to ensure that each person knows the task they are supposed to work on” (P1, Head of Operations, MM).

MMgmt (e.g., P1) was actively involved in helping to resolve project issues (e.g., delayed customer dependencies) by engaging senior and non-senior customer personnel in order to advance project delivery in alignment with set timelines. They intervene to help tackle project issues that LOW are unable to resolve. They also ensured that project work was carried out in an organised and harmonious manner with minimum disruption. For example, P1 was actively involved in internal and external coordination of project interactions. He made arrangements for his team’s offsite work at bank (customer) locations to ensure they had access to suitable work environment. He booked appointments for his teammates to facilitate customer collaboration:

“in the coordination he’s [Head of Operations] responsible for making sure that we book appointments with the banks... they [MMs] make sure that you get booked and then when you get to the bank you get received and everything you need to work with at the bank are ready, but then even here [HOLDCOY office location] too, they also have a general coordination, they are very helpful” (P3, Product Enhancement Developer, LOW).

- **Strategist**

As *Strategists*, the MMs engaged in strategic practices to devise ways to accomplish project goals and expectations. In doing so, they helped to ensure (a) project needs were being handled (e.g., resource planning), and (b) there was continuous alignment between project delivery and business strategy to achieve set objectives. Through resource planning in yearly review meetings, P1 ensured that additional resources for the agile project team were arranged in advance.

“when we are having a financial review or non-financial review at the end of each year, I have a list based on my planning for the year and how we intend to rollout for the year. I have

the list of developers or employees that we need to add to the team to ensure that we don't lose track... I plan for the roles which will be needed each year" (P1, Head of Operations, MM). P1, P6 (Head of Technology and Scrum Master, MM), and P7 (Head of Business Development, MM) also engaged in frequent strategic exchanges with senior management (P9, TECHCOY divisional CEO) to discuss yearly, quarterly, and monthly strategy in order to facilitate contextual understanding and execution of strategies, as well as agree strategic direction in terms of project and product roadmap.

"I also have weekly strategy reviews right [with the MMs]; its informal... We just talk about the strategy and I'm like I'm reminding them [MMs]... why I do that is so that they [MMs] have the right context, they have the right understanding of what needs to be done so that they can go into you know those operational planning sessions and actually come up with you know actionable goals, relevant goals right, goals that are aligned" (P9).

"we have a project roadmap, myself, the CEO [TECHCOY divisional CEO], the Chief Commercial Officer [Head of Business Development], the Head of Technology as well, we always discuss every time in terms of how do we want, in terms of roadmap, what next... in terms of product roadmap, I'm involved" (P1).

P1 engaged in strategic project management and planning to ensure his teammates remained dedicated and committed while leveraging agile delivery as a key planning and execution strategy to meet early go live expectation.

"I find every strategic way to ensure that we achieve this go live at the shortest time possible through incremental delivery, which the agile process, which the agile methodology gives us the permission to do... I do that strategic project management, strategic planning to ensure that, and to ensure that the resources, everybody is up and like dedicated and committed to ensure that we achieve this [project]" (P1).

- **Adviser and Negotiator**

In performing the role of *Adviser and Negotiator*, MMgmt (e.g., P1) advised project stakeholders (e.g., senior management) on PG rules and practices (which needed to be followed to safeguard project outputs) using their experiential knowledge. In addition, they negotiated project adjustments and timelines to ensure PG processes were followed.

“I try to explain to the senior management whenever we’re having this our monthly meeting or quarterly performance meeting that these things [PG rules and procedures]..., they are things that okay, we need to properly address... I made them [senior management] understand that this issue, that issue, this thing, this thing, all these things [PG rules and procedures] needs to be done. We need to do proper scanning of our applications. We need to do proper automated testing of our applications... they [senior management] also understood and they’re okay, ‘yes, go, we’ll give you some months’ grace to achieve this thing’” (P1).

- **Project Manager**

In the role of *Project Manager*, MMgmt oversaw the project management function in the agile project team. P1 employed strategic project management and planning to ensure his teammates fulfilled project tasks with dedication and commitment.

“I also supervise the project management team... coordinating on the project management aspects is done by Head of Operations... I do that strategic project management, strategic planning to ensure that and to ensure that the resources, everybody is up and like dedicated and committed to ensure that we achieve this” (P1, Head of Operations, MM).

P1 worked closely with the team’s designated project manager, i.e., the Project Manager and Business Analyst (P5, LOW), to perform project management duties.

“Head of Operations: the COO, like he doubles as the project manager too... he [Head of Operations, MM] has another team member that is the project manager... that helps him in the management of the whole process” (P3, Product Enhancement Developer, LOW).

- **Decision-Maker**

The MMs were key *Decision-makers*. They contributed to key decision-making in the agile project team. MMgmt enabled and practiced shared decision-making in the agile project team by seeking input and the opinions of other team members for the advancement of project delivery.

“they [MMs] are the key decision-makers, like the team key decision-makers, but then, of course, they don’t make decisions on their own, they seek like opinions from the team members to know if these decisions are favourable. It’s not that they just make decisions on their own” (P3, Product Enhancement Developer, LOW).

The MMs were involved in making decisions that affected the team in various aspects (e.g., technical decisions, product roadmap decisions, staff promotion decisions, process modification decisions), thereby enabling the team to operate as an autonomous self-managed entity.

“in terms of decision-making, in terms of product roadmap, I’m involved. In terms of decision-making for staff promotion or staff promotion or maybe we say the staff is underperforming and like performance for the staff in the year, I do that... but in terms of things like additions to our SDLC compliance, if I see there’s a loophole like I advise, so those are the things I come up with, I share it to the OpEx [Operational Excellence] team before sharing it with my team. Once OpEx agrees that yes, we can proceed with this, I share it with the team and I tell them that going forward this is how it’s going to be done in terms of the SDLC” (P1, Head of Operations, MM).

- **Resource Maximiser**

MMgmt (e.g., P6) performed *Resource Maximiser* role in the TECHCOY ASD project by managing resource shortfalls in the agile project team. P6 was utilising available team members to relieve other team members who were inundated with project tasks, and filling responsibilities of missing project roles by distributing unattended and outstanding tasks to those available so as to maintain unhindered project delivery.

“we want to make sure the team is working at their highest capacity and we are maximising the resource we have to the fullest. We still have a lot of missing roles, a lot of roles yet to be occupied... sometimes you need to carry on the roles of people that are missing. So, the target of all these things is to maximise the resource we have... like today I’m sending in two people into the banks... I mean, two roles missing which we also need their functions... for the day, I’m going to have to take up some tasks that they should have worked on and I have to share some of their tasks for others to do” (P6, Head of Technology and Scrum Master, MM).

- **Supervisor**

In the *Supervisor* role, MMgmt oversaw project work and the performance of the agile project team by working closely with team members through iterations and following up with assigned tasks. According to P6, this was necessary to ensure the project work they were completing was within scope—aligned with project expectations—and progressing without hindrance.

“we also want to make sure these guys are not working out of scope. So, we iterate continuously, we do that daily and I also have times in the day which they need to report in; ‘What’s the progress of your work?’, ‘How far have you gotten with it?’, ‘Are you facing any challenges?’, ‘Is there something I need to know?’, ‘Is there a blocker?’... Sometimes myself, I need to be on field to actually supervise things on my own” (P6, Head of Technology and Scrum Master, MM).

- **Goal Definer and Interpreter**

As *Goal Definer and Interpreter*, the MMs contributed to defining and interpreting project goals, such as those emerging from MPR sessions with senior management, as well as customer interactions, which were broken down and explained so that the team could understand what needed to be done and why such goals should be achieved. MMgmt encouraged and practiced collaborative goal setting—it involved collective brainstorming, input, and participation from everyone in the agile project team.

“if it were to be a traditional life cycle, probably the product owner will be the one setting the goals and the developers will just be working on the goal, here we don’t do that, we brainstorm and everybody decides on how the goal, the goal should be” (P1, Head of Operations, MM).

- **Auxiliary Resource**

MMgmt served as *Auxiliary Resources*. They served as additional help and support to fill resource gaps in the agile project team by taking up other job roles and duties in the team when resources were lacking, thereby helping to prevent lapses that may adversely affect team productivity and project delivery. For example, P6 (Head of Technology and Scrum Master, MM) performed the *Auxiliary Resource* role by volunteering to take on some unfulfilled development tasks originally assigned to the App Support developer who was unavailable on a particular day.

Observation from Sprint Planning Meeting:

“On the day of the sprint planning meeting, the App Support developer was away from work. During the meeting, the Head of Operations and the Head of Technology and Scrum Master began to brainstorm on who would work on the tasks that the App Support developer left outstanding. Head of Operations wanted one of the Product Enhancement developers to take up some of the outstanding tasks in question, but the Product Enhancement developer had a

lot of work to deal with. The Head of Technology and Scrum Master in contributing to the assignment of tasks to take up the tasks left by the App Support developer, said he would go ahead and work with the Product Enhancement developer to tackle the outstanding tasks under the App Support duties.”

P1 also acted as *Auxiliary Resource* when a tester resigned: he took up testing duties for the team.

- **Motivator**

As *Motivators*, MMs motivated their teammates by inspiring, encouraging, and influencing them to perform their duties as expected in order to successfully execute the ASD project. P6 empowered and motivated team members to learn new software development technologies and develop their competence through knowledge sharing. P1 (Head of Operations, MM) motivated teammates by providing incentives, e.g., supporting staff promotion practice to reward good performance, and recognising high-performing teammates as staff of the month, thereby promoting commitment, dedication, and task ownership in the team for project success.

“it’s more of an incentive that oh, if you do more tasks and if you complete more tasks, at the end of each month you would be recognised... at least just to encourage, so that by next month every other person will know that men I need to continue to collect more tasks and complete more tasks so that at the end of the month I’ll also be like the staff of the month. So those are things I try putting in place as incentives for, so even apart from promotion, these are just things that within our division we’re trying to do to ensure that yes the team is always happy and the team is always motivated week in, week out to achieve results” (P1).

Another form of incentive was incentive events. P7 (Head of Business Development, MM) was involved in organising team bonding activities to keep team members motivated, relaxed, and reinvigorated to tackle project commitments.

“What we do is try to organise team bonding exercises. So, for the last two weeks we went to an arcade centre, just to lift the spirits of the team members... I felt it was necessary for us not to just be work, work, work” (P7).

- **Product Owner**

MMgmt (i.e., P1) played the *Product Owner* role in the HOLDCOY ASD project. In this capacity, MMgmt was accountable for maximising value by prioritising requirements, tasks, and releases in

collaboration with other project stakeholders so that most valuable requirements were completed first. P1 represented project stakeholders (e.g., customers) to ensure his team worked with the needs of stakeholders in mind, thereby ensuring continuous alignment between the team's outputs and stakeholder expectations during project execution.

“we drop releases per iteration. So, we always prioritise with the stakeholders, whether it's the MoSCoW model; the must have, should have, so that by that we will know in terms of priority releases, which one should come first, which one should come next... I am a product owner... I'm also more of representing the stakeholders... so whatever the developers are saying, we must also ensure that it aligns with the expectation of the stakeholders” (P1).

Other MMs (i.e., P6 and P7) supported product ownership in the team. For instance, P1 along with P6 and P7 engaged in developing product vision through product and project road mapping jointly with senior management (P9). MMs clarified product goals. P1 and P6 managed the backlog—they had the authority to create tasks in the backlog. P7 interacted with customers and sensitised them on the project's product offering, its value proposition, and benefits to the customers. Refer to Appendix N for further examples of data regarding the *Product Owner* role.

- **Subject Matter Expert**

As *Subject Matter Experts*, the MMs provided input and expertise on technical and non-technical aspects of the ASD project based on their advanced knowledge and experience for successful project delivery. For example, drawing on his knowledge of prescribed PG rules in the organisation and situational awareness of project happenings, P1 provided point-in-time work and status information relating to the project. He provided information regarding project status and progress, outstanding work, and steps that needed to be taken to ensure good governance practice. Other subject matter expertise provided by MMgmt included technical expertise in SD (P6) and IT networking (P1), as well as financial industry domain expertise (P1, P6, and P7). Refer to Appendix N for further examples of data regarding the *Subject Matter Expert* role.

- **Foreseer**

In HOLDCOY, MMgmt (i.e., P1 and P6) acted as *Foreseers* who had foresight and could see the bigger picture during project delivery. MMgmt understood the need for foresight in order to

foresee potential project problems and issues and their resulting effects, which could hinder project implementation strategies and expected outputs.

“you [MM] must try to have some kind of foresight onto..., you must see the problem before it even arises. You must be able to anticipate deadlocks in whatever implementation strategy you want to employ” P6 (Head of Technology and Scrum Master, MM).

Continuous Improvement and Organisational Change

The MMs in HOLDCOY engaged in continuous improvement efforts to improve working processes and support team productivity, flexibility, and efficiency. These efforts tended to result in organisational changes. They engaged in such efforts by performing *Process Owner and Improver, Auditor, Innovator, and Rule-maker* roles.

- **Process Owner and Improver**

MMs were *Process Owners and Improvers* in the HOLDCOY ASD project. They were accountable for implementation of prescribed PG processes and procedures in the ASD projects. MMgmt (i.e., P1) facilitated agile retrospectives, as well as process and procedural changes for continuous improvement, ensuring inefficiencies and areas for improvement in PG processes and procedures were identified and addressed in collaboration with other stakeholders. The PG process and procedural changes facilitated by TECHCOY MMgmt may also be implemented company-wide across other HOLDCOY divisions. P1 collaborated with the HOLDCOY OpEx team (which was responsible for documenting and monitoring company-wide compliance to operational policies and processes) to ensure PG policies and processes were always appropriate for the agile project team’s day-to-day project work. P1 also ensured his agile project team complied with PG processes and rules to avoid penalties due to noncompliance. Refer to Appendix N for examples of data regarding the *Process Owner and Improver* role.

- **Auditor**

P8 (Operational Excellence Manager, MM); an external MM to the TECHCOY agile project team, and P6 acted as *Auditors*. P8 was the OpEx team’s manager. Together with his OpEx team, P8 performed an auditing exercise each month. The auditing involved the use of an audit framework and effectiveness criteria to ensure everyone in the agile project team worked in line with

HOLDCOY policies, processes, and procedures that governed project functions, activities, and deliverables. P6 also audited the performance of the agile team members.

“what we do currently is on a monthly basis also we do like a process audit for each function... we have an audit framework right where we go through..., okay for this guy, this tester..., so we carry out the testing. We check, open the testing policy. Was there a test plan for this test activity? Were there test scripts? Confirm those evidences right in testing. We ask for those evidence from..., from the team or from the employee carrying out that function. So, once we can ascertain all those evidences then we present it in a report, in an audit report... in each of our policies that governed the activities performed by any resource, we have what we call effectiveness criteria where we test the effectiveness of the person carrying out this..., a particular activity right. We identify gaps, things that we need to..., that we need to improve upon in the activity or in the process” (P8, Operational Excellence Manager, MM).

“We also have an auditing system by which I don’t only audit the code you’ve written and everything, I also audit the performance of the work of every individual” P6 (Head of Technology and Scrum Master, MM).

In the *Auditor* role, MMgmt was instrumental in identifying gaps and areas to improve in HOLDCOY’s PG processes and policies for continuous improvement to support each function, as well as project work that needed to be completed.

- **Innovator**

As *Innovators*, the MMs fostered innovation and change to improve PG practice in the ASD projects so that the teams could implement the projects more efficiently to achieve expectations. MMs (e.g., P1, P6, P8) were involved in recommending and introducing new ideas, practices and technological work tools to improve and advance project delivery.

“the CTO [Head of Technology and Scrum Master] and the COO [Head of Operations] they are actively involved in determining who does what and then how it’s being done, the technological tools to be used like I explained earlier. So, they play a very important role in that, and then if at any point in time the tools you are making use of, the technologies are not better or there is a better option, they are the ones that suggest that ‘Okay, try out these better options’” (P3, Product Enhancement Developer, LOW).

“We engage the process owners or the task owners. We try to play the devil’s advocate and find where and where needs to improve and of course try to stimulate suggestion on areas of improvements. And if the areas of improvement requires the implementation of a new tool or a new way of thinking then we standardise it, then we train the guys on how to go about it” (P8, Operational Excellence Manager, MM).

- **Rule-Maker**

The MMs served as *Rule-makers*. They formulated, introduced, and enforced PG rules and policies (e.g., testing policy, customer collaboration rule) that helped the agile project team to work in a disciplined and organised manner and in compliance with prescribed governance measures.

“the tester within the [TECHCOY] organization..., within the [TECHCOY] environment has to do Item A..., has to perform Activity A, Activity B, Activity C, Activity D right, has to perform these activities. Because I’m in charge of formulating the policy that govern that activity of testing” (P8, Operational Excellence Manager, MM).

“you don’t want to go to the bank and run an implementation on a Monday morning. They [banks] also have what they are also trying to achieve in the banks. So on Mondays and mostly Fridays we don’t go to banks, so they [MMs] are the ones that came up with that” (P2, App Support Developer, LOW).

MMgmt also maintained custody of PG policies that governed project work.

“I’m a custodian of polices: [TECHCOY] policies and policies that govern what a function does, the activities a function performs” (P8, Operational Excellence Manager, MM).

Agile and Technical Leadership

ASD projects involve developing software solutions following a set of work rules, principles, values, and technical activities to decompose and accomplish solution requirements in iterations and increments so as to quickly release good-quality software that meet stakeholder expectations. MMgmt led the TECHCOY ASD team as *Agile Leaders* and *Technical Leaders*.

- **Agile Leader**

As *Agile leaders*, MMgmt in HOLDCOY (e.g., P1, P6) ensured the agile project team implemented the project in accord with the agile approach. They helped to keep the agile project team current

regarding technologies they adopted for project delivery by showing interest in technology trends and keeping up to date with technologies being used in industry (e.g., P6). They encouraged shared decision-making (e.g., P6). Also, P6 was willing to receive and tolerate the opinions of other teammates during decision-making, whether or not such opinions supported his own opinions. P6 exercised business sense through his appreciation and understanding of the business opportunities associated with the ASD project, thereby helping to bring clarity of such opportunities to the agile project team—opportunities for the company to quickly introduce a new product to customers through agile project implementation and gain competitive advantage over competitors. P1 helped his team to maintain agility by adapting weekly work approaches when necessary to ensure the team achieved project goals. The MMs (e.g., P1, P6) engaged team members with a listening ear and emotional intelligence to ascertain work situations and personal issues that might affect project delivery. Refer to Appendix N for examples of data regarding the *Agile leader* role.

- **Technical Leader**

MMgmt performed the role of *Technical Leader*. The Head of Technology and Scrum Master (P6, MM) was the software development (SD) technical leader. With his advanced technical expertise and hands-on support, he provided needed technical leadership in SD in the team. P6 anchored his team in appropriate SD practice and ensured development outputs completed by developers were within project scope and aligned with project expectations. Some of the developers (who were mostly junior developers) lacked sufficient technical know-how and domain knowledge required for the project, a concern expressed by P6.

“there are limited people with sufficient knowledge to execute this project... like I said, we have more junior developers. So, you need to like have a hands-down time with everybody to make sure what they are doing is right in line with the project... we also want to make sure these guys are not working out of scope... I do give my sprints longer period, especially knowing fully well a lot of people in my team are still new to the domain knowledge” (P6, Head of Technology and Scrum Master, MM).

To help cushion potential impact from the development team’s technical competence deficiencies, P6 drew on his depth of technical knowledge and expertise to support the team—ensuring that technical development tasks were done correctly. He ensured that all technological requirements to accomplish the project were considered and put in place.

“we have the Head of Technology who is more of a Scrum Master... the essence of a Scrum Master is to ensure that everything that is required in terms of the technology aspect, everything that needs to be done is actually put in place because, you know, when your development team, when they’re brainstorming or saying about, okay we need to achieve this we need to achieve that, you need a Scrum Master which has the wider knowledge; which has deeper knowledge to ensure that whatever they say he also can contribute and okay say okay you’re on the right track” (P1, Head of Operations, MM).

Monitoring

In HOLDCOY, MMgmt were monitoring project work and team members’ performance in the PG activity as *Gatekeepers*, *Goal and Task Inspectors*, and *Pastoral Care Providers* to ensure the agile project team members accomplished assigned project tasks and goals as required with healthy state of mind.

- **Gatekeeper**

As *Gatekeepers*, MMs regulated PG interactions and procedures employed by the agile project team for project delivery, performing gatekeeping checks and controlling access from one state of project work to another to ensure change management and conformity to accepted work standards, such as during code reviews for code quality. Code review was overseen by MMgmt in the HOLDCOY case due to limited team competence.

“I still lead the code review myself because our team is not as wide as we would love it to be at the moment, finding enough and competent hands can be..., especially looking at the product like ours which is a new innovation” (P6, Head of Technology and Scrum Master, MM).

P6 issued necessary approval (or disapproval) regarding technical development change requests and code quality improvements during code reviews as needed.

“you must also get approval from the CTO [Head of Technology and Scrum Master, MM] before you make any changes to..., any configurational changes to the server or to any of the services we make use of... after you’ve made changes, you’ve made a new input to a code, you upload it there..., you push it to Bitbucket and then the CTO [Head of Technology and Scrum Master, MM] has to review the code and then either commit it to the master or assign that you

go and refactor or change some stuff in your code” (P3, Product Enhancement Developer, LOW).

Also, MMs (i.e., P1 and P6) controlled the addition of new tasks into sprints in order to minimise disruptions that could affect prioritised work during sprints.

“if you already have a task on your Jira board and this task is not yet on blocked items... before you can come to me like I said earlier on, only myself or the Head of Technology has the right to create a task for a developer... before you can come to me and say I should help you add this task, you must have given me a reason why the other task, which was assigned to you earlier on, why maybe you can't complete them or why they are blocked... the first thing why that task was even assigned to you was because we prioritised the deliverables” (P1, Head of Operations, MM).

According to senior management (i.e., P9), the MMs were the ‘owners’ of the ASD project. Hence, MMgmt collectively represented a single point of accountability and oversight in the agile project team regarding PG compliance in the project and delivery of project expectations.

“the middle managers are the owners of the project. It's their project right and they have to ensure that the project is delivered as expected. Now what that means is that they have to consciously ensure that those governance practices are adhered to” (P9, TECHCOY divisional CEO, senior management).

- **Goal and Task Inspector**

The MMs were *Goal and Task Inspectors* because they tracked and inspected goals and tasks that their teammates were expected to complete. MMgmt worked closely with team members in a hands-on manner as regards engagement and monitoring of project tasks and dependencies. For example, P1 (Head of Operations, MM) was regularly following up on project work using the team's Jira tool and sending reminders to his teammates to act on their assigned tasks to ensure no task was unattended.

“they [MMs] have access to this Jira where they monitor each of the progress for each of the team members on each of the tasks that have been assigned to them... Yes, Head of Operations, yeah. So, he monitors it on Jira and then if your tasks has been stagnant, like you are not moving it, like you are not showing that there's progress on the task, he messages you and

finds out what the problem is and tries to make sure that there's progress” (P3, Product Enhancement Developer, LOW).

P3 affirmed that MMgmt monitoring efforts were helpful. It helped the team because there were occasions when team members might be making progress but they fail to update their tasks' status because they were engrossed in project work or they simply forgot.

“It helps because most times you might be making progress on your part but then you just didn't..., you just couldn't update it because I don't know you might just have forgotten or might be carried away with the project you are doing and then you are not keeping track of your progress” (P3).

At the same time, MMgmt was monitoring, inspecting, and verifying project work that their teammates were completing to ensure set project goals were being achieved.

“they [MMs] have the outline of the goals that we're supposed to achieve, so, and they are monitoring, they are following up on those things, “Oh this, has it been done?” Whenever it's being tested they want to see it, not just that you say it's done, it's done, no. They come up and see it... they're able to monitor the progress of the project” (P2, App Support Developer, LOW).

As *Goal and Task Inspectors*, the MMs trust, but verify tasks that are said to be completed in order to keep track and establish actual project progression.

- **Pastoral Care Provider**

As *Pastoral Care Provider*, P1 (Head of Operations, MM) monitored the emotional state of the agile project team with empathy and emotional intelligence. P1 interacted with project team members at a personal level to identify personal or work-related issues that were affecting team member performance and provided pastoral care support accordingly (e.g., arranging necessary training to address capability needs).

“one quality that an agile leader must have is emotional intelligence because there are a lot of things that can be happening to developers maybe it may not even be a work-related issue, it might be personal issue which is making the developer have some down time or not being able to perform properly. So, once you notice things like that, as an agile leader what I do is I come to, I speak with the person, where is the problem coming from?... I ensure that everybody is always fine at every time... we ensure that we pay for training materials for our

developers and also the part about always speaking one on one with developers especially when you are seeing a sign of slow, maybe in terms of task delivery, the person doesn't deliver on time, that is part of my role to ensure..., to always call the person and say..., to ask what the problem is" (P1, Head of Operations, MM).

In the *Pastoral Care Provider* role, MMgmt was helping to promote psychological stability and psychological safety in the team by ensuring that team members were not overwhelmed by personal or work-related issues that may impact their ability to focus on their project work and accomplish project tasks.

Capability Building

MMs in HOLDCOY were found to contribute towards the capability building and competence development of members of the agile software team. They did so by assuming the *Capability Building Advocate* role and *Coach* role.

- **Capability Building Advocate**

As *Capability Building Advocates* in the agile project team, MMs engaged in and encouraged capability building in the team to ensure teammates had the ability to carry out project work. MMs ensured teammates were equipped with the requisite knowledge and skills to enable them to work effectively in cross-functional capacities and accomplish their project tasks. They arranged and encouraged training, knowledge sharing, and learning in the agile project team. For example, MMgmt ensured product enhancement developers in the team had the capability to take up the system integrator's development work whenever the latter was unavailable, and vice versa.

"we always want our guys to be cross-functional... like a PE [product enhancement developer] today can do an SI [system integrator] work. Likewise, an SI can do a PE work... we always ensure that each team member gets those knowledge to ensure..., so that everybody can be in the cross-functional... most of our guys are developers and there's not even time to go and start attending a course. So, that's why we paid for the Udemy so that guys can always learn for themselves" (P1, Head of Operations, MM).

Also, P6 championed regular knowledge exchange sessions for the developers and also ensured backup resources in the agile project team developed needed capabilities to fill any human resource

gaps in the team in situations where primary resources were unavailable, so as to minimise key person risk.

“I do make sure that we have a knowledge exchange hour... I do make sure everybody..., you’ve worked for one week, Monday to Thursday, today is Friday, explain to others what you’ve been doing. Let them understand so that if next week you could not make it to office someone else can pick up your task and continue working on it. So, we do share those knowledge: ‘Have you learnt anything new? Any new technology?’. Okay like personally, I have a couple of programming languages I’m working on so, I do share that with them too, to let them have a better understanding of the programming terminologies” (P6, Head of Technology and Scrum Master, MM).

- **Coach**

MMs performed the role of *Coach* in the TECHCOY agile project team by ensuring the team possessed the knowledge, skills, and capabilities to accomplish project tasks and meet project needs. MMgmt was providing assistance, training, and guidance to project team members for agile delivery while allowing them take ownership of assigned project tasks for the benefit of the team and project.

“the only way an agile project can succeed is if your team members actually own this project and own each task... my Scrum master, which is Head of Technology, he’s always there, always present and always giving that support ensuring that whatever..., whatever facilitation or whatever meeting we’re having, even though his team members are discussing, he [Head of Technology and Scrum Master] is always there to chip in; to assist them [developers] because in terms of knowledge, he’s always assisting them” (P1, Head of Operations, MM).

Also, MMgmt (e.g., P1) trained team members on the use of project software tools for agile delivery (e.g., Jira) and new software tools that were introduced to the team.

“if there is a new software that is introduced to the team, they [MMs] are the ones that make sure that each of the team members understand how the software works... the Jira app I talked about, yeah he [Head of Operations] was the one that put us through the app” (P3, Product enhancement developer, LOW).

MMgmt was also involved in setting capability building goals for team members (e.g., completion of training courses) and assigning minor tasks to team members (e.g., asking the developers to

complete a demo project) for their practice, learning, and capability building in order to help them develop useful competencies for completing project assignments.

“they [developers] were only good with Android OS but we wanted them to learn iOS and we paid for Udemy... each month we were always giving them the target, so we can tell you that in this month complete ten courses and after ten courses do a demo project” (P1).

4.1.2 Competencies of Middle Managers in Agile Project Governance

This section provides the results of thematic analysis regarding important competencies of MMs in agile PG setting based on the HOLDCOY case. The results of data analysis suggest that a total of 52 competencies that are important for MMs to have so as to function effectively and productively when working in ASD teams and projects were identified in HOLDCOY. The 52 competencies are represented in a thematic network (Figure 20) as basic themes, which are grouped into five second-order organising themes (competence subcategories), viz., *socio-relational, delivery, business, results-oriented, and people-oriented* competence aspects. The second-order organising themes are further grouped into three third-order organising themes (competence categories), viz., *input competence, personal competence, and output competence*. The competence categories were based on the three categories of job-specific competences (abstract PG tools) in the APGov framework. The organising themes are linked to a global theme—*Competences of middle managers in agile project governance*. The five competence subcategories emerged from data interpretations by considering related and relevant contexts in the data with regards to the various competencies. Table 23 below summarises the description of each competence category and subcategory. The corresponding competencies of MMs under each competence category and subcategory are described in the ensuing pages.

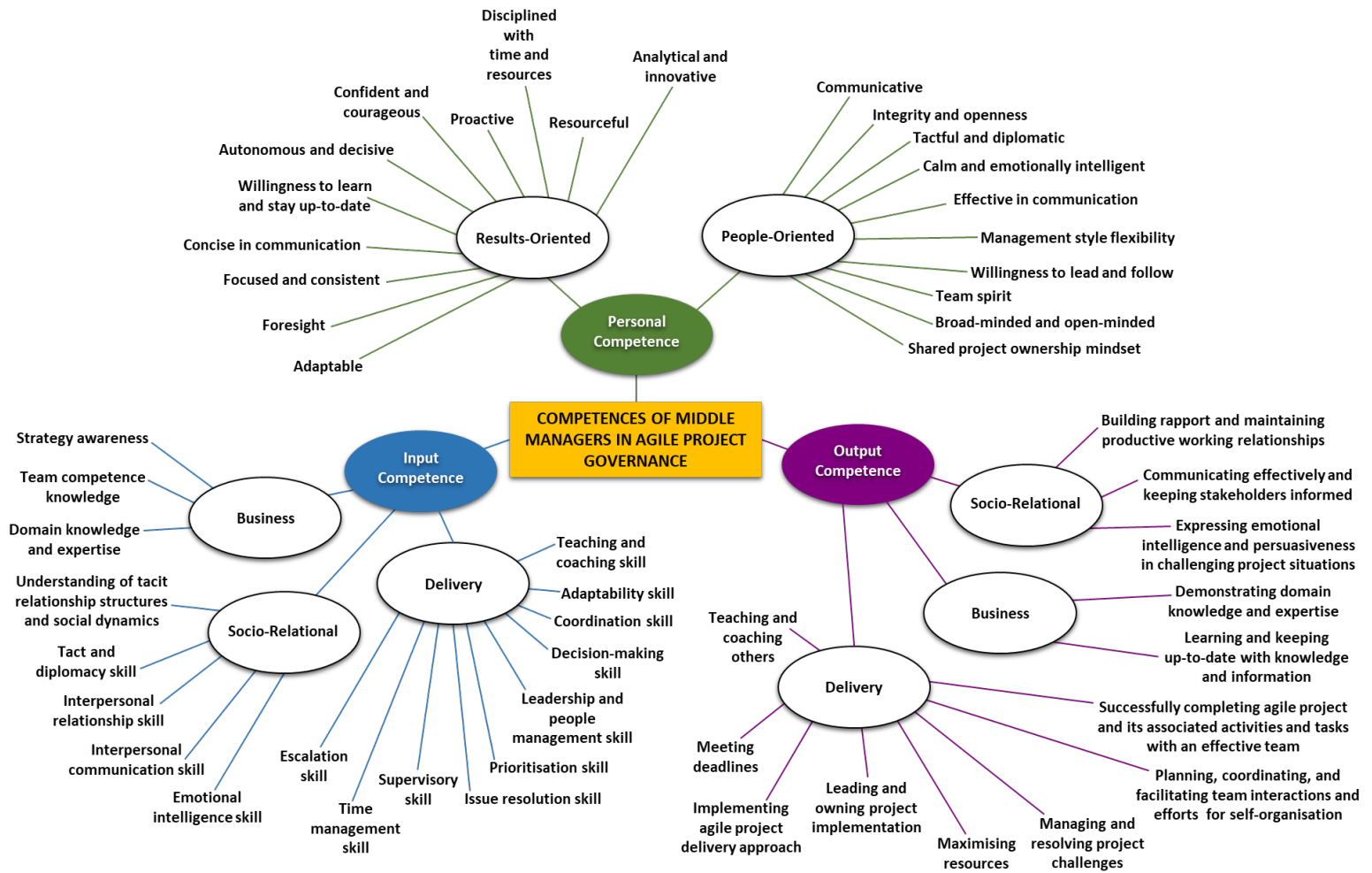


Figure 20: Thematic network of 52 MM competencies in agile PG from HOLDCOY

Table 23: Competence category and subcategory descriptions

Competence category and subcategory	Level	Description
Input competence	Category (third-order organising theme)	Input competence aspect relates to input competencies, which refer to the knowledge, skills, understanding, expertise, and experience that a MM brings to a job (e.g., agile software project)—including those developed and acquired in the course of doing the job
Personal competence	Category (third-order organising theme)	Personal competence aspect relates to personal competencies, which refer to personal attributes, personality traits, personality characteristics, behaviors, personal qualities and tendencies that underly a MM’s capability to perform a job
Output competence	Category (third-order organising theme)	Output competence aspect relates to output competencies, which refers to demonstrable performance, i.e., the ability to apply and demonstrate held

Competence category and subcategory	Level	Description
		knowledge, skills, expertise, experience, personality characteristics in relation to a MM's work
Delivery competence	Subcategory (second-order organising theme)	Delivery competence aspect represents the aspects concerned with bringing about the expected software by keeping project work organised and on course to deliver expected project results
Socio-relational competence	Subcategory (second-order organising theme)	Socio-relational competence aspect is concerned with MMs' social interactions and relationships with other project stakeholders. It relates to the human and social aspects of their engagement in agile software projects
Business competence	Subcategory (second-order organising theme)	Business competence aspect relates to all aspects of business and strategy essential for MMs to support project work and create expected software in order to accomplish the project. These include business strategy awareness, internal and external domain knowledge and expertise, and knowledge of team member capabilities needed to create expected software
Results-oriented competence	Subcategory (second-order organising theme)	Results-oriented competence aspect represents the set of personality characteristics and tendencies that aid MMs to focus, persevere, adapt, and remain steadfast in achieving project expected results and end goals in order to ultimately accomplish mandated software projects
People-oriented competence	Subcategory (second-order organising theme)	People-oriented competence aspect represents the set of personality characteristics and tendencies that aid MMs to support, develop, and interact with the people they work with in a productive manner. In so doing, MMs are able to foster a positive and productive project environment where healthy interpersonal work relationships thrive for the benefit of their software projects and stakeholders

Competencies in Input Competence Category

Eighteen input competencies pertaining to MMgmt were identified in HOLDCOY agile PG setting. Based on thematic analysis interpretations, the results suggest that the input competencies which are important for MMs to have consist of 10 delivery input competencies, five socio-relational input competencies, and three business input competencies. The delivery input competencies are *Teaching and coaching skill*, *Adaptability skill*, *Coordination skill*, *Decision-making skill*, *Leadership and people management skill*, *Prioritisation skill*, *Issue resolution skill*, *Supervisory skill*, *Time management skill*, and *Escalation skill*. The socio-relational input competencies are *Emotional intelligence skill*, *Interpersonal communication skill*, *Interpersonal relationship skill*, *Tact and diplomacy skill*, and *Understanding of tacit relationship structures and social dynamics*. The business input competencies are *Domain knowledge and expertise*, *Team competence knowledge*, and *Strategy awareness*. These competencies are described in Appendix O with excerpts of original data presented in italics, however, some are also described below.

Teaching and Coaching Skill

The *Teaching and coaching skill* refers to the ability of MMs to educate other team members and facilitate their learning, transmit knowledge that will enable and empower teammates so that they know what to do or how to act in particular situations during project delivery. This may help avert knowledge gaps and key-person risk if teammates leave the organisation or agile project team.

“You [MM] need to make sure you teach; you educate your team... He [MM] supervised the development of the project to a great extent but on his leave, it was like the team was just stuck for months; they were unable to do anything... he did not educate his team and when he left, the team became useless” P6 (Head of Technology and Scrum Master, MM).

MMs should be able to share and transfer knowledge and provide professional guidance to support collective project work in the agile team so as to facilitate accomplishment of shared project goals.

Adaptability Skill

The *Adaptability skill* is refers to the ability of MMs to change and adapt to changes so as to achieve project goals. It is important for a MM to have the capacity to consider and conform to necessary changes and adjustments that may be required to improve or support how an agile project team operates. This may involve reflecting on the way the team works and where changes are needed, and seeking and adopting new ways to ensure the team achieves its goals. It may also involve adjusting to situations of resource unavailability: taking up the duties of team members when they are unavailable to handle project tasks.

“if I see the way we went through our work for the week isn’t fine, I’ll look for another way the following week to ensure we achieve our goals” (P1, Head of Operations, MM).

“I’m sending in two people into the banks... for the day, I’m going to have to take up some tasks that they should have worked on” (P6, Head of Technology and Scrum Master, MM).

Coordination Skill

The *Coordination skill* is the ability of MMs to interface with different project stakeholders and coordinate and facilitate different aspects of project work and engagements in an organised and harmonious manner to accomplish the project. In HOLDCOY, coordination was a critical aspect of the day-to-day work that MMgmt performed during their ASD project. Hence, an important

competency for MMs is the ability to coordinate effectively to deliver quality outcomes on schedule.

Observation from Sprint Planning Meeting:

“Head of Operations coordinates the meeting. Head of Operations interacts with the team members to update their Jira software tasks. Head of Operations runs through the Jira tasks, checking status of current sprint (i.e., determining the tasks that have been completed and those tasks that are still pending)”.

Decision-making Skill

The *Decision-making skill* is about MMs having the ability to make decisions and engage in collaborative decision-making on project matters. MMs should know how to involve other team members in the decision-making process. Collaborative decision-making engaged by the MMs encourages teammates to contribute ideas and opinions during project interactions, thereby fostering team empowerment and shared project ownership.

“not that they [MMs] make the whole decisions at all times... in most cases we try and like get to a very good consensus of what should be done... So it helps me, so it makes me, like I will be able to contribute to what needs to be done and how it needs to be done, how long it will take and all of that. So in most cases, they also listen to the feedbacks they get from us on, ‘okay let’s not do it that way, let’s do it this way” (P2, App Support Developer, LOW).

Leadership and People Management Skill

The *Leadership and people management skill* refers to the ability of MMs to lead others and manage different people, exercise emotional intelligence, motivate team members, and take initiative during project delivery—to address challenges that impact project work, for example.

“there are a lot of things that can be happening to developers maybe it may not even be a work related issue, it might be personal issue... as an agile leader what I do is I come to, I speak with the person, where is the problem coming?... if I’m having any challenge with a tool or document I raise it up with the necessary person, especially if it’s something that is affecting my work with my developers or something that is slowing our work... You [MM] need to be there for your team” (P1, Head of Operations, MM).

Supervisory Skill

The *Supervisory skill* refers to the ability of MMs to oversee and follow up with team members and their assigned tasks in order to stay up to date with their work and ensure project work is progressing and completed as expected without hindrance. Refer to Appendix O for examples of data regarding *Supervisory skill*.

Emotional Intelligence Skill

The *Emotional intelligence skill* concerns the ability of a MM to understand what other team members are experiencing or feeling (i.e., their emotions), showing concern towards their well-being, and engaging and interacting with them appropriately with empathy and self-control during emotionally sensitive situations (e.g., conflict situations).

“one quality that an agile leader must have is emotional intelligence because there are a lot of things that can be happening to developers maybe it may not even be a work-related issue, it might be personal issue... once you notice things like that as an agile leader what I do is I come to, I speak with the person, where is the problem coming from?... team members can maybe say some things or frustrate you to the extent that you want to shout back at them... I’ll always know the kind of emotion that this person’s having at that moment and how to address that emotion” (P1, Head of Operations, MM).

Domain Knowledge and Expertise

Domain knowledge and expertise has to do with MMs having knowledge and understanding of different aspects of the agile project to ensure successful project delivery. The various aspects include project and product knowledge, customer needs and industry knowledge, agile software development, project management, IT networking, knowledge of organisation(s) and stakeholders involved in the project, project documentation, organisation processes and policies and regulations, and use of project software tools.

“The first thing that I will say managers [MMs] must possess is the knowledge of what agile is in the first instance” (P6, Head of Technology and Scrum Master, MM).

“You [MMs] are building a product for financial services; you need to understand how that..., whatever segment of financial services you’re building for you need to understand how it works” (P9, CEO of TECHCOY division, senior management).

Competencies in Personal Competence Category

In the HOLDCOY agile PG context, 21 personal competencies relevant to MMgmt were identified. The findings indicate that personal competencies which MMs are expected to possess are 11 results-oriented personal competencies and 10 people-oriented personal competencies, according to thematic analysis interpretations. The results-oriented personal competencies are *Adaptable, Foresight, Focused and consistent, Concise in communication, Willingness to learn and stay up-to-date, Autonomous and decisive, Confident and courageous, Proactive, Disciplined with time and resources, Resourceful, and Analytical and innovative*. The people-oriented personal competencies are *Communicative, Integrity and openness, Tactful and diplomatic, Calm and emotionally intelligent, Effective in communication, Management style flexibility, Willingness to lead and follow, Team spirit, Broad-minded and open-minded, and Shared project ownership mindset*. Appendix P provides a description of each of these personal competencies under their respective overarching subcategories, however, some are described below.

Foresight

This refers to the personality that can think ahead and foresee what may happen in the future within a project (e.g., problems, risks) before it happens based on observed or perceived realities and occurrences. A MM with foresight may aid the team in developing and implementing preventive measures to avoid or overcome potential risks and issues that may adversely affect their project.

“you [MM] must try to have some kind of foresight onto..., you must see the problem before it even arises. You must be able to anticipate deadlocks in whatever implementation strategy you want to employ” (P6, Head of Technology and Scrum Master, MM).

Focused and Consistent

This personal competency is about MMs being resolute and focused on achieving project goals and expected deliverables without losing sight of them (i.e., a goal-getter), and consistent in performing PG practices (e.g., organising daily Scrum, sending regular project updates to stakeholders) to achieve project goals.

“If everybody is deviating [during project meeting discussions], I probably allow you to deviate for like one minute... I always come back and I chip back in and say guys, don’t let us deviate from this, this is what we want to achieve” (P1, Head of Operations, MM).

They [MMs] have to be consistent right. If you say you do Scrum every day, make sure you have it every day. If you send or agree as part of..., as part of governance, you will send weekly status..., project updates, send it weekly right. Consistency very key” (P9, CEO of TECHCOY division, senior management).

Concise in Communication

This refers to the personality that can compress large quantity of information and express it clearly and briefly in a simple form. This will help MMs to rapidly transmit information when interacting with stakeholders during project delivery to help achieve project goals.

“You [MM] have to be concise in your communication... When you are interacting with those guys [senior management on client side] they don’t have hours... You typically would have ten minutes, fifteen minutes max to get what you need” (P9, CEO of TECHCOY division, senior management).

Autonomous and Decisive

This refers to the personality of a MM to make decisions on project matters and act by one’s own reasoning, volition and sense of judgment regarding project matters. An autonomous and decisive MM can foster team self-organisation by helping to reduce decision latency—when resolving project issues, for example.

“if, during the course of the week, the Project Manager [Project Manager and Business Analyst, LOW] doesn’t still have any luck at getting these things resolved they escalate to me, and when they escalate to me I go in there to have like a senior conversation with senior personnel [senior management on client side] and ensure that this thing happens” (P1, Head of Operations, MM).

Team Spirit

This pertains to MMs being approachable, self-sacrificing, and having a democratic personality that can collaborate and relate well with different people and provide (or receive) necessary support as a team player for effective teamwork and achievement of shared goals. A MM with good team spirit is considerate and supportive and recognises that other people may not be as proficient as

themselves. Hence, they complement the efforts of others by leveraging their own capabilities. Refer to Appendix P for examples of data regarding *Team Spirit*.

Broad-minded and Open-minded

This pertains to MMs having a personality that accepts feedback, tolerates different viewpoints and opinions of other team members (i.e., broad-minded), and open to new ideas and knowledge (i.e., open-minded).

“everybody has the right to express their own view whether for or against my decisions” (P6, Head of Technology and Scrum Master, MM).

“they [MMs] also listen to the feedbacks they get from us on, ‘okay let’s not do it that way, let’s do it this way because of this, this and this’” (P2, App Support Developer, LOW).

Shared Project Ownership Mindset

This pertains to MMs having a personality that recognises that for an agile project to succeed, each team member needs to own the project and own their respective assigned project tasks so as to promote self-organisation, accountability, and team autonomy.

“the only way an agile project can succeed is if your team members actually own this project and own each task... if, as a boss, you are just directing, directing, directing, what will happen in that scenario is these people are just working to achieve your task, they are not owning the task as theirs... But, if you are a servant-leader you are ensuring that your team is self-organising; you are ensuring that your team members are owning their task” (P1, Head of Operations, MM).

Competencies in Output Competence Category

Thirteen output competencies pertaining to MMgmt were identified in HOLDCOY agile PG setting. Results suggest that three socio-relational output competencies, two business output competencies, and eight delivery output competencies constitute the various output competencies that MMs are expected to possess, based on conclusions drawn from thematic analysis. The socio-relational output competencies are *Building rapport and maintaining productive working relationships*, *Communicating effectively and keeping stakeholders informed*, and *Expressing emotional intelligence and persuasiveness in challenging project situations*. The business output

competencies are *Demonstrating domain knowledge and expertise*, and *Learning and keeping up-to-date with knowledge and information*. The delivery output competencies are *Successfully completing agile project and its associated activities and tasks with an effective team*, *Planning, coordinating, and facilitating team interactions and efforts for self-organisation*, *Managing and resolving project challenges*, *Maximising resources*, *Leading and owning project implementation*, *Implementing agile project delivery approach*, *Meeting deadlines*, and *Teaching and coaching others*. These output competencies are described in Appendix Q under their respective subcategories, however, some are described below.

Building Rapport and Maintaining Productive Working Relationships

MMgmt participation in the HOLDCOY ASD project entailed working closely with people across intra- and inter-organisational boundaries (e.g., senior managers, teammates, and external project stakeholders). Hence, this competency pertains to MMs demonstrating the ability to build rapport and maintain productive interpersonal working relationships with various project stakeholders during project implementation, which can help strengthen teamworking and trust, as well as facilitate collaboration and issue resolution.

“always speaking one on one with developers especially when you are seeing a sign of slow, maybe in terms of task delivery, the person doesn’t deliver on time, that is part of my role to ensure..., to always call the person and say..., to ask what the problem is... senior managers which I know if I need someone to push or ‘put fire’ on the staff: maybe the normal regular staff at the bank, at least those people can actually do that. I hold that strategic relationship. I have it with all the stakeholders” (P1, Head of Operations, MM).

Expressing Emotional Intelligence and Persuasiveness in Challenging Project Situations

This competency pertains to MMs demonstrating emotional intelligence (i.e., expressive empathy, calmness, temperament control) towards team members during challenging project situations to encourage and motivate them, and at the same time being persuasive without applying excessive pressure on team members so as to ensure assigned project tasks and set goals are accomplished in such situations.

“one of the ways they [MMs] can demonstrate their competences is by showing..., letting the people they are managing, the software engineers, tech guys, project managers, letting them

understand that they know what they are going through. That's one of the ways they will show their competences, understanding them and making them know that, well, we understand that the timeline is short and you just need to get this done” (P2, App Support Developer, LOW).

Demonstrating Domain Knowledge and Expertise

This competency pertains to MMs demonstrating knowledge and understanding of different aspects of an agile project to ensure successful project delivery. The various aspects include project and product knowledge, project documentation, customer needs and industry knowledge, agile software development, project management, IT networking, knowledge of participating organisation(s) and stakeholders in the project, organisation policies and regulations, and use of project software tools. If MMs cannot demonstrate domain knowledge and expertise, it may be difficult to interact effectively with project stakeholders, make meaningful contributions, tackle issues and proffer solutions. Also, people may not learn much from them.

“in terms of the networking aspect of this [project], I am the one that handled this personally because of my level of experience... the way a middle-class manager can demonstrate his competency is, first off, domain knowledge. If you don't have that domain knowledge there's nothing for anybody to learn from you” (P1, Head of Operations, MM).

“the Jira app I talked about, yeah he [Head of Operations] was the one that put us through the app... put us through on how it's being used, what each of the functionalities are and what they mean” (P3, Product Enhancement Developer, LOW).

Successfully Completing Agile Project and its Associated Activities and Tasks with an Effective Team

This competency pertains to MMs demonstrating the ability to (a) focus and complete a given agile project, build an effective team, and deliver expected good-quality project results, and (b) carry out project activities and deliver on tasks that MMgmt is required to ensure are completed.

“Demonstrate competence..., so I think..., first, the most obvious way from a holistic perspective would be the quality of the team and the quality of work, because if you are an agile, if you are following that and you're an agile middle level manager and you're adhering to those principles, then the first evidence of that would be in your team and the quality of work that they deliver and the way work is done” (P7, Head of Business Development, MM).

Maximising Resources

The HOLDCOY ASD project necessitated effective utilisation of resources to meet project expectations. Hence, *Maximising Resources* refers to MMs being able to maximise available project resources (e.g., human resources) and adapt so as to nurture and promote cross-functionality in the agile team, minimise resource wastage, and meet project timelines.

“Ability to maximise available resources. You [MM] must learn how to do that. Like, for example, when I told you when our tester left impromptu, the way we had to manage to ensure that we are still delivering quality” (P1, Head of Operations, MM).

Leading and Owning Project Implementation

This competency pertains to MMs being able to (a) lead in an agile project environment (e.g., providing agile leadership and technical leadership) and delegate, (b) own project implementation and perform project duties with confidence (e.g., stakeholder engagements, issue resolutions, process improvements), and (c) operate with a shared project ownership mindset to promote team autonomy and accountability.

“They [MMs] should take ownership. They should lead really right, its..., they should lead really they should lead. So, I’ll give an example. They don’t have to wait on the senior management person to set up a meeting with the external stakeholder... They should go ahead and setup that meeting... one clear sign of competence right is being able to hold your own right, be able to lead, engagement... And hold your own during the engagement” (P9, CEO of TECHCOY division, senior management).

Teaching and Coaching Others

This competency pertains to MMs demonstrating the ability to teach and transfer knowledge to other team members in order to prevent knowledge gap and key-person risk in the agile project environment. Refer to Appendix Q for examples of data regarding *Teaching and coaching others*.

4.2 The BANKCOY Case

The second case organisation is the Nigerian microfinance bank (BANKCOY). The identified roles and competencies of MMgmt in BANKCOY’s agile PG environment are presented in the subsections that follow.

4.2.1 Roles of Middle Managers in Agile Project Governance

The findings indicate that MMgmt performed 21 roles during the governance of the BANKCOY ASD project. Figure 21 illustrates a thematic network comprising 21 *basic themes* representing MMgmt roles in the agile PG activity’s division of labour. The various roles are grouped into five *organising themes* (role categories). A superordinate *global theme*—*Roles of middle managers in agile project governance*—links the role categories. The roles were performed in the *Planning and coordination for project alignment and execution*, *Continuous improvement and organisational change*, *Agile and technical leadership*, *Monitoring*, and *Capability building* role categories, respectively. The role categories and roles were identified and named by considering the contexts in which MMs performed the roles in the ASD project as contained in data. The MMs roles in their corresponding role categories are detailed below.

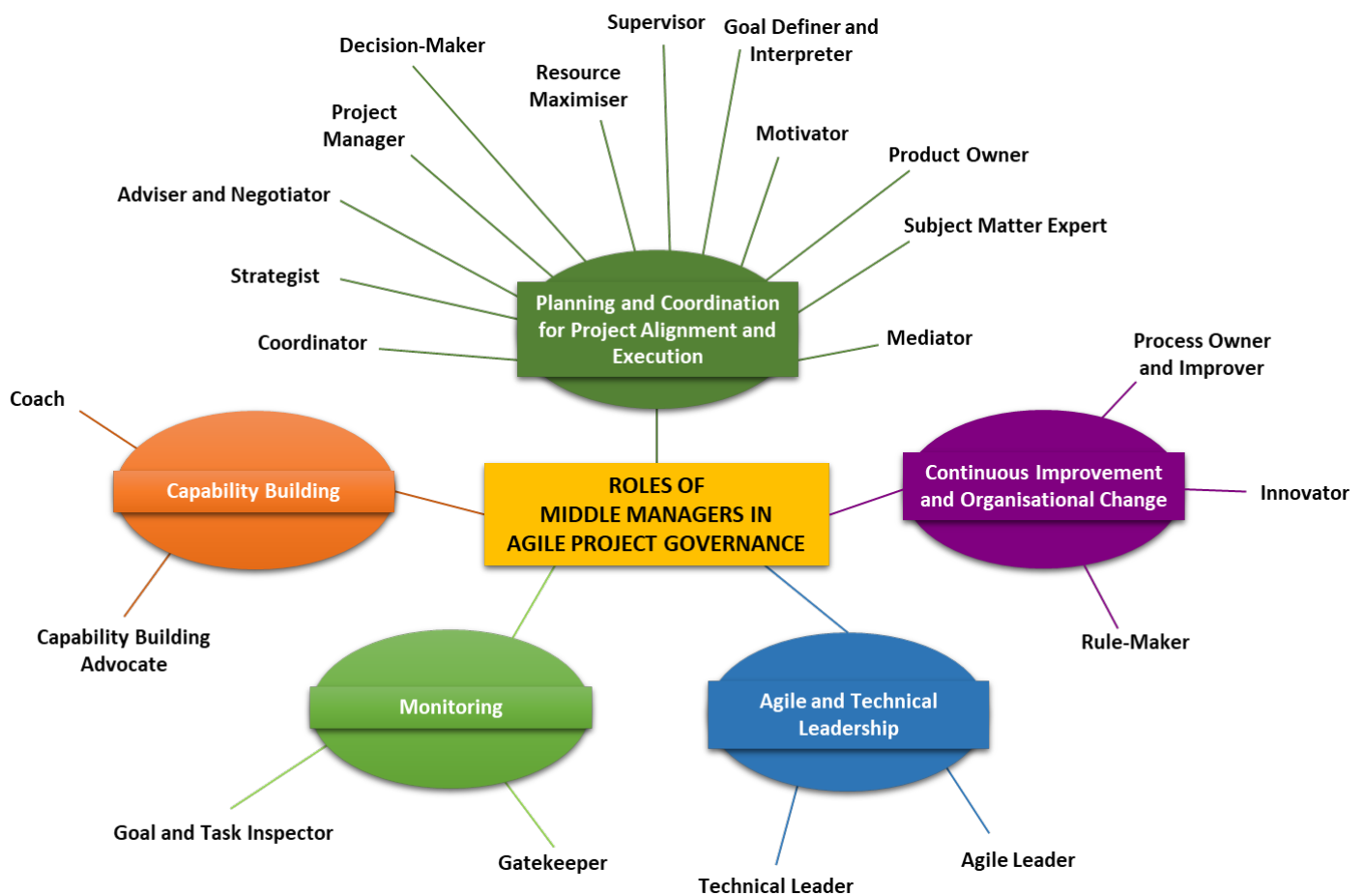


Figure 21: Thematic network of 21 MM roles in agile PG in BANKCOY

Planning and Coordination for Project Alignment and Execution

In order for ASD projects to succeed and meet desired goals and expectations, stakeholders must work together. A successful project requires planning, coordination, and alignment between stakeholders, timelines, and business strategy throughout the entire delivery process. By performing 12 roles, viz., *Coordinator, Strategist, Adviser and Negotiator, Project Manager, Decision-Maker, Resource Maximiser, Supervisor, Goal Definer and Interpreter, Motivator, Product Owner, Subject Matter Expert, and Mediator*, MMs in the BANKCOY agile project team contributed towards planning and coordination during their ASD project, including maintaining alignment between stakeholders, timelines, and business strategy. The roles are described below.

- **Coordinator**

In performing the *Coordinator* role, MMgmt in the persons of P11 (Project and Change Coordinator, MM) and P12 (E-channels Manager, MM) coordinated project work through agile delivery. They acted as an interfacing bridge between different stakeholders (e.g., senior management, various sub-teams in the agile project team, and customers, i.e., users or IT service requesters) in order to advance project delivery. P11 communicated project progress and status reports to senior management, i.e., P21 (CIO), and other stakeholders external to the IT department. The *Coordinator* role of MMgmt involved ensuring that project work was carried out by the agile project team and other stakeholders in a way that was aligned, organised, and harmonious with minimum disruption, and in alignment with project timelines. This *Coordinator* role also involved making sure that every stakeholder had a clear understanding of the project requirements.

“I’m the coordinator when it comes to sprints and agile and also our monthly iteration. So, I coordinate between DevOps, the QA, the user or the requester, then also align all this coordination with my line manager, which is the CIO... For the agile IT project, coordinating now is to ensure that stakeholders understand the requirements of the project or the active sprint... Then also, that we have each document, artifact ready. Then two..., three, each resource or stakeholder aligns with time estimates or timeline of the project. Then also manage conflict, then communicate to other stakeholders or other external unit outside of IT the progress and status of the projects” (P11, Project and Change Coordinator, MM).

“the coordination of that project [BANKCOY ASD project] lies on my table. So, I coordinate what every other person has to do with the various timeline apportioned to them” (P12, E-channels Manager, MM).

According to senior management (i.e., P21), P11 and P12 played a special role in the ASD project: they were in-charge of the entire end-to-end value chain of the project. A responsibility of the value chain owner was to orchestrate project work and ensure that all project stakeholders stayed the course and remained aligned from conception to successful project completion. In BANKCOY, a single person would normally play the role of value chain owner in a project, however, in the BANKCOY ASD project, it was deemed necessary to put two people in charge of the end-to-end value chain on account of the complexity and weight of the project in the bank’s project portfolio.

“we realised quickly that you need to have one person who’s actually in charge of the whole end-to-end value chain for instance right. Like that person is like bringing everybody together... if you want to look at the value chain as a role, like this guy is the guy who makes sure that everybody actually lead to the same road, because the road is where you define your starting point, your end goal point... in this role [value chain owner role] now, you can do it..., sometimes it can be one person, sometimes you can..., depending on the complexity and then the weight of the project as well, you can link that person with also the business analyst or the owner from the functional perspective, right. The [BANKCOY ASD project name] project, for instance, it was two people: you have like the Change Lead [Project and Change Coordinator] and then you had the Product Manager [E-channels Manager], basically. The two together, they were driving this” (P21, CIO, senior management).

Besides P11 and P12 being in charge of the overarching project coordination, other MMs in the BANKCOY agile project team coordinated the sub-teams and project tasks they were overseeing.

- **Strategist**

To achieve project goals and expectations, MMgmt—in the *Strategist* role—engaged in and encouraged strategic practice in the agile project team. In doing so, they helped in ensuring project needs and challenges were being handled (e.g., devising specific project solutions) to accomplish project objectives. In strategising for instance, P13 (DevOps Lead, MM) collaborated with his teammates to identify steps to tackle integration and knowledge gap issues they faced with their

external vendor's legacy technology. The strategic steps included doing more research about the legacy technology, learning more, and seeking support.

“the technology [external vendor's technology solution] used was somehow, I don't want to use old version, but an earlier technology that even myself and some members of the team had to learn... I had to decide on what we had to use internally. So, I did research to pick the best tools for us to use, and also to learn about the technology that we were integrating with, which was outside the scope of what we were doing but for that project we had to do that... Just to now have meeting with internal [agile project team] like, 'Okay, if there's need to do more research about...','. Just to emphasise that it's not about what you know how to do or how you are doing it, it's about you having to do it according to what is required. If it means you have to go and learn; just seek support” (P13).

- **Adviser and Negotiator**

In performing the role of *Adviser and Negotiator*, MMgmt advised project stakeholders regarding PG requirements that were necessary to consider and address in the ASD project so as to safeguard project outputs. For example, as a member of the Information Security and Assurance sub-team, P16 (Information Security and Assurance Lead) played an advisory role by advising the agile team and project stakeholders on information security and assurance matters, using experiential knowledge. He contributed to proffering security recommendations, as well as collaborating and negotiating with other project stakeholders for the acceptance and implementation of such recommendations in order to address identified security flaws. This was crucial to ensure the project's software product was secure and compliant with prescribed information security standards and policy requirements in the organisation. It was also important in order to provide senior management with security assurance regarding the project's software product.

“We just play advisory role in terms of security alright, and assurance to the management that one, this application has been tested and it is okay” (P16).

- **Project Manager**

In the BANKCOY ASD project, the *Project Manager* role performed by MMgmt included engaging team members to ascertain work progress and project challenges that team members encountered, as well as ensuring team members provided regular reporting and daily feedback

regarding status of their assigned tasks. P11 (Project and Change Coordinator, MM) and P12 (E-channels Manager, MM) were co-project managers, both overseeing the project management function in the agile project team and project. See Appendix N for data examples regarding the *Project Manager* role.

- **Decision-Maker**

As *Decision-makers*, MMgmt contributed to key decision-making in the agile project team. For example, the MMs were involved in making project timeline decisions, product design decisions (e.g., P12), and technical development decisions (e.g., P13).

“That’s what the product owner [E-channels Manager, MM] is also there for—they say, ‘okay we have done this one fast, so let’s do this’, ‘Ah no, this one has changed because now let’s adjust this design... he [E-channels Manager, MM] can take the decisions quickly based on the mandate also given to him. For some decisions he has to come back to the Change advisory board” (P21, CIO, senior management).

“I did research to pick the best tools for us to use, and also to learn about the technology that we were integrating with, which was outside the scope of what we were doing but for that project we had to do that. I was the one that decided those tools and technology that we used” (P13, DevOps Lead, MM).

The MMs enabled decision-making in the agile project team to advance project delivery, which helped ensure that the team operated as a self-managed entity with considerable degree of autonomy.

- **Resource Maximiser**

MMs performed the *Resource Maximiser* role in the BANKCOY ASD project by managing resource shortfalls in their agile project team and project. MMgmt (e.g., P12) achieved this by identifying and utilising available team members that could assist to fulfil the support needs of other teammates in team—the needs included providing assistance in completing outstanding project tasks. Also, P12 (E-channels Manager, MM) and P14 (IT Operations Manager, MM) in collaboration with P15 (Enterprise Solution and Service Desk Lead, LOW), were able to maximise resources by identifying and leveraging redundant material resources (e.g., unused database server resource) to fill material resource gaps in the ASD project and meet project implementation needs.

MMgmt's contribution in this role was important to ensure project delivery remained unhindered. See Appendix N for data example regarding the *Resource Maximiser* role.

- **Supervisor**

In performing the role of supervisor, MMgmt in BANKCOY supervised project work in the agile project team by working closely with members of the various sub-teams they oversaw. By overseeing their subordinate teammates in the agile project team, the MMs ensure that subordinates deliver the expected project deliverables that are required from them.

“they [MMs] are the first point of contact for each unit whereby they lead... they [MMs] ensure the resource reporting to them actually delivered on what is expected” (P11, Project and Change Coordinator, MM).

- **Goal Definer and Interpreter**

As *Goal Definer and Interpreter*, the MMs in BANKCOY (i.e., P12 and P13) contributed to defining and interpreting project goals and requirements, which were explained so that project team members and other stakeholders could fully understand what needs to be accomplished in terms of the project tasks and expectations. P12 (E-channels Manager, MM) defined user requirements and gathered requirements from internal and external stakeholders for the ASD project. P12 ensured project requirements were clearly understood by both internal and external stakeholders. Also, to ensure technical alignment between BANKCOY's technical specification for the ASD project and the technical specification of the external vendor's team, the DevOps Lead (P13, MM) interpreted and explained the project's technical specifications to internal and external stakeholders to ensure technical goals and requirements were understood by all parties. He explained BANKCOY's technical specification to the external team, and also interpreted and explained the external team's technical specification to all internal project stakeholders.

“what I mean by technical alignment is that we are having two technical teams, the external party [external vendor team] had their own technical specification; we had our own. So, I was able to be the one in the meeting to make sure that both teams..., to explain every detail of the technical design to their own [team] so that they can understand our technical specification. And it was my responsibility to interpret their own technical requirements and understand it 100%, and to be able to relate that to every stakeholder internally” (P13, DevOps Lead, MM).

- **Motivator**

In BANKCOY, P11 and P12—the project value chain owners—were *Motivators* by trusting others in the team to make choices that would contribute to project accomplishment. In spite of being one of the value chain owners by senior management mandate, P11 (Project and Change Coordinator, MM) allowed other MMs to contribute in making project-related choices and deciding project work and scheduling—thereby encouraging autonomy—so that the agile project team as a whole could achieve shared success. P12 (E-channels Manager, MM) recognised the value of other team members—both those in MMgmt and LOW—and trusted their capabilities. In doing so, he was able to leverage the expertise and contributions of other teammates to resolve project issues (e.g., IT infrastructure capacity issues). For example, the ASD project at some point had insufficient database server capacity to meet project need. P12 trusted and relied on P14 (IT Operations Manager, MM) and P15 (Enterprise Solution and Service Desk Lead, LOW)—they both helped to resolve the issue by identifying a redundant server that was adequate to satisfy the IT infrastructure server needs of the ASD project. Refer to Appendix N for examples of data regarding the role of P11 and P12 as *Motivator*.

- **Product Owner**

MMgmt performed the role of *Product Owner* in the BANKCOY ASD project. P12 (E-channels Manager, MM) was the product owner in the project.

“A middle manager here was the product owner [E-channels Manager, MM]” (P21, CIO, senior management).

As *Product Owner*, P12 was accountable for making product design decisions adaptively to ensure the desired software product was built to specification in order to realise the product vision. MMgmt’s contribution in this role was very important for the project because it also allowed the team (through P12) to give adequate attention to the content and quality of various iteration outputs to ensure software product requirements and expected first-rate results were achieved.

“But the product owner will focus more on the content, quality of the different outputs of iteration basically, right. And that was very key because it’s not only about moving fast because at the end of the day you need to deliver something, which meets the requirement, which also has quality and so forth. And usually in agile project you therefore allow also to change requirement or to increase requirement and stuff like that. That’s what the product

owner [E-channels Manager, MM] is also there for-they say, 'okay we have done this one fast, so let's do this', 'Ah no, this one has changed because now let's adjust this design and blah blah'. That's..., he can make..., he [E-channels Manager, MM] can take the decisions quickly based on the mandate also given to him" (P21, CIO, senior management).

- **Subject Matter Expert**

As *Subject Matter Experts*, MMs in the BANKCOY agile project team provided specialised input and expertise on various aspects of their ASD project. For example, technical know-how regarding software development (P13, DevOps Lead), IT infrastructure (P14, IT Operations Manager), and information security and assurance (P16, Information Security and Assurance Lead). Basically, the MMs leveraged their advanced and unique knowledge and experience to provide specialised insights that supported various aspects of project work for successful project delivery. Refer to Appendix N for example of data regarding the *Subject Matter Expert* role.

- **Mediator**

In BANKCOY, P12 (E-channels Manager, MM) acted as a *Mediator*. He intervened as a middleman to help resolve a conflict between warring members of the agile project team by helping to bring about a settlement. A network connection between BANKCOY's software environment and external vendor's environment suddenly failed. Reason for failure was unknown, which led to a blame game between the DevOps and IT Operations sub-teams. P12 interposed between the two parties and recommended that tests should be performed to detect root cause. It was later discovered that the root cause was actually an issue in the external vendor's software environment. Refer to Appendix N for example of data regarding the *Mediator* role.

Continuous Improvement and Organisational Change

In order to enhance working procedures and enable team productivity, flexibility, and efficiency during the BANKCOY ASD project, MMgmt engaged in continuous improvement efforts. Organisational changes were frequently the result of these efforts. They enabled continuous improvement and organisational change by playing a variety of roles, viz., *Process Owner and Improver, Innovator, and Rule-maker* roles.

- **Process Owner and Improver**

As *Process Owner and Improver*, MMgmt in the BANKCOY ASD project was accountable for implementation of prescribed PG processes and procedures in the project. MMgmt (e.g., P14, IT Operations Manager, MM) was involved in actualising process changes that needed to be made for continuous improvement; ensuring inefficiencies and areas for improvement in PG processes and procedures were identified and addressed. Refer to Appendix N for example of data regarding the role of P14 as *Process Owner and Improver*.

- **Innovator**

MMgmt performed the role of *Innovator* in the BANKCOY case. In this role, MMgmt fostered innovation and change to improve PG practice in the BANKCOY ASD project, thereby enabling the team to implement the project more efficiently to achieve expectations. For example, P18 (Head of Service Delivery, MM) was involved in recommending and introducing a new testing idea and approach in the project, i.e., automated testing and its associated software tools (e.g., Postman) for application programming interface (API) testing in order to improve how testing was performed in the project.

“we introduced a new one called Postman... For testing APIs, yeah. It’s a free application that we got online so there wasn’t need to purchase any..., but there was need for knowledge of the application, so I had to start doing a crash course on how to use Postman... The way it works is when we go for standup meetings, we try to look at how we can..., how we can test application; automate testing, and how we can test using a faster method instead of doing it manually. So, when we go for such meetings, we table..., ‘These are the softwares that we browsed or checked online, and this is what we are going to use’. So, in the standup meeting we already know as a team that we’ll be using this software. So, the next thing is let’s do a research on how to use it” (P18, Head of Service Delivery, MM).

- **Rule-Maker**

MMgmt performed the role of rule-maker in BANKCOY. For example, the Information Security and Assurance Lead (P16, MM) ensured that PG rules and standards, i.e., information security standards, were in place and also enforced to help the agile project team work in a manner that was compliant with prescribed governance measures. This was essential to ensure development and

release of quality and secure project outputs. Also, it provided senior management with the guarantee and assurance that security testing was being conducted on the application system before actual deployment to production.

“I’m the Lead, Information Security and Assurance. I work within the IT department right, majorly is just to ensure you know in terms of information security and governance in the bank, in terms of implementation of information security standards... For instance, when we are deploying our applications we have to be there as well as the Information Security Officer in the team, probably during projects to ensure that our..., you know application system being deployed is tested and we also give assurance to the management” P16 (Information Security and Assurance Lead, MM).

Agile and Technical Leadership

To quickly deliver high-quality software that meets stakeholder expectations, ASD projects involve developing software solutions in accordance with a set of work rules, principles, values, and technical activities. This allows for the decomposition and accomplishment of solution requirements in iterations and increments. The ASD project team at BANKCOY was led by MMgmt, who also served as *Agile Leaders* and *Technical Leaders*.

- **Agile Leader**

In performing the *Agile Leader* role, MMgmt in BANKCOY ensured the agile project team implemented the project in line with the agile way of working, which P11 ensured. MMgmt showed interest in technology trends and kept up to date with technologies being used in industry. They helped to keep the agile project team current with regards to contemporary SD approaches and technological tools that were needed to support project delivery. For instance, P18 was involved in introducing automated testing approach and tools to the team. Also, MMgmt practiced shared decision-making in the team, such as when project work timelines were being deliberated and decided. Also, MMgmt (e.g., P12) tend to foster adaptability in the team by being change-friendly regarding requirements and product design decisions, as implied by P21. Refer to Appendix N for examples of data regarding the *Agile Leader* role.

- **Technical Leader**

As *Technical Leader*, MMgmt in the person of P13 (DevOps Lead, MM) provided technical leadership by leading software development in the projects, providing the agile project team with advanced technical know-how and practical assistance. P13 led technical development and integration efforts in the BANKCOY project. He was the contact person for technical design documentation and architectural design. He provided technical expertise and ensured there was alignment between BANKCOY and external vendor technical specifications for the project. Refer to Appendix N for example of data regarding the role of P13 as *Technical Leader*.

Monitoring

The MMs in BANKCOY monitored project work and team members' performance in the PG activity as *Gatekeepers*, and *Goal and Task Inspectors*. They performed these roles to ensure the agile project team members accomplished assigned project tasks and goals as required.

- **Gatekeeper**

In performing the *Gatekeeper* role, the MMs in BANKCOY served as the first points of contact for any aspect of project work that pertained to members of their sub-teams. This was an accepted norm. They ensured that any task allocated to their respective sub-teams were handled by the right people with the right capabilities. The role of *Gatekeeper* by MMgmt seemed beneficial for the governance of the ASD project because it established a form of accountability, oversight, and delivery assurance mechanism in the respective sub-teams. In the same capacity, the MMs also served as a collective single point of accountability, oversight, and delivery assurance for the entire project. However, it is worth mentioning that depending on project complexity and importance, a single MM could still be the 'owner' of a project. Refer to Appendix N for examples of data regarding the *Gatekeeper* role.

- **Goal and Task Inspector**

MMgmt performed the role of *Goal and Task Inspector* in that they monitored and tracked tasks and dependencies that were identified to meet the goals of the ASD project. These were tasks and dependencies that project stakeholders were expected to complete and deliver at different stages of the project life cycle for successful project delivery. For instance, DevOps Lead (P13, MM) was

following up on various goal-critical tasks and dependencies involving the external vendor team, whose technology solution the BANKCOY project solution was integrating with. These dependencies included tasks such as provisioning of requirements (e.g., resources, assets), as well as technical meetings and sign-off meetings, which needed to take place as part of PG activities. P13 used a Dependencies checklist Excel sheet to monitor the provisioning of these dependencies by the external vendor team.

“At the project initialisation, we identified these are the things we will need from them [the external vendor team] at different stages... We had a checklist both in terms of resources, assets, and whatever we require from them. We had that checklist. And then we now had based on the project timeline, the dependencies are things even up to things like meetings, technical meetings, sign-off meetings and all those stuff. And then based on that checklist, at every stage is either ‘Completed’ or ‘Not done yet’, ‘Delayed’ and everything. So, we had the Excel. I used to manage that to monitor that” (P13, DevOps Lead, MM).

In this role, MMgmt was able to ascertain point-in-time status of project dependencies. The role served as a governance measure to help ensure project dependencies from contributory stakeholder activities were provisioned as expected—at the times they were needed as input into project work.

Capability Building

MMgmt in BANKCOY were also found to make contribution towards the capability building and competence development of their teammates in the agile project team. They accomplished this by performing the *Capability Building Advocate* and *Coach* roles.

- **Capability Building Advocate**

In the BANKCOY ASD project, project team members were actively encouraged by MMgmt to develop their capabilities. This was to ensure the team was equipped with the knowledge and skills needed to complete their tasks successfully. For example, in the *Capability Building Advocate* role, P13 encouraged his teammates to develop their capabilities by learning the legacy technology being used by their external vendor’s team (which the team was integrating with) in order to deliver on the ASD project. Integrating with the legacy technology was an onerous task that the agile project team had to accomplish. P13 researched and selected the most appropriate technology tools for the agile project team to use and support their integration work in the project. In doing so, he

was encouraging team learning and promoting a capability building culture in the agile project team. Refer to Appendix N for examples of data regarding the *Capability Building Advocate* role.

- **Coach**

MMgmt in BANKCOY helped the agile project team to build skills and capabilities. MMgmt performed the role of *Coach* by facilitating capability building training. MMgmt ensured the team possessed requisite capabilities to accomplish project tasks and meet project needs. For example, as part of his efforts to ensure the agile project team was equipped with the necessary knowledge and skills to accomplish their ASD project, evidence suggests P16 (Information Security and Assurance Lead, MM) organised and facilitated in-house training for the team on information security aspects relating to the project, thereby building the project team's capacity and increasing their potential. The contribution of MMgmt in the person of P16, was crucial for both team and project considering the sort of project they were implementing and the challenging nature of external system integration that was involved. The in-house training presented a professional development opportunity for team members, through which they became technologically enlightened. Refer to Appendix N for examples of data regarding the *Coach* role.

4.2.2 Competencies of Middle Managers in Agile Project Governance

Findings from the BANKCOY case are presented in this section with regards to competencies that are important for MMs to have for effective governance and implementation of agile software projects. Based on the BANKCOY case, data analysis results suggest that MMs should have multi-faceted competences in order to operate effectively within an ASD team and project, such as the BANKCOY agile project team and project. A total of 47 competencies that are important for MMs to have in order to function effectively when working with ASD teams in ASD projects were identified from BANKCOY. The 47 competencies are represented in a thematic network (Figure 22) as basic themes, which are grouped into five second-order organising themes (competence subcategories), viz., *socio-relational*, *delivery*, *business*, *results-oriented*, and *people-oriented* competence aspects. The second-order organising themes are also grouped into three third-order organising themes (competence categories), viz., *input competence*, *personal competence*, and *output competence*. The global theme—*Competences of middle managers in agile project governance*—links the various organising themes. Refer to the aforementioned Table 23

(Subsection 4.1.2 of Section 4.1 above) for descriptions of the overarching competence categories and subcategories. The competence categories were based on the three categories of job-specific competences (abstract PG tools) in the APGov framework. The five competence subcategories emerged from data interpretations by considering related and relevant contexts in the data regarding the various identified competencies. The corresponding competencies of MMs under each competence category and subcategory are described in the ensuing subsections below.

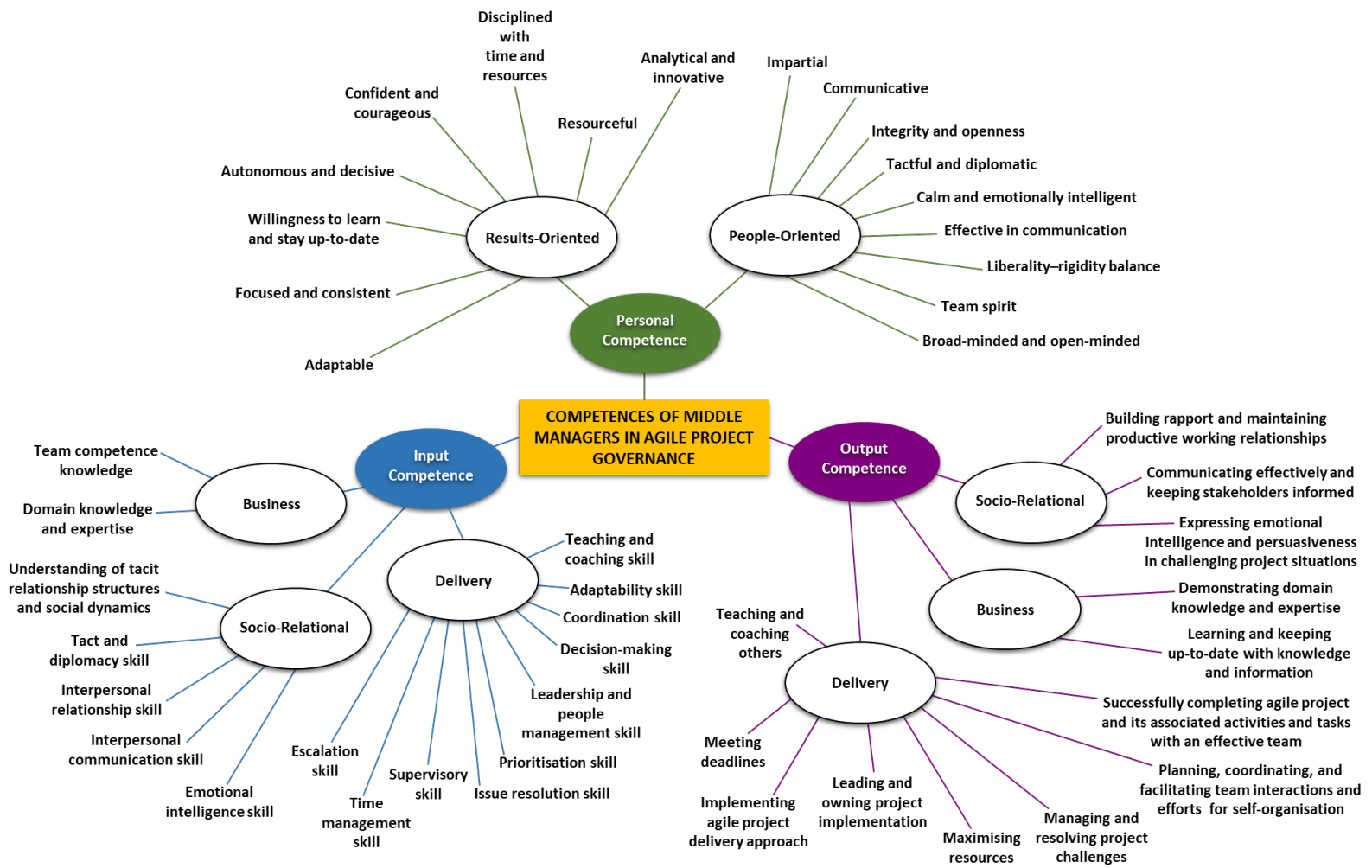


Figure 22: Thematic network of 47 MM competencies in agile PG from BANKCOY

Competencies in Input Competence Category

Seventeen input competencies pertaining to MMgmt were identified in the BANKCOY case. Based on thematic analysis interpretations, findings suggest that input competencies that are

important for MMs to have are 10 delivery input competencies, five socio-relational input competencies, and two business input competencies. The delivery input competencies are *Teaching and coaching skill*, *Adaptability skill*, *Coordination skill*, *Decision-making skill*, *Leadership and people management skill*, *Prioritisation skill*, *Issue resolution skill*, *Supervisory skill*, *Time management skill*, and *Escalation skill*. The socio-relational input competencies are *Emotional intelligence skill*, *Interpersonal communication skill*, *Interpersonal relationship skill*, *Tact and diplomacy skill*, and *Understanding of tacit relationship structures and social dynamics*. The business input competencies are *Domain knowledge and expertise*, and *Team competence knowledge*. Appendix R describes the various input competencies with excerpts of original data, however, some are also described below.

Prioritisation Skill

The *Prioritisation skill* refers to MMs' ability to prioritise by collaborating with other project stakeholders in order to determine tasks and activities that need to be performed in a prioritised order based on importance.

“They [MMs] will now come and say, ‘Hey guys, this is what we propose. We’re going to structure it [BANKCOY ASD project] like this, and then it will be like this. After one month we receive this, six weeks later we see this, [inaudible] like this’, okay. Maybe we wanted six services and then they [MMs] come back and say, ‘No. After analysis actually the two services; key services this one will deliver this one first and then this one comes next’. This is the ‘how’ part basically, that’s their responsibility to structure that to inform us [senior management]”
(P21, CIO, senior management).

Time Management Skill

The *Time management skill* refers to the ability to effectively manage allocated time for project work and activities, and adhere to timelines. Refer to Appendix R for examples of data regarding *Time management skill*.

Escalation Skill

The *Escalation skill* refers to the ability of MMs to escalate and share encountered project issues with other stakeholders on time so that escalated issues can be dealt with promptly in order to achieve project deliverables accordingly.

“you [MM] also need to appreciate escalation: you don’t bottle issues. When there are issues you escalate on time so that we can seek help on how to solve them, because I think agile method is more in tune with timebound; you have to ensure..., because those phases are actually timebound and you need to ensure those deliverables are done within the set timeline” (P12, E-channels Manager, MM).

Interpersonal Communication Skill

The *Interpersonal communication skill* is the ability to listen and interact well with project stakeholders, communicate information by reporting and presenting it effectively to project stakeholders in a way that is clear and understandable.

“communication skill is very important... we could have some salient points but the way we communicate it to the other guys, I mean the other stakeholders, if it’s not well communicated there could be a kind of a gap... I would say that he [MM] should be a good listener” (P16, Information Security and Assurance Lead, MM).

Interpersonal Relationship Skill

The *Interpersonal relationship skill* is about MMs having the ability to relate, engage, and collaborate effectively with different stakeholders in a project (e.g., senior managers, team members), thereby maintaining healthy interpersonal working relationships with others so as to produce expected results.

“also having what some people don’t really look out for is having interpersonal relationship with your colleagues; it’s very important when handling projects. You [MM] need to be able to know how to relate with your colleagues and..., either senior or junior colleagues” (P18, Head of Service Delivery, MM).

Tact and Diplomacy Skill

The *Tact and diplomacy skill* refers to the ability of MMs to handle sensitive people, navigate sensitive matters, situations, and conversations, and negotiate with persuasion and dialogue in order to reach an agreement. Refer to Appendix R for examples of data regarding this competency.

Understanding of Tacit Relationship Structures and Social Dynamics

This competency refers MMs having an understanding of the tacit (unspoken) relationship structures and social dynamics in the project environment (e.g., within the customer organisation) in order to facilitate project communications and issue escalations and resolutions.

“challenge that we can say we had during the [BANKCOY project name] were having the cooperation of the [the external vendor]... you really need to relate with them at least in a personal level before they can help you get one or two information or help you execute one or two scripts that you need to be done from their own end... Because if not, if we say we should go through the official route with them we won't accomplish a task on time” (P18, Head of Service Delivery, MM).

Team Competence Knowledge

The *Team competence knowledge* competency refers to MMs having knowledge of the capabilities, competences, and skill sets of their team members. By possessing such knowledge regarding the people they work with during project implementation, MMs will know the right people to assign specific tasks in order to ensure the team delivers on requirements and expected deliverables.

“middle managers have the fair knowledge of the ability and capability of each of the resource reporting to them. So, as far as the requirements and the deliverables of project is concerned, they know the specific resource to assign the roles based on the capability and ability of the resource under their unit” (P11, Project and Change Coordinator, MM).

Competencies in Personal Competence Category

Analysis of BANKCOY data revealed 17 personal competencies that are important for MMs to have in agile PG settings. The personal competencies are grouped into eight results-oriented personal competencies and nine people-oriented personal competencies. The results-oriented personal competencies are *Adaptable, Focused and consistent, Willingness to learn and stay up-*

to-date, Autonomous and decisive, Confident and courageous, Disciplined with time and resources, Resourceful, and Analytical and innovative. The people-oriented personal competencies are *Impartial, Communicative, Integrity and openness, Tactful and diplomatic, Calm and emotionally intelligent, Effective in communication, Liberality–rigidity balance, Team spirit, and Broad-minded and open-minded.* The descriptions of the various personal competencies are presented in Appendix S under corresponding subcategories, however, some are described below.

Adaptable

This pertains to a MM having a personality whereby the person is flexible and open to change, and can adapt to changes (e.g., learning and adopting a different technology) to achieve project goals.

“an earlier technology that even myself and some members of the team had to learn... to conform to the technology being used by the provider [external vendor team], I had to decide on what we had to use internally. So, I did research to pick the best tools for us to use, and also to learn about the technology that we were integrating with, which was outside the scope of what we were doing but for that project we had to do that” (P13, DevOps Lead, MM).

Willingness to Learn and Stay Up-To-Date

This is about MMs being willing to learn for continuous self-development that benefits agile project delivery, acquisitive for knowledge, cognisant and informed on relevant developments (e.g., current technology tools), and keen to stay up-to-date.

“we introduced a new one called Postman... For testing APIs... but there was need for knowledge of the application, so I had to start doing a crash course on how to use Postman... The way it works is when we go for standup meetings, we try to look at how we can..., how we can test application; automate testing, and how we can test using a faster method instead of doing it manually... So, the next thing is let’s do a research on how to use it” (P18, Head of Service Delivery, MM).

Confident and Courageous

This pertains to MMs having a confident and courageous personality with the self-assurance, willingness, and optimism to engage project stakeholders, handle project matters, and deal with project challenges when they arise. See Appendix S for data examples regarding this competency.

Disciplined with Time and Resources

This personal competency is about MMs being (a) disciplined and strict with time regarding meetings and adherence to project timelines, and (b) economical and not wasteful; able to maximise project resources (e.g., human and material resources).

“when I say time and resources, discipline with time when there are meetings that needs to be held both internally and externally. He [MM] must be somebody that adheres to the timeline of the project. Then in terms of resources, he must not be wasteful in resources, that is resources allocated must be properly managed.” (P13, DevOps Lead, MM).

Resourceful

This refers to the personality of a MM whereby the person is able to identify feasible problem-solving approaches and alternatives to resolve and overcome project issues in order to accomplish set project goals.

“when we hit brick wall..., specific example was when we are supposed to provide a separate database server in that project, and it was valued at about ninety million and the bank is not ready to take that huge cost at that time. So, we had to improvise. So, the manager [MM] in charge that [inaudible] and said, ‘Okay, we have a database server that we can also use’” (P12, E-channels Manager, MM).

Analytical and Innovative

This refers to the personality of a MM to analyse a situation and engage in out-of-the-box thinking to support project delivery (e.g., devising workarounds and solutions to problems). Refer to Appendix S for examples of data regarding this competency.

Communicative

This pertains to a MM having the willingness to teach and transfer knowledge to other team members and project stakeholders in order to prevent knowledge gap, knowledge hoarding, and key-person risk in the agile project environment.

“fortifying all stakeholders with details of the project is also a way of building the capability to ensure that everybody is abreast of detailed information of what the project is about, and so that you can have the holistic view and also know which area you come into play and how

you will play your part... in terms of that, each time we have our standup, I do..., I relate..., I take it from the start to say, 'Okay, this is what we are expected to do. This is what we have done. This is what is pending'' (P12, E-channels Manager, MM).

Competencies in Output Competence Category

Findings from the BANKCOY agile PG setting revealed 13 MMgmt output competencies. The output competencies consist of three socio-relational output competencies, two business output competencies, and eight delivery output competencies that MMs are expected to possess, exercise, and develop based on thematic analysis conclusions. The three socio-relational output competencies are *Building rapport and maintaining productive working relationships*, *Communicating effectively and keeping stakeholders informed*, and *Expressing emotional intelligence and persuasiveness in challenging project situations*. The two business output competencies are *Demonstrating domain knowledge and expertise*, and *Learning and keeping up-to-date with knowledge and information*. Finally, the eight delivery output competencies are *Successfully completing agile project and its associated activities and tasks with an effective team*, *Planning, coordinating, and facilitating team interactions and efforts for self-organisation*, *Managing and resolving project challenges*, *Maximising resources*, *Leading and owning project implementation*, *Implementing agile project delivery approach*, *Meeting deadlines*, and *Teaching and coaching others*. Appendix T describes the output competencies under their respective subcategories, however, some are described below.

Communicating Effectively and Keeping Stakeholders Informed

This pertains to MMs demonstrating the ability to (a) listen and interact well with project stakeholders, receive complex information, break it down into its basic components and interpret it, report and present it effectively to project stakeholders in a way that is clear and understandable, and (b) keep stakeholders informed about project happenings, progress, updates, and carry everyone along (e.g., communicating technical details).

“we are having two technical teams, the external party [external vendor team] had their own technical specification; we had our own... I was able to be the one in the meeting to make sure that both teams..., to explain every detail of the technical design to their own so that they can understand our technical specification. And it was my responsibility to interpret their own

technical requirements and understand it 100%, and to be able to relate that to every stakeholder internally” (P13, DevOps Lead, MM).

“each time we have our standup, I do..., I relate..., I take it from the start to say, ‘Okay, this is what we are expected to do. This is what we have done. This is what is pending’” (P12, E-channels Manager, MM).

Learning and Keeping Up-To-Date With Knowledge And Information

This pertains to MMs demonstrating the ability to learn and acquire knowledge that benefits agile project delivery, and keep up-to-date with relevant knowledge, developments, and information. For example, this was the case whereby P13 (DevOps Lead, MM) had to improve himself by learning the external vendor’s outdated technology used during the BANKCOY project. Consequently, the agile team was able to develop the technical know-how to deliver on the project.

Planning, Coordinating, and Facilitating Team Interactions and Efforts for Self-Organisation

This pertains to MMs demonstrating the ability to plan, coordinate, and facilitate team interactions and efforts in the agile project team (project delivery efforts, decision-making, prioritising, etc.) so as to nurture and promote a collaborative, self-organised, autonomous, and empowering agile project environment.

“in terms of the governance, when we do the project management plan, so you do it in such a way that, okay, this project can be delivered in iteration such that..., okay so..., just like I mentioned that’s the beautiful part that I actually appreciate in that method [agile method]. So, we designed it to..., to have it delivered in piecemeal, ‘Okay in Phase 1 or let’s say Iteration 1, this is what we are going to be having” (P12, E-channels Manager, MM).

“I led the integration, yes. And then when it was needed for us to meet with the technical team of the provider [external vendor team], I was the interface between our team..., I actually met with their own technical team [external vendor team] to even sort some things out. So, I was like the point contact person technically” (P13, DevOps Lead, MM).

Managing and Resolving Project Challenges

This pertains to MMs demonstrating the ability to manage project escalations and challenges by taking action to find precise solutions to the challenges either independently without escalating to higher level of authority (where possible), or in collaboration with other stakeholders.

“where they [desired results] cannot be achieved, you [MM] must come to the table with proposed solution; not come back with the problem... we hit a brick wall at a certain period of time and the provider they [the external vendor team] could not support certain technology that we are using. Then, they are proposing that we use another technology... the software team [DevOps sub-unit] is saying, ‘Okay we can also find a way around it. We can use that technology you are proposing. This is our only..., this is the only way we can align with the provider, but we can add one other thing to make it safer’. And that was discussed... we took it [the proposed solution] to the CIO, and CIO approved” (P12, E-channels Manager, MM).

Implementing Agile Project Delivery Approach

This pertains to MMs demonstrating the ability to implement and follow agile project delivery approach. The BANKCOY project was completed through several iterations. With the support and leadership of the MMs, the BANKCOY agile team worked with the external vendor team in a collaborative and synchronised manner during the iterations; each team working with corresponding milestones, phases, and timelines to ensure project delivery was well-ordered, and dependencies were ready when required.

“we followed the SDLC, but let me just run through the SDLC... A request comes. The request is reviewed, approved. Once they approved it, it comes into the technical team to review and build their Functional Specification document and more of like an architectural design, which goes for approval too before development starts and when development starts so it’s done in iterations... for each internal iteration, there’s corresponding phase with the external provider” (P13, DevOps Lead, MM).

Meeting Deadlines

This pertains to MMs demonstrating the ability to ensure completion of project tasks in line with agreed timelines and deliver expected results by agreed deadlines. Refer to Appendix T for examples of data regarding *Meeting Deadlines* competency.

4.3 Cross-case Analysis and Combined Thematic Networks

This section presents results of cross-case analysis performed to determine commonalities and differences pertaining to the roles and competencies of MMgmt in agile PG across the two case organisations—HOLDCOY and BANKCOY—on account of the RQs. Following cross-case analysis, the respective thematic networks of MMgmt roles and competences from each case organisation were combined to form two thematic networks representing (a) thematic model of MMgmt roles in agile PG, and (b) thematic model of MMgmt competencies in agile PG.

4.3.1 Cross-case Analysis of Roles of Middle Managers in Agile PG

Results show that the MMs performed a total of 25 roles in the two case organisations during the governance of their respective ASD projects. There were commonalities and differences regarding the roles performed by the MMs (see Table 24 below). It was discovered that of the 25 roles, 24 roles were performed by MMs in HOLDCOY, whereas in BANKCOY 21 roles were performed by the MMs. Four roles in HOLDCOY were not found in BANKCOY, i.e., *Auxiliary Resource*, *Foreseer*, *Auditor*, and *Pastoral Care Provider*. One role in BANKCOY was not found in HOLDCOY, i.e., *Mediator*.

Table 24: Cross-case analysis of MMgmt roles in agile PG from the two cases

Role category	Middle manager role	HOLDCOY	BANKCOY
Planning and coordination for project alignment and execution	Coordinator	X	X
	Strategist	X	X
	Adviser and Negotiator	X	X
	Project Manager	X	X
	Decision-Maker	X	X
	Resource Maximiser	X	X
	Supervisor	X	X
	Goal Definer and Interpreter	X	X
	*Auxiliary Resource	X	
	Motivator	X	X
	Product Owner	X	X
	Subject Matter Expert	X	X
	*Foreseer	X	
	*Mediator		X

Role category	Middle manager role	HOLDCOY	BANKCOY
Continuous improvement and organisational change	Process Owner and Improver	X	X
	*Auditor	X	
	Innovator	X	X
	Rule-Maker	X	X
Agile and technical leadership	Agile Leader	X	X
	Technical Leader	X	X
Monitoring	Gatekeeper	X	X
	Goal and Task Inspector	X	X
	*Pastoral Care Provider	X	
Capability building	Capability Building Advocate	X	X
	Coach	X	X

Results from cross-case analysis suggests that MMs in the two case organisations performed the various MMgmt roles for planning and coordination for project alignment and execution, continuous improvement and organisational change, providing agile and technical leadership, monitoring, and capability building. Hence, there were no differences regarding the role categories and aspects under which the MM roles were performed in the agile PG activities of the ASD projects in both companies.

Still on case commonalities, findings suggest that the participants from across senior management, MMgmt, and LOW in the two case organisations believe that MMs were important to their respective agile project teams, and they play pivotal roles in agile PG practice. For example, P4 (Group CIO, senior management) pointed out that the role of MMgmt in HOLDCOY’s agile PG setting is very critical. This is because the MMs orchestrate the project activities between internal and external project stakeholders and act as boundary spanners. They are responsible for ensuring close collaboration with respective project stakeholders and ensuring that project tasks are successfully completed within agreed timelines. They have the mandate to successfully deliver on expected project results.

* This middle manager role was found in only one case organisation.

“their [MMgmt] role is actually very critical. Because after the project is awarded and different stakeholder sessions has been held with customer..., external sessions, the project middle managers are responsible to work closely with all the internal teams and the contacts at the external team to ensure that every single deliverable as stated in the business requirement documentation..., document are completed, tested and delivered... delivered within the time allocated for it” (P4, Group CIO, senior management).

In both cases, the MMs performed the role of *Subject Matter Expert*, which is arguably a specialist role. Also in both cases, MMgmt involvement established a form of accountability and oversight mechanism in the ASD project environments. Hence, their contributions were believed to be beneficial and important to the way PG was performed in the ASD projects. In both cases, the MMs were front-and-centre on PG matters in the ASD projects and agile project teams to ensure successful implementation of mandated ASD projects so as to meet set business objectives. Also, in both cases, research data did not reveal any evidence that suggests resistance from MMgmt towards the agile approach—the MMs supported the agile approach.

In both cases, MMs performed several agile PG roles in different instances as circumstances and needs demanded during project implementation. By way of illustration, in HOLDCOY, P1 (Head of Operations, MM) performed the roles of *Coordinator, Strategist, Adviser and Negotiator, Decision-Maker, Agile Leader, Project Manager, Motivator, Product Owner, Foreseer, Innovator, Pastoral Care Provider, Gatekeeper, Goal and Task Inspector, Coach, Auxiliary Resource, and Capability Building Advocate*. Also, P6 (Head of Technology and Scrum Master, MM) performed the roles of *Coordinator, Strategist, Decision-Maker, Agile Leader, Technical Leader, Resource Maximiser, Auxiliary Resource, Innovator, Rule-Maker, Gatekeeper, Coach, and Capability Building Advocate*. In BANKCOY, P13 (DevOps Lead, MM) performed the roles of *Strategist, Decision-Maker, Technical Leader, Goal Definer and Interpreter, Goal and Task Inspector, and Capability Building Advocate*. Also, P12 (E-channels Manager, MM) performed the roles of *Coordinator, Project Manager, Resource Maximiser, Product Owner, Mediator, Decision-Maker, Goal Definer and Interpreter, Motivator, and Agile Leader*.

In addition, the evidence presented thus far from both cases suggests that several MMs performed particular roles regardless of their job titles. For example, in HOLDCOY, the *Innovator* role was

performed by P1 (Head of Operations, MM), P6 (Head of Technology and Scrum Master, MM), and P8 (Operational Excellence Manager, MM). Also, the *Coordinator*, *Decision-Maker*, *Agile Leader*, *Coach*, and *Capability Building Advocate* roles were taken up by P1 and P6. In BANKCOY, the *Coordinator*, *Project Manager*, *Motivator*, and *Agile Leader* roles were performed by P11 (Project and Change Coordinator, MM) and P12 (E-channels Manager, MM). In addition, *Decision-Maker* and *Goal Definer and Interpreter* roles were taken up by P13 (DevOps Lead, MM) and P12 (E-channels Manager, MM) as project work and needs demanded. These examples support the idea that more than one MM can take up a particular MMgmt agile PG role regardless of job title.

Furthermore, MMs in both cases enjoyed a certain amount of leeway from senior management regarding decision-making in the agile PG activities. As *Decision-Makers*, the MMs were critical to the self-organisation and autonomy of the respective agile project teams. Findings suggest MMgmt supported the teams in making different types of decisions to advance the ASD projects autonomously without heavy involvement or day-to-day direction from SM. In HOLDCOY, exceptions to this were decisions pertaining to project financial matters. For such decisions, direct authorisation from senior management (i.e., P9, TECHCOY divisional CEO) may be required.

“if it’s something that affects not just the technical part [of project work] but it affects the business part, and maybe that will lead us to expend money of course, the CEO [TECHCOY divisional CEO, senior management] needs to approve that” (P6, Head of Technology and Scrum Master, MM).

In BANKCOY, the exception included decisions pertaining to major or critical project changes, in which case such decisions must be made through the Change Advisory Board (or Change Management Committee), which P21 (CIO, senior management) belonged to.

Findings suggest that several identified agile PG roles were also taken up by team members that were not recognised as MMs (based on formal organisational structures of the case organisations). For instance, P2 (App Support Developer, LOW) served as a *Coach* to interns in the HOLDCOY team. The designated Project Manager and Business Analyst in the HOLDCOY team (i.e., P5, LOW) also performed the *Project Manager* role. P5 also acted as a *Coordinator* between the agile team and customers and ensured intra-team and inter-team collaboration. P5 also acted as *Auxiliary*

Resource when a tester in the team resigned: she stood in as a tester and learnt how to use testing tools and run tests to support the team. In the BANKCOY team, P15 (Enterprise Solution and Service Desk Lead, LOW) and P17 (Senior E-channels Officer, LOW) also served as *Coordinators*. P5, P15, and P17 also performed the *Goal Definer and Interpreter* role.

Aside from aforesaid case differences as per the number of roles found in each case, MMgmt showed a generalist tendency in HOLDCOY, which manifested in the *Auxiliary Resource* role that P1 (Head of Operations, MM) performed when taking up testing duties to support his team. However, this study did not find evidence to suggest MMgmt generalist tendency in BANKCOY. Another difference between the cases concerns the *Supervisor* and *Coordinator* roles. Regarding the HOLDCOY ASD project, the TECHCOY agile project team comprised team members that were competent and experienced, and those that were not. This contributed to resource unavailability issues because it put a strain on team members that were competent and available, particularly the MMs. The lack of team member competence was a major issue that contributed to micromanagement wherein MMgmt micromanaged team members, particularly the developers because they were mostly junior developers with limited competency in the required domain knowledge. MMgmt resorted to close supervision and coordination of the developers' individual activities. According to P6 (Head of Technology and Scrum Master, MM), this was necessary to ensure developers clearly understood what needed to be done for each task so that the content and quality of their work was within scope and aligned with the project. Regular knowledge exchange sessions and training courses for team capacity building, as well as extended sprint durations were effected to help minimise the impact of the team's competence limitations.

"I still lead the code review myself because our team is not as wide as we would love it to be at the moment, finding enough and competent hands can be..., especially looking at the product like ours which is a new innovation. So, at the moment I don't think I can find someone to replace me, so I still do micromanagement of guys that's my situation" P6 (Head of Technology and Scrum Master, MM).

Regarding BANKCOY, MMgmt in the *Supervisor* and *Coordinator* roles oversaw and coordinated the work allocated to subordinates in the respective sub-teams to ensure they delivered on expected project deliverables within set timelines. However, the findings did not suggest that MMgmt micromanaged the agile project team.

4.3.2 Combined Thematic Network of Middle Managers' Roles in Agile PG

Comparing and combining the identified themes in HOLDCOY and BANKCOY produced a thematic network comprising 25 basic themes that represent the roles MMs performed within the agile PG activity's division of labour in both cases. Figure 23 illustrates the thematic network interpreting identified MMgmt roles following cross-case analysis. The thematic network represents a thematic model of MMgmt roles in agile PG, i.e., *Model of middle management roles in agile project governance* (M1). The roles in the model are grouped into five *organising themes* (role categories): *Planning and coordination for project alignment and execution*, *Continuous improvement and organisational change*, *Agile and technical leadership*, *Monitoring*, and *Capability building*, and linked to the global theme - *Roles of middle managers in agile project governance*.

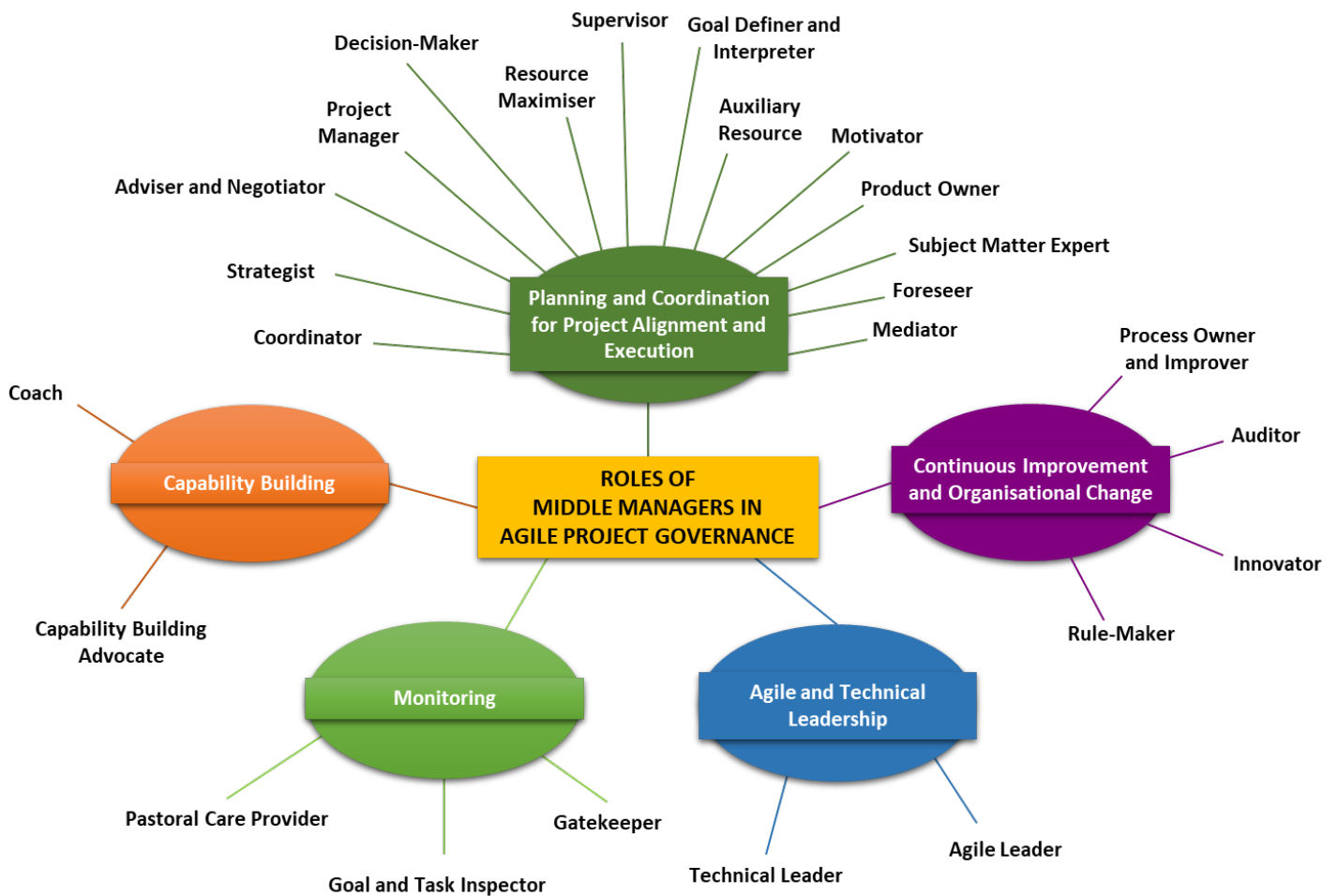


Figure 23: Thematic model of 25 MMgmt roles in agile PG

In essence, the model of MMgmt roles suggests that during agile PG, MMs perform 14 roles that are related to *Planning and coordination for project alignment and execution*. They perform four roles related to *Continuous improvement and organisational change*, as well as two roles that relate to *Agile and technical leadership*. In addition, they perform three roles that relate to *Monitoring*, as well as two roles relating to *Capability building*. Table 25 below summarises the 25 MMgmt roles from the two cases with their descriptions and indicates the number of times each role was mentioned in the data (number of references). Through these identified roles, the MMs in the two cases supported their respective agile project teams and contributed towards agile PG practice in their respective ASD projects.

Table 25: Twenty-five (25) roles of MMs in agile PG from the two cases

Role Category	Middle Manager Role	Role Description	Number of References
Planning and Coordination for Project Alignment and Execution Roles	*Coordinator	<ul style="list-style-type: none"> Coordinates project work through agile delivery, assigns tasks, and communicates progress and situational reports to senior management and other stakeholders Acts as bridge between different stakeholders in the project by interfacing between the agile project team and other stakeholders (e.g., other internal teams, customers and other external stakeholders) so as to facilitate and advance the project according to allocated timeline and resolve any impediments Ensures that project work is successfully completed by the agile project team and other stakeholders in an aligned, organised, and harmonious manner with minimum disruption and clear understanding of the project requirements 	123
	Strategist	<ul style="list-style-type: none"> Engages in strategic practices and interactions (e.g., discussions with senior management to agree strategic direction) in order to devise viable ways to accomplish project goals and expectations, and ensure that (a) project challenges are addressed, (b) project needs (e.g., required resources) are provisioned, (c) members of the agile project team remain dedicated and committed, and (d) there is a continuous alignment between the project and business strategy to achieve set objectives. 	21
	Adviser and Negotiator	<ul style="list-style-type: none"> Advises project stakeholders (e.g., senior management) on project governance rules and norms which need to be followed to safeguard project outputs, using their experiential knowledge Negotiates project adjustments and timelines to ensure project governance processes are followed. 	16
	Project Manager	<ul style="list-style-type: none"> Oversees the agile project team's project management function and performs project management duties, and ensures team members perform project tasks with dedication, commitment, as well as provide regular reporting and feedback regarding status of their assigned tasks. 	31

* This MM role has the highest number of references.

Role Category	Middle Manager Role	Role Description	Number of References
	Decision-Maker	<ul style="list-style-type: none"> Contributes to key decision-making in the agile project team (e.g., technical decisions, product roadmap decisions, staff promotion decisions, process modification decisions, project timeline decisions, product design decisions) Enables decision-making in the agile project team to advance project delivery through collaborative autonomous decision-making, which helps ensure that the team operates as a self-organised and self-managed entity 	46
	Resource Maximiser	<ul style="list-style-type: none"> Manages human and material resource shortfalls in the agile project team and project by (a) utilising available team members to relieve other team members who are inundated with project tasks or fill responsibilities of missing project roles by distributing unattended and outstanding tasks to those available, and (b) identifying and leveraging redundant material resources (e.g., unused IT server resources) to fill material resource gaps in the project so as to maintain unhindered project delivery 	10
	Supervisor	<ul style="list-style-type: none"> Oversees project work and performance of the agile project team by working closely with team members and following up with assigned task items to ensure project work is progressing and completed as expected without hindrance 	20
	Goal Definer and Interpreter	<ul style="list-style-type: none"> Contributes to defining and interpreting project goals and requirements, such as those emerging from customer or senior management interactions Breaks down and explains project goals and requirements so that agile project team members and other stakeholders can understand what needs to be done and why such goals should be achieved 	40
	Auxiliary Resource	<ul style="list-style-type: none"> Serves as additional help and support to fill resource gaps in the agile project team by taking up other roles in the team when resources are lacking, thereby helping to prevent lapses that may adversely affect team productivity and project delivery 	8
	Motivator	<ul style="list-style-type: none"> Motivates the agile project team by inspiring, encouraging, and influencing team members to act or respond in a manner that is desired of them, thereby promoting commitment, dedication, and task ownership in the team so as to achieve results and project success (e.g., providing incentives such as recognition and staff promotion for good performance) Empowers and motivates team members to learn new software development technologies and develop their competence through knowledge sharing. Organises team bonding activities to keep team members motivated, relaxed, and reinvigorated to tackle project commitments. Trusts and values other members of the team and gives them autonomy by allowing them to contribute to making project-related choices and deciding project work that needs to be completed so that the team can achieve shared success 	9
	Product Owner	<ul style="list-style-type: none"> Supports the agile project team as stakeholder representative to ensure the team operates with the needs and demands of stakeholders in mind, thereby ensuring continuous alignment between the team's project outputs and stakeholder expectations during project execution. Accountable for maximising product value, which is achieved by (a) developing product vision through product and project road mapping in collaboration with senior management, (b) implementing product 	22

Role Category	Middle Manager Role	Role Description	Number of References
		vision through project execution in collaboration with the agile project team, (c) focusing on content and quality of iteration outputs and making product design decisions adaptively, (d) prioritising and ordering requirements, tasks, and releases in collaboration with stakeholders and the agile project team so that the most valuable requirements are completed and released first, (e) clarifying goals, (f) managing the backlog, and (g) sensitising customers and stakeholders on the team's product offering from the project, its value proposition, and product benefits to customers	
	Subject Matter Expert	<ul style="list-style-type: none"> Provides input and expertise on technical and non-technical aspects of the project (e.g., technical development, IT networking, project work and status information, industry domain expertise) based on their advanced knowledge, experience or both, which they use to support the agile project team and other stakeholders for successful project delivery 	32
	Foreseer	<ul style="list-style-type: none"> Foresees potential impediments and their effects, which may hinder project implementation strategies and expected outputs – this may prompt the agile project team to take steps that will help avoid or overcome such impediments if they occur 	4
	Mediator	<ul style="list-style-type: none"> Intervenes as a middleman to help resolve conflicts between warring project stakeholders (e.g., members of the agile project team) by helping to bring about an agreement or settlement 	2
Continuous Improvement and Organisational Change Roles	Process Owner and Improver	<ul style="list-style-type: none"> Accountable for implementation of prescribed project governance processes and procedures in the agile software project Facilitates retrospectives for continuous improvement in project delivery approach Ensures inefficiencies and areas for improvement in project governance processes and procedures are identified and addressed in collaboration with other stakeholders Ensures the agile project team complies with project governance processes and rules to avoid penalties due to noncompliance 	24
	Auditor	<ul style="list-style-type: none"> Audits each member of the agile project team to ensure each person works in line with policies, processes, and procedures that govern their project functions, activities, and deliverables Identifies gaps and areas to improve or change in project governance processes and policies for continuous improvement in order to support each function and respective project work that needs to be completed 	4
	Innovator	<ul style="list-style-type: none"> Fosters innovation and change to improve project governance practice in the project so that the agile project team can effectively implement project and achieve project expectations more efficiently Recommends and introduces new ideas, practices and technological work tools to the agile project team in order to improve and maintain team productivity during project delivery 	22
	Rule-Maker	<ul style="list-style-type: none"> Formulates and introduces, enforces, and maintains custody of project governance rules and policies that guide and regulate the agile project team's project work, which helps the team to work in an organised manner and in compliance with prescribed organisational rules and policies 	21

Role Category	Middle Manager Role	Role Description	Number of References
Agile and Technical Leadership Roles	Agile Leader	<ul style="list-style-type: none"> Adapts and helps the team to maintain agility Engages, interacts and communicates with team members with a listening ear and emotional intelligence to ascertain work or personal issues that may affect team productivity and project advancement Helps to keep the agile project team current regarding technologies they adopt for software project delivery by showing interest and curiosity for current technology trends and keeping up to date with current technologies being used in industry Encourages shared decision-making and receives and tolerates the opinions of other team members Exercises business sense, which brings appreciation and clarity of business opportunities associated with a given project to the agile project team—opportunities for the organisation to rapidly introduce new products to customers through project implementation and gain competitive advantage over competitors using the agile approach Ensures the agile project team functions effectively as an agile team by ensuring that the team works and delivers in accordance with agile methodology 	36
	Technical Leader	<ul style="list-style-type: none"> Provides technical leadership by leading software development in the project Supports the agile project team with advanced technical expertise and hands-on support Anchors the team in appropriate development practice and ensures that software development work outputs completed by developers are within project scope and aligned with project expectations Ensures all technology requirements to accomplish the project are identified and provisioned Ensures all necessary technical considerations for effective software development are made in order to achieve expected results 	30
Monitoring Roles	Gatekeeper	<ul style="list-style-type: none"> Serves as single point of accountability, oversight, and delivery assurance for the agile software project Regulates project governance interactions and procedures employed by the agile project team for project delivery Performs gatekeeping checks and controls access from one state of project work to another to ensure conformity to accepted work standards (e.g., during code reviews) Issues necessary approvals (or disapprovals) for code quality improvements and technical development change requests as required Controls the addition of new tasks into sprints (iterations) in order to minimise disruptions to prioritised project work during sprints Serves as first point of contact in the agile project team regarding project work undertaken by the team and ensures tasks to be completed by the team are taken up by the right people with the right capabilities 	28
	Goal and Task Inspector	<ul style="list-style-type: none"> Tracks and inspects goals and tasks which members of the agile project team and other stakeholders are expected to complete during the project – monitoring tasks and dependencies, following up, sending reminders to stakeholders to act on their assigned tasks Verifying project work to ensure set goals are being achieved 	16
	Pastoral Care Provider	<ul style="list-style-type: none"> Monitors the emotional state of the agile project team with empathy and emotional intelligence 	2

Role Category	Middle Manager Role	Role Description	Number of References
		<ul style="list-style-type: none"> • Interacts with team members in the agile project team at a personal level to identify personal or work-related issues affecting a person's performance and provides pastoral care support accordingly (e.g., arrange required training to address capability needs) • Helps to promote psychological stability and psychological safety in the team by ensuring that team members are not overwhelmed by personal or work-related issues which may impact their ability to focus on their project work and accomplish project tasks 	
Capability Building Roles	Capability Building Advocate	<ul style="list-style-type: none"> • Engages in and encourages capability building in the agile project team to ensure team members are equipped with requisite knowledge and skills to enable them work effectively in cross-functional capacities and accomplish their project tasks • Arranges and encourages training, knowledge sharing, and learning in the team • Ensures backup resources develop needed capabilities and are available to fill any human resource gaps in the agile project team in situations where primary resources are unavailable, so as to minimise key person risk 	20
	Coach	<ul style="list-style-type: none"> • Provides assistance, training, and guidance to team members while allowing them take ownership of assigned project work for the benefit of the agile project team and project • Ensures the agile project team possesses requisite knowledge, skills and capabilities to accomplish project tasks and meet project needs • Assigns minor tasks to team members for their practice, learning, and capability building 	11

4.3.3 Cross-case Analysis of Competencies of Middle Managers in Agile PG

Cross-case analysis was performed to help determine commonalities and differences in MMgmt competencies across the two case studies (Table 26). Results show that a combined total of 54 competencies emerged from the two cases. A total of 18 input competencies were found in HOLDCOY and BANKCOY. Eighteen input competencies were found in HOLDCOY, whereas 17 were found in BANKCOY. Seventeen input competencies were common in both cases. One input competency in HOLDCOY was not found in BANKCOY, viz., *Strategy awareness*.

A total of 23 personal competencies were found in HOLDCOY and BANKCOY. Twenty-one personal competencies were found in HOLDCOY, whereas 17 were found in BANKCOY. Fifteen personal competencies were common in both cases. Six personal competencies in HOLDCOY were not found in BANKCOY, viz., *Foresight*, *Proactive*, *Concise in communication*, *Management style flexibility*, *Willingness to lead and follow*, and *Shared project ownership*

mindset. Two personal competencies in BANKCOY were not found in HOLDCOY, viz., *Impartial*, and *Liberality–rigidity balance*.

A total of 13 output competencies were found in total in HOLDCOY and BANKCOY. The output competencies were common in the two cases.

Table 26: Cross-case analysis of MMgmt competencies in agile PG from the two cases

Competence categories	Competence sub-group	Middle Manager Competency	HOLDCOY	BANKCOY
Input competence	Delivery input competence	Teaching and coaching skill	X	X
		Adaptability skill	X	X
		Coordination skill	X	X
		Decision-making skill	X	X
		Leadership and people management skill	X	X
		Prioritisation skill	X	X
		Issue resolution skill	X	X
		Supervisory skill	X	X
		Time management skill	X	X
		Escalation skill	X	X
	Socio-relational input competence	Emotional intelligence skill	X	X
		Interpersonal communication skill	X	X
		Interpersonal relationship skill	X	X
		Tact and diplomacy skill	X	X
		Understanding of tacit relationship structures and social dynamics	X	X
	Business input competence	Domain knowledge and expertise	X	X
		Team competence knowledge	X	X
		*Strategy awareness	X	
	Personal competence	Results-oriented personal competence	Adaptable	X
*Foresight			X	
Focused and consistent			X	X
*Concise in communication			X	
Willingness to learn and stay up-to-date			X	X
Autonomous and decisive			X	X
Confident and courageous			X	X
*Proactive			X	

Competence categories	Competence sub-group	Middle Manager Competency	HOLDCOY	BANKCOY
		Disciplined with time and resources	X	X
		Resourceful	X	X
		Analytical and innovative	X	X
	People-oriented personal competence	*Impartial		X
		Communicative	X	X
		Integrity and openness	X	X
		Tactful and diplomatic	X	X
		Calm and emotionally intelligent	X	X
		Effective in communication	X	X
		*Liberality–rigidity balance		X
		*Management style flexibility	X	
		*Willingness to lead and follow	X	
		Team spirit	X	X
		Broad-minded and open-minded	X	X
		*Shared project ownership mindset	X	
Output competence	Socio-relational output competence	Building rapport and maintaining productive working relationships	X	X
		Communicating effectively and keeping stakeholders informed	X	X
		Expressing emotional intelligence and persuasiveness in challenging project situations	X	X
	Business output competence	Demonstrating domain knowledge and expertise	X	X
		Learning and keeping up-to-date with knowledge and information	X	X
	Delivery output competence	Successfully completing agile project and its associated activities and tasks with an effective team	X	X
		Planning, coordinating, and facilitating team interactions and efforts for self-organisation	X	X
		Managing and resolving project challenges	X	X
		Maximising resources	X	X
		Leading and owning project implementation	X	X
		Implementing agile project delivery approach	X	X
		Meeting deadlines	X	X
		Teaching and coaching others	X	X

* This MM competency was found in only one case organisation.

The findings in HOLDCOY and BANKCOY suggest that these competencies, which are deemed important for MMgmt in agile project settings to have, are multifarious and interrelated. It may be argued that some of these competencies are also competencies that managers in non-agile project settings are expected to also possess. For example, one of the output competencies is *Communicating effectively and keeping stakeholders informed*. A part of this competency involves MMs being able to actually communicate with other project stakeholders with a listening ear while performing their project-related assignments. According to P6 (Head of Technology and Scrum Master, MM), having a listening ear is not only important for MMgmt in agile settings, but it is also important for managers in general.

“I always make sure that no matter what, I try to maintain as good communication with the team as possible. I also make sure that I have a listening ear to everything coming up. I have a listening ear. I think it’s not just for agile development I think it’s generally for management, you need to have a good listening ear if you want to be a good manager” (P6).

Notwithstanding that a selection of these competencies may apply to non-agile managers, the unearthed competencies have emerged from empirically investigating real agile PG contexts. In next section, the competencies from HOLDCOY and BANKCOY are combined to form a thematic model. Together, these competencies represent a unified set of pertinent competencies that MMs in agile environments can nurture, exercise, and master for optimum performance during the governance and delivery of ASD projects.

4.3.4 Combined Thematic Network of Middle Managers’ Competencies in Agile PG

The thematic networks of MMgmt competencies in agile PG generated from the two cases where combined to form a single thematic network (Figure 24) representing a thematic model of MMgmt competencies in agile PG, i.e., *Model of middle management competencies in agile project governance* (M2). Based on cross-case analysis (see Table 26 above), a total of 54 competencies that are important for MMs to have so as to function effectively when working alongside agile software teams and governing ASD projects were found in the two cases. In the thematic network, the 54 competencies are grouped into *input competence*, *personal competence*, and *output competence*, which are the competence categories (third-order organising themes). The cross-case analysis also suggests the identified input and output competencies are broken down into *socio-*

relational, delivery, and business competence aspects, which are the competence subcategories (second-order organising themes). On the other hand, the identified personal competencies are grouped into *results-oriented* and *people-oriented competence* aspects (second-order organising themes). The organising themes are linked to the global theme—*Competences of middle managers in agile project governance*. Refer to the aforementioned Table 23 above (see Subsection 4.1.2 of Section 4.1) for descriptions of the overarching competence categories and subcategories.

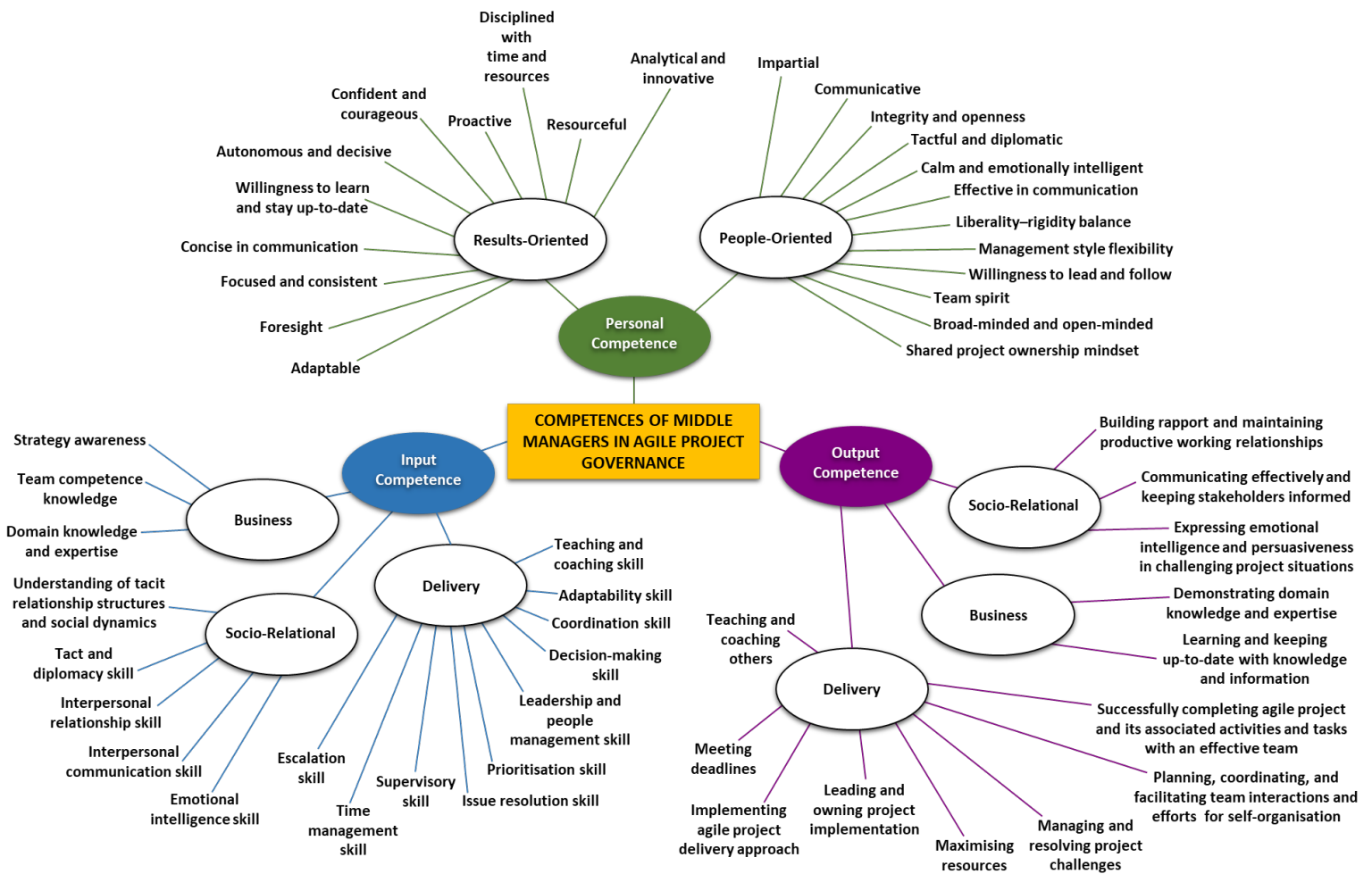


Figure 24: Thematic model of 54 MMgmt competencies in agile PG

In essence, the thematic model of MMgmt competencies suggests that the set of competencies that are important and useful for agile MMs to have comprise (a) 18 input competencies consisting of

three business input competencies, five socio-relational input competencies, and 10 delivery input competencies, (b) 23 personal competencies consisting of 11 results-oriented personal competencies, and 12 people-oriented personal competencies, and (c) 13 output competencies consisting of two business output competencies, three socio-relational output competencies, and eight delivery output competencies. Table 27 below summarises the 54 MMgmt competencies from the two cases with their descriptions and indicates the number of times each competency was mentioned in the data (number of references).

Table 27: Fifty-four (54) competencies of MMs in agile PG from the two cases

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Number of References
Input Competence	Delivery input competence	Teaching and coaching skill	<ul style="list-style-type: none"> Ability to educate other team members and facilitate their learning, transmit knowledge that will enable and empower teammates so that they know what to do or how to act in particular situations during project delivery 	11
		Adaptability skill	<ul style="list-style-type: none"> Ability to change and adapt to changes so as to achieve project goals 	14
		*Coordination skill	<ul style="list-style-type: none"> Ability to interface with different project stakeholders and coordinate and facilitate different aspects of project work and engagements in an organised and harmonious manner to accomplish the project 	56
		Decision-making skill	<ul style="list-style-type: none"> Ability to make decisions and engage in collaborative decision-making on project matters 	27
		Leadership and people management skill	<ul style="list-style-type: none"> Ability to lead (e.g., through servant leadership) and manage different people, carry team members along during project delivery, delegate tasks as needed, motivate team members, exercise emotional intelligence, and take initiative 	38
		Prioritisation skill	<ul style="list-style-type: none"> Ability to prioritise by collaborating with other project stakeholders to determine tasks and activities that need to be performed in a prioritised order based on importance, value, and feasibility 	7
		Issue resolution skill	<ul style="list-style-type: none"> Ability to identify and apply feasible problem-solving approaches and alternatives to resolve project issues 	50

* This MM competency has the highest number of references in its competence subcategory.

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Number of References
			amicably in order to achieve set project goals	
		Supervisory skill	<ul style="list-style-type: none"> Ability to oversee and follow up with team members and their assigned tasks so as to stay up to date with their work and ensure project work is progressing and completed as expected without hindrance 	14
		Time management skill	<ul style="list-style-type: none"> Ability to effectively manage allocated time for project work and activities, and adhere to timelines 	7
		Escalation skill	<ul style="list-style-type: none"> Ability to escalate and share encountered project issues with other stakeholders on time so that escalated issues can be dealt with promptly in order to achieve project deliverables accordingly 	19
	Socio-Relational input competence	Emotional intelligence skill	<ul style="list-style-type: none"> Ability to understand what other team members are experiencing or feeling (i.e., their emotions), showing concern towards their well-being, and engaging and interacting with them appropriately with empathy and self-control during emotionally sensitive situations (e.g., conflict situations) 	17
		*Interpersonal communication skill	<ul style="list-style-type: none"> Ability to listen and interact well with project stakeholders, receive complex information, break it down into its basic components and interpret it, report and present it effectively to project stakeholders in a way that is clear and understandable 	47
		Interpersonal relationship skill	<ul style="list-style-type: none"> Ability to relate, engage, and collaborate effectively with different stakeholders in a project (e.g., senior managers, team members, external stakeholders), thereby maintaining healthy interpersonal working relationships with others so as to produce expected results 	41
		Tact and diplomacy skill	<ul style="list-style-type: none"> Ability to handle sensitive people, navigate sensitive matters, situations, and conversations, and negotiate with persuasion and dialogue in order to reach an agreement 	20
		Understanding of tacit relationship structures and social dynamics	<ul style="list-style-type: none"> Understanding of the tacit (unspoken) relationship structures and social dynamics in the project environment (e.g., within the customer organisation) in order to facilitate project communications and issue escalations and resolutions 	3

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Number of References
	Business input competence	*Domain knowledge and expertise	<ul style="list-style-type: none"> Knowledge and understanding of different aspects of an agile project to ensure successful project delivery (e.g., project and product knowledge, project documentation, customer needs and industry knowledge, agile software development, project management, networking, information security, knowledge of the organisation(s) and stakeholders involved in the project, organisation/industry processes and policies and regulations, use of project software tools that are utilised in the industry) 	131
		Team competence knowledge	<ul style="list-style-type: none"> Knowledge of the capabilities, competences, and skill sets of team members 	5
		Strategy awareness	<ul style="list-style-type: none"> Understanding of business strategy requirements and expectations in the right context in order to develop actionable project goals that are relevant and aligned with specified business strategy 	5
Personal Competence	Results-Oriented personal competence	Adaptable	<ul style="list-style-type: none"> Personality that is flexible and open to change, and can adapt to changes so as to achieve project goals 	15
		Foresight	<ul style="list-style-type: none"> Personality that can think ahead and foresee what may happen in the future within a project (e.g., problems, risks) before it happens based on observed or perceived realities and occurrences 	3
		Focused and consistent	<ul style="list-style-type: none"> Resolute and focused on achieving project goals and expected deliverables without losing sight of them (i.e., a goal-getter), and consistent in performing project governance practices to achieve project goals (e.g., consistency in carrying out agile practices like daily Scrum, collaboration, sending regular project updates to stakeholders) 	23
		Concise in communication	<ul style="list-style-type: none"> Personality that can compress large quantity of information and express it clearly and briefly in a simple form for rapid information transmission during project delivery to help achieve project goals 	1
		Willingness to learn and stay up-to-date	<ul style="list-style-type: none"> Personality that is willing to learn for continuous self-development that benefits agile project delivery, acquisitive for knowledge, cognisant and informed on current project happenings and other relevant developments (e.g., current technology tools), and keen to stay up-to-date. 	23

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Number of References
		Autonomous and decisive	<ul style="list-style-type: none"> Personality to make decisions on project matters and act by one's own reasoning, volition and sense of judgment regarding project matters (e.g., resolving project issues) 	18
		Confident and courageous	<ul style="list-style-type: none"> Confident and courageous personality with the self-assurance, willingness, and optimism to engage project stakeholders, handle project matters, and deal with project challenges when they arise 	11
		Proactive	<ul style="list-style-type: none"> Personality that allows a middle manager to prepare and take action in advance to control and influence how a situation will occur instead of reacting to the situation after it has occurred 	3
		Disciplined with time and resources	<ul style="list-style-type: none"> Personality that is: (a) disciplined and strict with time with regard to meetings and adherence to project timelines, and (b) economical and not wasteful; able to maximise project resources (e.g., human and material resources) 	16
		*Resourceful	<ul style="list-style-type: none"> Personality that can identify feasible problem-solving approaches and alternatives to resolve and overcome project issues in order to accomplish set project goals 	29
		Analytical and innovative	<ul style="list-style-type: none"> Personality to analyse a situation and engage in out-of-the-box thinking to support project delivery (e.g., devising workarounds and solutions to problems) 	19
	People-Oriented personal competence	Impartial	<ul style="list-style-type: none"> Impartial and neutral without taking sides during project conflicts so as to resolve conflicts amicably 	1
		Communicative	<ul style="list-style-type: none"> Willingness to teach and transfer knowledge to other team members and project stakeholders in order to prevent knowledge gap, knowledge hoarding, and key-person risk in the agile project environment 	14
		Integrity and openness	<ul style="list-style-type: none"> Personality that is honest, straightforward, truthful, and direct without mincing words, open and transparent when dealing with team members in order to maintain trust in the agile project environment 	4
		Tactful and diplomatic	<ul style="list-style-type: none"> Personality that can handle sensitive people, navigate sensitive matters, situations, and conversations, and negotiate with persuasion and dialogue in order to reach an agreement 	19

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Number of References
		Calm and emotionally intelligent	<ul style="list-style-type: none"> Personality that is calm under pressure, understands and appreciates what other people are experiencing or feeling (i.e., their emotions), shows concern towards their well-being, engages and interacts with them appropriately with empathy and self-control during emotionally sensitive situations (e.g., conflict situations). 	19
		Effective in communication	<ul style="list-style-type: none"> Personality that can listen and interact well with project stakeholders, receive complex information, break it down into its basic components and interpret it, report and present it effectively to project stakeholders in a way that is clear and understandable to them 	41
		Liberality–rigidity balance	<ul style="list-style-type: none"> Personality that is not overly liberal and not overly rigid (strict) but can balance the two extremes when dealing with different project stakeholders in different project situations 	1
		Management style flexibility	<ul style="list-style-type: none"> Personality that knows when to apply or combine different management styles when working with various project stakeholders across organisational levels (e.g., other middle managers, subordinates) in order to achieve results during project delivery 	1
		Willingness to lead and follow	<ul style="list-style-type: none"> Personality that is willing to take up the responsibility to inspire, guide, and influence others to do and achieve what is expected of them, at the same time willing to follow the leadership of others 	5
		*Team spirit	<ul style="list-style-type: none"> Approachable, self-sacrificing, and democratic personality that can collaborate and relate well with different people and provide (or receive) necessary support as a team player for effective teamwork and achievement of shared goals 	45
		Broad-minded and open-minded	<ul style="list-style-type: none"> Personality that accepts feedback, tolerates different viewpoints and opinions of other team members (i.e., broad-minded), and open to new ideas and knowledge (i.e., open-minded) 	6
		Shared project ownership mindset	<ul style="list-style-type: none"> Personality that recognises that for an agile project to succeed, each team member needs to own the project and own their respective assigned project tasks so as to promote self-organisation, accountability, and team autonomy 	5

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Number of References
Output Competence	Socio-Relational output competence	Building rapport and maintaining productive working relationships	<ul style="list-style-type: none"> Demonstrate the ability to build rapport and maintain productive interpersonal working relationships with other project stakeholders (e.g., team members and external project stakeholders) during project implementation 	31
		*Communicating effectively and keeping stakeholders informed	<ul style="list-style-type: none"> Demonstrate ability to: (a) listen and interact well with project stakeholders, receive complex information, break it down into its basic components and interpret it, report and present it effectively to project stakeholders in a way that is clear and understandable, and (b) keep stakeholders informed about project happenings, progress, updates, and carry everyone along (e.g., communicating project challenges, tasks, status, technical details) 	41
		Expressing emotional intelligence and persuasiveness in challenging project situations	<ul style="list-style-type: none"> Demonstrate emotional intelligence (i.e., expressive empathy, calmness, temperament control) towards team members during challenging project situations to encourage and motivate them, and at the same time being persuasive without applying excessive pressure on team members so as to ensure assigned project tasks and set goals are accomplished in such situations 	10
	Business output competence	*Demonstrating domain knowledge and expertise	<ul style="list-style-type: none"> Demonstrate knowledge and understanding of different aspects of an agile project to ensure successful project delivery (e.g., project and product knowledge, project documentation, customer needs and industry knowledge, agile software development, project management, networking, information security, knowledge of the organisation(s) and stakeholders in the project, organisation/industry processes and policies and regulations, use of project software tools that are utilised in the industry) 	93
		Learning and keeping up-to-date with knowledge and information	<ul style="list-style-type: none"> Demonstrate ability to learn and acquire knowledge that benefits agile project delivery, and keep up-to-date with relevant knowledge, developments, and information 	18
	Delivery output competence	Successfully completing agile project and its associated activities and tasks with an effective team	<ul style="list-style-type: none"> Demonstrate ability to: (a) focus and complete a given agile project, build an effective team, and deliver expected good-quality project results, and (b) carry out project activities and deliver on tasks that MMgmt is required to ensure are completed 	20

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Number of References
		*Planning, coordinating, and facilitating team interactions and efforts for self-organisation	<ul style="list-style-type: none"> Demonstrate ability to plan, coordinate, and facilitate team interactions and efforts in the agile project team (project delivery efforts, decision-making, prioritising, etc.) so as to nurture and promote a collaborative, self-organised, autonomous, and empowering agile project environment 	71
		Managing and resolving project challenges	<ul style="list-style-type: none"> Demonstrate ability to manage project escalations and challenges (e.g., issues, conflicts) by taking action to find precise solutions to the challenges either independently without escalating to higher level of authority (where possible), or in collaboration with other stakeholders 	52
		Maximising resources	<ul style="list-style-type: none"> Demonstrate ability to maximise available resources (e.g., human and material resources) and adapt so as to nurture and promote cross-functionality in the agile team, minimise resource wastage, and meet project timelines 	11
		Leading and owning project implementation	<ul style="list-style-type: none"> Demonstrate ability to: (a) lead in an agile project environment (e.g., providing agile leadership, technical leadership, and inclusive leadership), delegate, and lead by example, (b) own project implementation and perform project duties with confidence (e.g., stakeholder engagements, issue resolutions, process improvements), and (c) operate with a shared project ownership mindset to promote team autonomy and accountability 	29
		Implementing agile project delivery approach	<ul style="list-style-type: none"> Demonstrate ability to implement and follow agile project delivery approach 	23
		Meeting deadlines	<ul style="list-style-type: none"> Demonstrate ability to ensure completion of project tasks in line with agreed timelines and deliver expected results by agreed deadlines 	7
		Teaching and coaching others	<ul style="list-style-type: none"> Demonstrate the ability to teach and transfer knowledge to other team members in order to prevent knowledge gap and key-person risk in the agile project environment 	11

* This MM competency has the highest number of references in its competence subcategory.

Chapter Five: Validation of the Two Models

In IS research, validation studies allow researchers to critique their research end-products, reflect on outcomes, and identify areas for improvement, which can reveal opportunities for future research. They help to obtain evidence to substantiate and crystallise the significance of research studies. This chapter describes a validation study that was conducted to assess and substantiate the potential usefulness of the two models (M1 and M2), as well as determine their strengths and limitations. It was also intended that outcomes from the validation study would facilitate generalisation of this study's findings. The validation study involved expert agile practitioners⁴ (validators), who helped in generating qualitative and evaluative insights pertaining to the models. In general, the validators expressed promising views regarding the models with recommendations to strengthen their utility and versatility. Implications of the models were also identified.

5.1 Validation Process

The aim of the validation study was to obtain critical feedback and ascertain the potential usefulness—not actual usefulness—of the two models, their strengths and limitations, as well as the extent to which the research findings aligned with the experiences of agile practitioners in other companies. The study was conducted as an expert-interview study—an approach used in previous validation studies (Ambore *et al.*, 2021; Tuncel *et al.*, 2021). It involved interviewing a number of industry-based expert agile practitioners to critique identified MMgmt roles and competencies as developed in the two models.

5.1.1 Validation Criteria

It was important to establish validation criteria as a basis of assessment to critique the models and ascertain their qualities and characteristics from several aspects. Validation criteria was adapted from Omar *et al.* (2020) to meet the needs and preferences of the validation study. The validation criteria has four dimensions, viz., *Relevance and importance*, *Understandability*, *Organisation*, and *Comprehensiveness* (see Table 28). I chose these dimensions because other software

⁴ In this thesis, an expert agile practitioner is a person with five or more years' experience (a) using agile methods for ASD and project delivery, (b) managing or working with ASD teams, (c) conducting research on agile methods and practices, or (d) making decisions that promote the use of agile methods in an organisation.

engineering researchers have used them to successfully assess their works, such as proposed model, framework, and method (Omar *et al.*, 2020). However, the *Relevance and importance* dimension I applied was slightly modified from the *Relevance* dimension applied in Omar *et al.* (2020). To decompose the *Relevance and importance* dimension, I conceived three probable industrial use cases of the models based on their potential to have implications for organisations and practitioners. Consequently, the models were validated against the four dimensions.

Table 28: Validation criteria for the two models

Validation criteria	Description
Relevance and importance	<p>This aims to ascertain whether the models are relevant and important to organisations and practitioners, as well as practical in their work environments.</p> <p>Use cases:</p> <ol style="list-style-type: none"> 1. Useful to produce job descriptions and person specifications when recruiting people into MMgmt positions in agile software teams 2. Useful as an education and training tool for continuing professional development and self-development 3. Useful as a performance framework resource to help create and define specific criteria and indicators for MMs’ job performance
Understandability	This aims to ascertain whether descriptions and details in the models are clear and easy to understand.
Organisation	This aims to ascertain whether descriptions and details in the models are arranged and presented in an organised and acceptable manner.
Comprehensiveness	This aims to ascertain whether the models are comprehensive and detailed enough in terms of content, descriptions, and details. This is to ensure the models contain necessary information that would aid their application and use.

5.1.2 Participant Selection

Participant selection criteria were:

1. Participants should be based in industry to ensure validation feedback captured industry-based contextual perspectives. They should have current or previous experience working in technology-enabled companies that have in-house ASD teams, or technology companies that use agile methods for projects.
2. Participants should have five or more years’ experience in at least one of the following:
 - a) ASD
 - b) Using agile methods in IT projects
 - c) Managing and/or working with agile IT teams.
 - d) Involved in making decisions that promotes the use of agile methods in companies

3. Participants can be situated in any country.
4. Participants should include individuals from different hierarchical levels in companies so as to capture a variety of perspectives.
5. Participants should include agile practitioners that have been in positions where they needed to help recruit new team members into their companies.
6. Participants should include agile practitioners with different job roles so as to capture a variety of perspectives.

Six participants were deemed appropriate for this study in line with related agile studies (Omar *et al.*, 2020; Tuncel *et al.*, 2021) that involved the same number of participants. The participants in this study were selected using convenience sampling and purposive sampling. First, I applied convenience sampling to identify participants that I could have easy access to from within my professional networks, which included my LinkedIn professional connections. These were people that shared common interest in agile, and were more likely to be interested in the validation study and willing to participate based on my pre-existing relationships with them (e.g., previous employment relationships, previous alma mater relationships, professional interactions). I employed this strategy to facilitate quick participant recruitment considering the limited time period of the PhD study. However, this strategy could have biased participants' opinions regarding the validation study. Afterwards, I applied purposive sampling to identify participants that satisfied the above-stated selection criteria for the validation study. I verified that the participants satisfied the selection criteria through my interactions with them prior to the interviews, and online research, i.e., perusing their LinkedIn profiles.

5.1.3 Data Collection and Analysis

Following ethics approval for the validation study (Appendix U), data collection was completed in May 2022. Data collection involved online semi-structured one-to-one interviews with the participants—two senior managers, three MMs, and one LOW participant. Appendix V and Appendix W provide the participant information sheet and interview consent form, respectively. Table 29 below summarises the details and interview duration for each participant (validator). The interviews were conducted using Microsoft Teams (an online communication software) with an average duration of 34 minutes. Interviews enabled collection of rich insights based on each

participant’s review. The interviews also helped to probe for more details from participants, which revealed interesting and unexpected insights regarding the models. The models and supporting information were sent to each participant through email several days before mutually agreed interview dates, thereby giving them the opportunity to inspect the models prior to the study. Each interview was conversational in style but guided by an interview protocol (see Appendix X) that comprised of questions centred around the validation criteria and participant background. Background information on the participants was also gathered from their LinkedIn profiles. Participation in the interviews was completely voluntary. Each interview was visual-recorded, audio-recorded, and automatically transcribed using Microsoft Teams so that I could have a record of interview discussions. Validation data from the interviews was analysed qualitatively to interpret validators’ feedback and extract the strengths and limitations of the two models, as well as areas for improvement and future work. See Appendix Y for excerpts of the analysis. The next section highlights the findings of the validation study.

Table 29: Participants of validation study and duration of interviews

Details							
Participant	Job Role/Title	Industry/ Location	Level	Years of IT Experience	Years of Agile Methods Experience	Agile Certifications	Interview Duration
V1	Chief Strategy and Innovation Officer	Automotive/ UK	Senior management	12+ years	6 years	<ul style="list-style-type: none"> Agile Project Management Scrum Master 	40 minutes
V2	Product Manager	Energy/ USA	MM	15+ years	11 years	<ul style="list-style-type: none"> Certified SAFe 5 Program Consultant Certified Scrum Master 	30 minutes
V3	Senior Product Manager	Technology/ Canada	MM	7+ years	7+ years	<ul style="list-style-type: none"> Certified SAFe 5 Product Owner/ Product Manager Certified Scrum Product Owner Team Kanban Practitioner 	27 minutes
V4	Director of Applications Service Line	Technology/ UK	Senior management	22 years	10 years	<ul style="list-style-type: none"> Not provided 	23 minutes
V5	Platform Software Engineer	Technology/ Finland	LOW	15 years	10 years	<ul style="list-style-type: none"> None 	36 minutes
V6	Technology Product Owner	Banking and Financial Services/ UK	MM	12 years	9 years	<ul style="list-style-type: none"> Professional Scrum Master 	50 minutes

5.2 Findings

In general, there were varying subjective views for and against various aspects of the models. However, reviews from the validators suggest the models can be used by agile-practicing organisations and project teams, as well as traditional organisations and project teams involved in software development. Potential beneficiaries of the models comprise MMs, prospective MMs, prospective senior managers, senior management, agile teams, HR personnel, hiring managers, educators and training providers, and traditional MMs transitioning to the agile way of working. Besides the three predetermined use cases, the following use cases for the models were identified from the validation:

- M1 and M2 can be used to create project team member profiles for ASD projects to support PG;
- M1 can be used to create responsibility assignment matrices for ASD projects to support PG;
- M1 can be used to create job interview questionnaires for MMgmt recruitment;
- M1 can be used as an auditing tool for ASD projects to support PG.

In order to harness the full potential of the models for the various use cases, users may need to modify and adapt the models in line with specific needs of their agile teams and organisations, taking into account diverse contextual factors, such as organisational culture, priorities, and company/team size. The strengths and limitations of the models, according to the validation study findings, are summarised in Table 30. Detailed descriptions of the findings are available in Appendix Z.

Table 30: Summary of the strengths and limitations of the models

Model	Strength	Limitation
M1	<ul style="list-style-type: none"> • Useful to produce job descriptions and person specifications for MMgmt recruitment • Useful as an education and training resource for continuing professional development and self-development • Useful as a resource for MMgmt performance assessment • Useful for creating project team member profiles • Useful for creating responsibility assignment matrices, i.e., responsible, accountable, consulted, and informed (RACI) matrices • Useful for creating job interview questionnaires • Useful as an auditing tool 	<ul style="list-style-type: none"> • Some roles and the language/terms used to label them may seem foreign to agile project settings • Not all roles may be adopted because project-specific PG roles that are defined in organisations are highly contextual • Some roles will be limited to particular organisations and most likely non-transferable across organisations and geographical regions • Perceived duplication and overlaps in the model • Lacks information regarding the ‘how-to’ associated with responsibilities under the MMgmt PG roles, such as the skills, tools, methods, techniques, and approaches

Model	Strength	Limitation
	<ul style="list-style-type: none"> • Promotes understanding of the various PG roles that MMs perform in agile project settings • Can help promote transparency and minimise bias in organisations with respect to career growth requirements and opportunities in the workplace for prospective agile MMs (i.e., employees that aspire to become MMs in agile teams) • Descriptions and details are clear and easy to understand • Descriptions and details are arranged and presented in an organised, acceptable, and relatable manner • Comprehensive and sufficiently detailed with regards to roles' descriptions and details 	<ul style="list-style-type: none"> • that MMs would need to apply to perform the duties that are defined in each role description. These are important for training purposes. • Descriptions of some roles do not sufficiently capture all possible competencies that are required to fulfil those roles • Model does not capture all possible PG roles that MMs perform in agile project environments • To fully exploit the model for performance assessment purposes, it will have to be customised to include performance-level criteria/scales to suit each organisation's specific needs and environment.
M2	<ul style="list-style-type: none"> • Useful to produce job descriptions and person specifications for MMgmt recruitment • Useful as an education and training resource for continuing professional development and self-development. It can help agile project teams assess themselves by enabling them to perform competency gap analysis to identify current strong points, desired competencies, and competency gaps in order to inform team development and learning and development initiatives, such as training programmes, mentoring and employee coaching, provision of career guidance, and career development planning support • Captures several competencies that prospective MMs may fail to consider as pertinent competencies that are important for MMs to function effectively in agile project environments—<i>tact and diplomacy skill, shared project ownership mindset, openness, and liberality–rigidity balance</i>, for example • Useful as a resource for MMgmt performance assessment • Useful for creating project team member profiles • Helpful in understanding various competencies that are pertinent for MMs to operate successfully in agile software teams and projects • Covers a wide-range of MMgmt competencies • Descriptions and details are clear and easy to understand • Descriptions and details are arranged and presented in an organised and acceptable manner • Comprehensive, precise, and detailed enough in terms of content, descriptions and details. The diagram for the model is well-presented and appropriate because it presents the competence aspects, competencies, and their relationships in a single comprehensive view • Segmentation of the competencies into <i>Input competence, Personal competence, and Output competence</i> segments, as well as the language/terms used to label them, are appropriate 	<ul style="list-style-type: none"> • Not all competencies in the model will need to be specified for every MMgmt job—different sub-sets of competencies may be required for different MMgmt job roles. • Perceived duplication and overlaps in the model • Does not explicitly indicate or distinguish the competencies that MMs in ASD projects exclusively need to have, which represent the competencies that MMs who are not involved in ASD projects are not expected to have (e.g., MM in finance department) • Competencies that are exclusive to agile MMs, (e.g., <i>Implementing agile project delivery approach</i>) lack information on specific practices, techniques, and methods • Lacks information regarding the 'how-to' associated with described competencies, such as specific techniques, options, and approaches that MMs and prospective MMs would need to learn, as well as apply in different project situations as they exercise various competencies. These are important for training purposes. • Does not map onto the knowledge, skills, and abilities (KSA) framework • To fully exploit the model for performance assessment purposes, it will have to be customised to include performance-level criteria/scales to suit each organisation's specific needs and environment. • Model diagram may seem crammed for some users

5.3 Discussion, Implications and Recommendations

The validation study findings provide an opinion-based indication of the potential usefulness of the models in real project and workplace settings, albeit validators were divided about some aspects. For example, regarding M1, V6 (MM) felt that MMs in agile settings would not perform *Pastoral Care Provider* role, nor would they perform *Auditor* role because the role personas and language seemed foreign to the agile domain. He felt that *Pastoral Care Provider* role is not one that can be found in UK or US agile project environments. However, V2 (MM), whose organisation operated in the US, affirmed that members of his team included MMs that performed the *Pastoral Care Provider* role; they were called staff development managers. Also, V2 noted that M1 can be used for *auditing*—which suggests his approval of the term in agile settings—to ensure relevant PG roles were defined and staffed in the PG machinery of ASD projects. V1 (senior management) felt it will be unusual and difficult for MMs to perform the *Strategist* role due to organisational inhibitors. However, several studies (Floyd and Wooldridge, 1992, 1997; Paavola *et al.*, 2017; Raman, 2009) report that MMs often play strategic roles to support organisations. MMs have been known to be front-and-centre in strategic exchanges and project implementations to drive digital transformation (DT) in organisations (Christodoulou *et al.*, 2022; Paavola *et al.*, 2017). This suggests that adoption of the two models in organisations will depend on distinguishing contextual factors, such as company culture, direction, size, region. In her criticism of M1, V4 (senior management) felt the model was not detailed enough because it lacked information about techniques, approaches and so on, which MMs would need to apply when performing the PG roles. However, V2 felt M1 was detailed enough, with opportunity for users to include additional details as needed. V3 (MM) felt the diagram for M2 was cramped, whereas V6 felt it was well-presented and appropriate. Ultimately, the variance in validator opinions is an advantage because it helps one to appreciate different perspectives that may impact adoption of the models.

The validation study findings suggest a possible issue of overlaps and duplication in M1. V1 (senior management) felt the role categories in M1 (i.e., monitoring, capability building and so on) were interlinked and not mutually exclusive. This in his opinion represented overlaps and duplication in the model. A reason for the perceived overlaps and duplication is that often times in reality, the actions that are performed through various human-occupied roles can be similar,

closely linked, or closely intertwined with each other to the point that it may become unnatural to attribute or associate such actions distinctively and uniquely with only specific roles. This is in line with roles in agile teams: they tend to intertwine and change dynamically (Barke and Prechelt, 2019). As an example, the MMgmt role of *Decision-Maker* basically pertains to their key decision-making contributions, as well as their perpetuation of joint decision-making in their agile teams. Still, in the *Agile Leader* role, MMgmt also encourages (and participates in) joint decision-making with other team members during project delivery. The same applies to activities. When actions, roles, or subactivities related to a larger activity are interlinked, it creates opportunities for the people involved to gain better understanding of inner workings, as well as complexities that may impact one or more aspects. Interlinking of the role categories in M1 is a positive factor. In practice these activities (monitoring, capability building, providing agile and technical leadership and so on) arguably do not transpire in isolation; their interlinkage helps to ensure that the overarching PG activity (which they are part of) is successful.

The validation study findings also suggest practical implications of the models, which may benefit organisations, MMs, senior management, prospective MMs and senior managers, agile teams, HR personnel, hiring managers, training providers, traditional MMs transitioning to the agile way of working, and agile PG. The practical implications (see Appendix AA) pertain to (a) PG in ASD projects, (b) MMgmt recruitment for agile software teams and projects, as well as traditional software teams and projects, (c) learning and development of MMs, prospective MMs and senior managers, senior management, and project teams in agile-practicing organisations, (d) learning and development of practitioners in the traditional domain, (e) training providers, and (f) MMgmt performance management in agile-practicing organisations.

The validation study findings provide evidence to suggest the models' potential usefulness and versatility. However, proving actual usefulness and versatility will require their use in practice. In the interim, several recommendations regarding guidelines and modifications to facilitate utilisation of the models in practice and opportunities for future research were generated from validation findings (see Appendix AB).

Chapter Six: Discussion

This qualitative and interpretive study involving case studies in two Nigerian companies has been conducted in order to investigate the roles and competencies of MMs in agile PG settings and address the RQs. The roles and competencies relate to the *Division of labour* and *Tools* components of the APGov framework, respectively. This chapter discusses research findings in light of related work and reflects on the research by presenting the trustworthiness criteria for qualitative research, limitations of the research, and finally reflection on the application of AT.

6.1 Roles of Agile Middle Managers

The first RQ this study addresses is *What are the roles of middle managers in agile project governance within small-scale agile software development projects in Nigerian organisations?* Based on two case studies, it was found that MMs perform 25 roles in agile PG (see Figure 23 and Table 25 in Subsection 4.3.2 of Section 4.3 above for descriptions). The roles are related to *Planning and coordination for project alignment and execution*, *Continuous improvement and organisational change*, *Agile and technical leadership*, *Monitoring*, and *Capability building*, and represented in a thematic model: *Model of middle management roles in agile project governance* (M1). In the following subsections, the findings are discussed in light of governance dimensions in agile PG, roles found in ASD project teams and MMgmt roles, as well as role changeability and role interchangeability during project delivery.

6.1.1 Governance Dimensions in Agile PG

The findings of this study resonate with agile PG literature. The practices that MMs engaged in are similar to those in Lappi *et al.* (2018), for example. By linking the findings of this study with Lappi *et al.*'s (2018) agile PG framework, the study showed that the MM roles in M1 are represented in the six PG dimensions, albeit not in the same grouping. For instance, coordination dimension (e.g., *Coordinator*, *Project Manager*, *Product Owner*), capability building dimension (e.g., *Capability Building Advocate*, *Coach*), monitoring dimension (e.g., *Supervisor*, *Goal and Task inspector*), goal setting dimension (e.g., *Goal Definer and Interpreter*, *Product Owner*), roles and decision-making power dimension (e.g., *Decision-maker*), and incentives dimension (e.g.,

Motivator). The *Agile and technical leadership* role category fits into the roles and decision-making power dimension, in which Lappi *et al.* highlight the adaptive nature of leadership provided by an agile project manager which is needed to handle seemingly increasing workload due to risks and greater coordination needs in autonomous teams. As an adaptive leader, the agile project manager also serves as coordinator or administrator for the agile project team (Lappi *et al.*, 2018). This role interchange behaviour is similar to that of MMs in this study. In supporting coordination, MMs facilitated mechanisms to support frequent customer deliveries. MMs promoted knowledge exchange interactions as capability building routine to support continuous learning in their teams, as well as use of agile practices and software tools. They were involved in tracking project progress and inspecting deliverables to ensure project monitoring and oversight. They were also involved in product vision development and backlog management to support goal-setting and prioritised iterative delivery. They performed various roles and performed project duties in their areas of expertise while supporting cross-functional teamworking. They also participated in key decision-making while supporting collaborative autonomous decision-making to help ensure teams operated as self-organised entities. They also provided incentives to motivate team members. Practices in Lappi *et al.* (2018) that this study did not find MMs participating in are flexible budgeting and contracting for goal-setting, development of client capabilities with respect to capability building to facilitate project delivery, and provision of risk and opportunity-sharing incentives to motivate team members and other stakeholders. Practices that MMs were involved in but not included in Lappi *et al.* (2018) are resource maximising, supervising—which agile managers engage in (Gandomani *et al.*, 2020)—advising stakeholders on PG practices/compliance and negotiating project adjustments/timelines when needed to ensure PG compliance, provision of additional incentives like organising team bonding activities, internal project auditing, PG rule and policy making, gatekeeping for project monitoring, provision of pastoral care, and mediation to resolve conflicts. An area that Lappi *et al.* recommends for further research is how conflicts are managed in agile projects—the mediator role of MMgmt contributes to this as a way to manage conflicts. Therefore, in light of Lappi *et al.*'s (2018) work, this study showed that MMs play an important but non-exclusive role in agile PG.

Taking into account the doings of MMs in this study, it is arguable that continuous improvement and organisational change should be recognised as a germane dimension of agile PG. Several MMs

roles (e.g., *Process Owner and Improver, Innovator*) highlight the pertinence of continuous improvement and organisational change to agile PG. Organisational change is caused by events in an organisation which result in modifications to structures or processes therein (Weick and Quinn, 1999). Process improvements, innovations, and changes prompted by the MMs engendered continuous change and improvement. This study suggests that MMs facilitate innovation, rule-making, auditing, process and procedural changes, and retrospectives. These mechanisms allow the agile project teams to flexibly review and reflect on how they operate and devise and implement improvements and strategies to address inefficiencies in their work processes, thus affecting not only their projects, but also PG practice in each organisation as a whole. While Lappi *et al.* (2018) categorises retrospectives as a PG mechanism within the coordination dimension, this study posits continuous improvement and organisational change as a possible dimension of agile PG that warrants further research. Moreover, existing agile PG frameworks (e.g., Lappi *et al.*, 2018; Nyandongo and Khanyile, 2019; Vlietland and van Vliet, 2015) do not address this dimension. Furthermore, a hallmark of agility is the continuous affinity for and responsiveness to change (Conboy, 2009)—this should also reflect in the way agile PG is exercised. Along the same vein, agile managers engage in building an agile structure and organisational culture that adapts to changes, as well as fostering team flexibility and organisational changes that benefit teams (Gandomani *et al.*, 2020), which relate to what MMs in this study were doing. From this study, MMs tend to facilitate continuous improvement (Hermkens *et al.*, 2020) and change (Annosi *et al.*, 2020; Balogun, 2003), hence they contribute to a culture of PG in ASD projects that is not rigid and static, but one that is dynamic and mutative: constantly evolving so as to remain effective.

6.1.2 Roles in ASD Project Teams and Middle Management Roles

The roles and responsibilities of MMs identified in this study accords with those in Annosi *et al.* (2020), i.e., (a) acting as change agents for teams they supervise; (b) securing suitable work environment for their team members; (c) establishing external interfaces between their teams and other stakeholders; (d) securing availability of external workforce; and (e) providing important information, such as strategy and upcoming features in the pipeline. This study affirms that organisations utilise project managers for agile projects and suggests that project managers can be part of MMgmt. The present study adds to existing studies that highlight the existence of the project manager role—albeit a traditional role—in organisations that practice ASD (Drury-Grogan

and O'Dwyer, 2013; Shastri *et al.*, 2016, 2021). An organisation may retain the project manager role due to (a) its hierarchical nature in which individuals have defined roles and duties (Drury-Grogan and O'Dwyer, 2013), or (b) its ongoing agile transformation (Shastri *et al.*, 2021). While either of these reasons may apply to the two cases in this study given that they are hierarchical in nature and undergoing agile transformation, this study has insufficient evidence to establish the specific reason for retainment of the project manager role in the companies other than organisation-specific PG preferences. Nonetheless, as individuals directly involved in developing, enforcing, and improving processes and rules that guide project delivery workflow, and considering their boundary spanning position and technical-operational knowledge from day-to-day internal and external project interactions, one could argue that MMs may be well-placed as project managers to ensure that projects are managed and completed in line with defined requirements, guidelines, and standards so that strategic and operational goals can be achieved.

This study suggests that the strategic and coordination agency of MMs may potentially help strengthen organisation–project strategic connections, as well as coordination efforts in agile settings considering MMgmt's frequent participation in strategic and technical–operational multistakeholder exchanges. Projects are the nexus between strategy and execution (Dalcher, 2017), however, in agile settings, weak strategic connections between organisations and their projects is seen as a PG issue (Lappi *et al.*, 2018). Christodoulou *et al.* (2022) found that MMs perform the strategic role of implementing deliberate strategy—the most important role of MMs—thus making them vitally important for the implementation of DT projects. The results of this study resonate with that discovery. As *Strategists*, the MMs strategised to fulfil their duties and achieve strategic goals, which included ensuring their teams delivered project expectations as quickly as possible by leveraging agile development. They participated in strategic planning exchanges in collaboration with senior management through periodic reviews, as well as project and product roadmapping sessions. Participation of agile MMs in such strategic engagements is advantageous. This is because, as Paavola *et al.* (2017) suggests, MMs tend to be well aware of their areas of responsibility; therefore, they are capable of suggesting suitable solutions for business problems and can help increase the chances of success for implemented solutions to realistically satisfy business needs. Also, their participation in strategic planning may reinforce commitment to a chosen action plan (Raman, 2009). MMgmt was active in devising viable ways and ideas to address

challenges and accomplish project goals and expectations, which accords with Paavola *et al.* (2017) assertion that MMs are able to think and act strategically and independently as ‘shakers and strategists’ to push and devise solutions to technical and operational issues so as to advance digitalisation initiatives and achieve goals. Therefore, in this study, MMgmt contributed to strategy making and implementation efforts, which supports the notion that MMs are enabling in defining and implementing strategy in organisations due to their intermediary position (Balogun, 2003). This links with the *Coordinator* role in that MMs are intermediaries. As *Coordinators*, the MMs in this study coordinated the agile teams’ interactions with internal stakeholders (e.g., senior management, other internal teams) and external stakeholders (e.g., external customers, vendors) for optimal collaboration to achieve shared project goals. As *Coordinators*, MMgmt promoted iteration planning and coordination by facilitating the team’s agile ceremonies to accomplish iteration deliverables. The *Coordinator* role of the MMs is similar to an aspect of the agile manager ‘coordinator’ role in Shastri *et al.* (2017), where the agile manager coordinates team collaboration with customers and specialists, as well as collaboration within and between teams. Hence, in the *Coordinator* role, the MMs are boundary spanners in that they link “the organisation with the environment to forge intra and extra-organisational boundaries”, and serve as “interfaces between a unit and its environment” (Keszey, 2018, pp. 1062–1063). The boundary spanning position of the MMs in this study arguably gives them access to knowledge from across intra and inter-organisational boundaries, which could possibly provide intelligence for generating and implementing useful ideas during projects (Paavola *et al.*, 2017). Lappi *et al.* (2018) categorises coordination practices in agile PG into strategic organisational practices (e.g., knowledge sharing facilitation in the organisation which relates to capability building), managerial coordination practices, and technical coordination practices. The results of this study indicates MMgmt’s active contribution to each category. For instance, as a strategy to address competence deficiencies in developers, MMgmt ensured regular knowledge exchange sessions took place to encourage knowledge sharing among developers and cultivation of requisite know-how in the team for project delivery. Also, MMs engaged in communicating progress and situational reports to senior management, as well as coordinating collaborative engagements with external customer teams and coordinating technical work regarding agile development of expected solutions. By recognising the value and efficacy of MMs and involving them, organisations may be able to raise the prospect

of agile projects successfully meeting business needs, and achieving strategic intents and effective coordination.

This study confirms findings in previous research that MMs perform subject matter expert (specialist) role, as well as product owner and Scrum master roles, and that Scrum masters or product owners can also fulfil additional roles. In Russo (2021), MMs as Scrum masters were domain experts whose in-depth knowledge of the organisation was deemed critical for problem-solving. This relates to the *Subject Matter Expert* role, through which MMs in both cases supported their teams and other stakeholders for successful project delivery. The role also appears to be a specialist one (Wiedemann and Weeger, 2017) given that MMs had various specialisms (e.g., software development expertise, IT networking, security, finance industry domain expertise). In HOLDCOY, MMgmt displayed a generalist tendency, which manifested in the *Auxiliary Resource* role by Head of Operations taking up testing duties. This study however did not find evidence for MMgmt generalist tendency in BANKCOY. While this may be unideal for an agile team since they are expected to be generalists (Wildt and Prikladnicki, 2010), agile teams should also have “special knowledge to find the right solutions” (Wiedemann and Weeger, 2017, p. 1415). Moreover, a sufficient mix of generalists and specialists is needed for agile teams to perform optimally (Wiedemann and Weeger, 2017). According to Moran (2015), a setup of this kind is acceptable so long as teams collectively have the requisite competencies to do their work. In Russo (2021) still, MMs as product owners represented stakeholders (e.g., users) and ensured software outputs matched user expectations. This is similar to the *Product Owner* role that was fulfilled by MMgmt in both cases, which also relates to the role of agile managers in promoting the customer acceptance culture in agile delivery (Gandomani *et al.*, 2020). Product owners also help teams to maximise the value of products they create and manage the product backlog, which includes development and communication of the product goal (Schwaber and Sutherland, 2020)—the *Product Owner* role matches this. Also similar to Russo (2021), the Scrum master role, which helps a team to understand Scrum theory and apply it in practice (Schwaber and Sutherland, 2020), was fulfilled by MMgmt in one of the cases. In both cases, MMgmt—through the *Agile Leader* and *Technical Leader* roles—ensured their teams functioned effectively as agile teams; working in accordance with the agile paradigm to co-create expected software solutions. P6 (Head of Technology and Scrum Master, MM) was responsible for ensuring the TECHCOY agile project

team stayed successful as an agile team. His position allowed him to support the team in applying the agile approach as Scrum master (Schwaber and Sutherland, 2020). Scrum masters are also regarded as servant leaders who facilitate team empowerment and motivation and perform boundary spanning between their organisations and teams (Modi and Strode, 2020). Similarly, P6 empowered and motivated team members to learn new software development technologies and develop their competence through knowledge sharing, in addition to interfacing between the organisation and the team on technical development aspects. His position also enabled him to lead the project's technical development as Head of Technology; supporting the team with advanced technical expertise and anchoring them in appropriate development practices. This finding bears similarity with prior research (e.g., Noll *et al.*, 2017), which reveal that Scrum masters also fulfil additional roles—technical roles (architect/software designer, developer/senior engineer) and management role (head of department), for example. Although ideally technical development may not be part of Scrum master responsibilities (Schwaber and Sutherland, 2020), nonetheless in the real world, organisations may choose to combine Scrum master roles with other roles to meet business needs. The same could be said for product owners who have also been known to hold other roles, such as project manager, business expert, solution architect, and developer (Diebold *et al.*, 2015). In this study, the *Product Owner* role was fulfilled by the Head of Operations (P1) and E-channels Manager (P12) in the respective cases. Although the Scrum Guide does not specify who should fulfil the Scrum master or product owner roles, nor does it specify whether or not they are management roles (Schwaber and Sutherland, 2020), this study indicates that MMs can fulfil various agile leadership roles.

The findings of this study confirm those of other studies that MMs in agile projects—who are also agile managers—perform gatekeeping-related role. Gatekeepers, such as the MMs in this study, are viewed as “organizational actors that sit at the junction of a number of communication channels in such a way that they can regulate the flow of demands and potentially control decision outcomes” (Heiskanen and Similä, 1992, p. 11). As *Gatekeepers*, the MMs were the first points of contact for each sub-team they led. For any task that needed to be completed by a resource belonging to a particular sub-team, MMgmt was the first point of contact. In Russo (2021, p. 30), the MMs (Scrum masters and product owners) were collectively designated the “gatekeepers between the top management directions and the implementation efforts”. The Scrum masters in

particular “acted as gatekeepers, focusing on Agile values” (Russo, 2021, p. 52:29), which relates to the *Agile Leader* MM role in this study and the agile manager ‘mentor’ role in Shastri *et al.*, (2017) in that the three roles ensure project delivery follows the agile approach. In HOLDCOY, MMgmt as *Gatekeepers* solely controlled the addition of new tasks into ongoing sprints rather than developers. This runs counter to the modus operandi in an agile method like Scrum, which dictates that developers own the sprint backlog and decide what tasks to do to achieve the sprint goal (Schwaber and Sutherland, 2020). Nonetheless, insofar as it is not best practice to add new tasks into ongoing sprints in ASD as this may jeopardise the sprint goal and prioritised tasks, the gatekeeping practice of MMs—albeit unorthodox—could be seen as a helpful governance measure to minimise project risks (e.g., risk of disruptions to prioritised work during sprints) and ensure the right items are being worked on. Moreover, this is closely related to the ‘negotiator’ role of agile managers in Shastri *et al.* (2017), whereby a manager acts as gatekeeper and negotiates work items with stakeholders to ensure scope creep is prevented and change management is exercised during project delivery.

As agile teams work closely together, some social support to help individuals can be beneficial for team health and performance. The *Pastoral Care Provider* role identified in one of the case studies is an interesting example of this. In performing this role, MMgmt in HOLDCOY displayed empathy and emotional intelligence when engaging with team members. They monitored the performance of team members with a heightened sense of awareness for the state of mind of team members and its effect on project work, and provided support as needed. They engaged teammates one-to-one, and in cases where issues affecting them are capability related for instance, MMgmt ensured necessary provisions were made for training (which dovetails with the *Capability Building Advocate* role of the MMs). The *Pastoral Care Provider* role performed by MMgmt fits closely with findings in Huy (2002) that highlight the beneficial role of MMs during projects because they express sensitivity and provide emotional support to project stakeholders. Hence, Huy (2002) asserts that the emotionally engaging role of MMs is crucial in projects. In response to Tarakci *et al.*’s (2023) call to unearth the role of MMs in managing emotional processes in agile teams, the *Pastoral Care Provider* role provides a practical example. The behaviour of the HOLDCOY MMgmt in engaging and interacting with teammates who may be dealing with personal or work-related issues suggests their keen interest in the well-being of colleagues in the agile project team.

In doing so at a personal level, the MMs encourage their teammates to open up and talk about their personal and work-related issues in order to alleviate those issues so that the affected people can stay mentally focused on their project workload, remain productive, and be less emotionally and psychologically burdened. This pastoral care exertion in essence may help build strong agile team members by fostering their psychological stability, which is frequently associated with a person’s ability “to perform professional activities in difficult and extreme situations as successfully as under normal conditions” (Kuznetsova *et al.*, 2018, p. 748). Also, it may help create psychologically safe agile environments where honesty and open communication thrive such that team members can lower their guard and feel safe to express their concerns and ideas, thus fostering team engagement and performance (Buvik and Tkalic, 2022; Peeters *et al.*, 2022).

This study also agrees with the literature that MMs have upward and downward strategic influence. Several roles that MMs fulfilled relate to some of Floyd and Wooldridge’s (1997) MM roles and strategic influence activities (Table 31). However, this study did not find evidence to support several strategic influence activities, including the championing role and its upward influence activities. Hence, the synthesising, facilitating, and implementing roles of MMs appear to be more important and relevant than their championing role within the agile PG context. Also, this study found other MM roles with upward influence in respect of interactions with senior management, viz., *Strategist, Adviser and Negotiator, Goal Definer and Interpreter*, and *Product Owner* roles. All other MM roles not mentioned (*Decision-Maker, Motivator*, etc.) appear to have downward influence. Altogether, the findings suggest that MMs can have considerable influence—which organisations can leverage—in the governance of ASD projects.

Table 31: Floyd and Wooldridge’s (1997) MM roles that relate to this study's findings

Floyd and Wooldridge’s (1997) MM roles		MM roles from this study	
Upward		Upward	
Synthesising information	Communicate the activities of competitors, suppliers, etc.	Coordinator	Communicates project progress and situational reports to senior management
Downward		Downward	
Facilitating adaptability	Encourage informal discussion and information sharing	Agile Leader	Engages, interacts and communicates with team members to ascertain work or personal issues that may affect team productivity and project advancement, and helps maintain team agility

Floyd and Wooldridge's (1997) MM roles		MM roles from this study	
		Capability Building Advocate	Arranges and encourages training, knowledge sharing, and learning in the team
		Coach	Provides assistance, training, and guidance to team members
		Coordinator	Communicates progress and situational reports to other stakeholders besides senior management, and acts as bridge between various stakeholders during project delivery
Implementing deliberate strategy	Monitor activities to support top management objectives	Strategist	Ensures there is continuous alignment between project delivery and business strategy to achieve set objectives
		Goal and Task Inspector	Tracks and inspects goals and tasks that agile project team members and other stakeholders are expected to complete
		Supervisor	Oversees project work and performance of agile project team
		Gatekeeper	Serves as single point of accountability, oversight, and delivery assurance for agile project
	Translate goals into action plans	Project Manager	Oversees agile project team's project management function and performs project management duties
		Coordinator	Coordinates project work through agile delivery
		Agile Leader	Ensures agile project team works and delivers according to the agile approach
	Translate goals into individual objectives	Goal Definer and Interpreter	Contributes to defining and interpreting project goals and requirements, and breaks down same
		Product Owner	Developing product vision and implementing same in collaboration with agile project team, prioritising and ordering requirements, clarifying goals, and managing backlog
	Sell top management initiatives to subordinates	Agile Leader	Exercises business sense, which brings appreciation and clarity of business opportunities associated with a project to team members—opportunities for the organisation to rapidly introduce new products using the agile approach

A few other MM roles in this study match other findings in Shastri *et al.* (2017). For example, in the *Coach* role, MMs train teammates on new software tools for project work. They provide guidance and assistance while allowing teammates to own their project tasks. The MMs also assign minor tasks to teammates to build their know-how and aid their growth. This is on a par with the

coaching aspect of the ‘mentor’ role in Shastri *et al.* (2017), which entails guiding and assisting teammates to complete tasks, and aiding their growth by giving them minor tasks to complete. The ‘mentor’ role also builds team relations using different means, including organising team bonding activities. This is close to the *Motivator* role whereby MMs support and organise team bonding activities to inspire teammates. In the *Adviser and Negotiator* role, MMs advise stakeholders on PG rules and best practices to safeguard project outputs, as well as negotiate project adjustments and timelines. This MM role is similar to the ‘negotiator’ role in Shastri *et al.* (2017), in which managers engage stakeholders in negotiations regarding project requirements and scope, budget, and project issues to facilitate accomplishment of project deliverables and goals. Ultimately, this study’s findings indicate that as multirole actors, MMs are beneficial to ASD projects and teams.

MMs in this study may have engaged in different leadership styles from the hierarchical and shared leadership perspective. Weichbrodt *et al.* (2022) reports that as organisations become more agile, (1) shared-transformational and shared-transactional leadership increases significantly, (2) hierarchical-transformational leadership increases slightly, but (3) hierarchical-transactional leadership decreases. MMgmt engage in knowledge sharing and learning at team-level (e.g., knowledge exchange sessions) so that team members can contribute towards one another’s development to achieve team learning goals—this relates to shared transformational leadership. They also engage in joint goal-setting at team-level to ensure goals are jointly conceived and agreed upon by team members so as to direct project work, which relates to shared transactional leadership. In the *Capability Building Advocate, Coach, and Pastoral Care Provider* roles, MMs encourage team members to develop their capabilities, coach team members to increase their potential, as well as pay attention to their needs and provide emotional support—these relate to hierarchical transformational leadership. Through the *Goal Definer and Interpreter, Supervisor, Goal and Task Inspector, and Motivator* roles, MMgmt comes up with project goals to guide and focus agile team efforts, supervises team members, inspects project work to ensure set goals are being achieved, and rewards team members—these relate to hierarchical transactional leadership. Their execution of these types of leadership underscores the importance of MMgmt in agile teams and organisations given that transactional and transformational leadership are reckoned as vitally important leadership functions in organisations (Weichbrodt *et al.*, 2022). Also, leadership executed by MMs is a key element for the successful formulation and implementation of strategy

vis-à-vis DT projects (Christodoulou *et al.*, 2022). It is arguable that usage of hierarchical leadership in the examined cases may be due to their fairly hierarchical management structures, as well as the industry context. The finance industry is a highly-regulated industry (Beerbaum, 2021; Briggs and Brooks, 2011). The sensitive nature of business activities in such industry may demand a certain degree of oversight and control, which may influence how governance is performed and how MMs operate in ASD projects within such contexts. Another reason may be the limited technical and domain knowledge of team members, thus requiring direct supervision and guidance from MMgmt, as was the case in HOLDCOY. In any respect, this study provides evidence regarding the existence and relevance of hierarchical leadership in agile settings.

This study showed that what MMs do is closely related to the ‘single point of accountability’ PG function in agile project settings (Moran, 2015). Generally, MMs worked together and ‘owned’ the projects in the case studies. They acted as the single point of accountability and oversight, ensuring tasks were completed by the right people to achieve stakeholder expectations and best project outcomes. Even though in BANKCOY a MM could be the ‘owner’ of a project; however, this is contingent upon project complexity and importance. Moran (2015) argues that ultimately, any agile undertaking (e.g., project) must be traced back to a single person who has access to the necessary resources and authority to direct activities and can be held accountable for performance and outcomes. MMgmt performed this function. Despite being project owners by senior management mandate, MMgmt worked alongside their teammates with a shared project ownership and team autonomy mindset, believing that for an agile project to succeed, each person in the agile team has to own the project, as well as own their respective project tasks.

Ultimately, the findings of this study indicate that MMs are the intermediary workforce that connect senior management with other teams and workforce that operate in an organisation (Balogun, 2003), which is consistent with the definition of MMs in agile literature (e.g., Christodoulou *et al.*, 2022; Russo, 2021; Tarakci *et al.*, 2023). This study’s findings also controvert the notion that MMs are generally ‘persona non grata’ in ASD—they are agile resistant (Joiner, 2017; Kalenda *et al.*, 2018; Thorgren and Caiman, 2019). On the contrary, MMs in this study did not express resistance towards the agile way of working. Also, the multiple pivotal roles that MMs played in the governance of ASD projects within the cases counters the viewpoint that MMgmt “is

seen as at best unnecessary and at worst positively harmful to the successful operation of the new, more flexible organization” (Procter *et al.*, 1999, p. 243)—they are neither important nor beneficial for agility in organisations. Contrariwise, this study suggests MMs can be agile facilitators as well (Annosi *et al.*, 2020; Christodoulou *et al.*, 2022; Russo, 2021), and they perform roles that support their agile teams during agile PG. However, the practice of MMs solely controlling the addition and assignment of tasks for sprints instead of developers collides with standard Scrum practice (Schwaber and Sutherland, 2020). Moreover, the study findings suggest that non-MMs, i.e., LOW in the agile project teams also performed some of the roles that MMs performed (e.g., *Coordinator, Coach, Auxiliary Resource*). Albeit some of the roles identified may not be exclusively performed by MMgmt, the findings suggest that MMs indeed perform the identified roles, and in the case studies they are recognised as important contributors to agile PG practice and the effectual functioning of agile project teams to achieve project success. Therefore, relating to positionality, this study on balance advocates acceptance and involvement of MMs in ASD teams and projects, and as with other studies (e.g., Annosi *et al.*, 2020; Hermkens *et al.*, 2020; Russo, 2021), calls attention to the relevance and evident potential of MMs in present-day agility landscape.

As organisations continue to employ agile approaches (Digital.ai, 2024), it is reasonable to recognise and encourage agile adoption beyond western nations so that organisations and SD practitioners in non-western regions (e.g., Nigeria) are not left behind in reaping the benefits of the agile way of working. Relatedly, Yerokun and Anigbogu (2017) investigated practitioners’ perception regarding adoption of agile approaches for software projects in Nigeria. They argue that while ASD is well-established in western nations, it is nascent in Nigeria. The authors revealed several agile approaches employed in Nigeria which may help spread awareness of agile methods usage in the region. Although Nigerian studies on PG or MMgmt in ASD project settings are lacking, existing Nigerian ASD studies (Ardo *et al.*, 2023; Nwohiri and Sonubi, 2020; Onwuka *et al.*, 2021; Yerokun and Anigbogu, 2017) and this present study draw attention to the reality that Nigerian organisations and SD practitioners employ agile approaches for SD undertakings. Furthermore, the present study suggests that MMs—through the various roles they performed in agile PG within Nigerian small-scale ASD projects—are able to orchestrate, facilitate, and support such undertakings. It is therefore hoped that findings from this present study will encourage

Nigerian organisations to embrace the practicality of employing agile approaches and agile MMs for their software teams and projects to enable them operate effectively.

6.1.3 Role Changeability and Interchangeability during Project Delivery

This study found that MMs tend to switch between roles to cater for IS project needs that are occasioned by project events. This is consistent with MM roles during DT project delivery in that the roles they perform tend to change at various points during digitalisation implementation (Paavola *et al.*, 2017). It is also consistent with roles in agile teams, which according to Barke and Prechelt (2019), tend to change dynamically. There can be one or more MMs performing the same MMgmt agile PG role regardless of their job titles, which is how agile managers tend to operate in agile projects (Shastri *et al.*, 2017). This dynamic, instantaneous, and transitory nature of the MM roles in agile teams during agile PG is characteristic of roles found in self-organised agile teams (Hoda *et al.*, 2013). Additionally, considering the variation in the number of MM roles found in each case as well as validation study findings, the present study raises the possibility that the roles MMs perform in organisations' agile PG machinery may be contextual; the existence of particular roles may depend on organisation-specific environments, as well as PG preferences and requirements. This is consistent with the notion that PG “is not one-size-fits-all” and “needs to be tailored to an organization’s specific needs” (Alie, 2015, para. 2).

MMs perform the identified agile PG roles at different times and situations, albeit some of the roles are not exclusive to MMs as they are also performed by other team members who are non-MMs. This occurrence is similar to occurrences in agile teams whereby various team members may take up certain roles as the need arises to help meet project needs, as in Hoda *et al.* (2013).

6.2 Competencies of Agile Middle Managers

The second RQ this study addresses is *What competencies are important for middle managers to function effectively in Nigerian small-scale agile software development projects?* Based on findings from two case studies, this study develops a *Model of middle management competencies in agile project governance* (M2), which identifies 54 competencies that are pertinent for MMs to operate effectively in ASD teams and projects (see Figure 24 and Table 27 in Subsection 4.3.4 of Section 4.3 above for descriptions). The competencies relate to five competence sets: *Socio-*

relational, Delivery, Business, Results-oriented, and People-oriented aspects. The competencies also relate to three elemental aspects of competence: *Input, Personal, and Output* aspects in accordance with the view that competencies are constituents of competence (Crawford, 2005). In the following subsections, the findings are discussed in light of a competency framework (i.e., KSA framework) and competencies that help fill competency gaps in agile PG, competencies of agile leaders and project leaders' agile mindset competency profile, as well as competencies for managing activities in ASD projects, self-organisation competencies, transferable competencies, and competencies required from IS MMs in sub-Saharan Africa (SSA).

6.2.1 Competency Framework and Competency Gaps in Agile PG

Comparing M2 with the widely used KSA framework (Chang *et al.*, 2019; Cheney *et al.*, 1990; Jones *et al.*, 2018; Tripathi and Agrawal, 2014) shows a noteworthy difference in segmentations. While the knowledge, skills, and abilities of individuals can be included in its structure, the KSA framework does not explicitly include the personal characteristics or traits of individuals as important elements of an individual's competence. It does not explicitly consider personal characteristics as a distinct segment. In contrast, because Crawford's (2005) model was adopted in this study, M2 explicitly makes provision for personal competencies under the *Personal competence* category. Gilli *et al.* (2022) examined job advertisements that targeted DT experts and found that several personality traits were specified as job requirements. Also, Yilmaz *et al.* (2017) examined agile and traditional software teams in a case study and found that teams that were effective had members who exhibited several personality traits. The findings of this study bear similarity to findings of Gilli *et al.* (2022) and Yilmaz *et al.* (2017) in highlighting the relevance of personal competencies. The findings of this present study underscore the notion that the personal characteristics of individuals, such as MMs in ASD teams, are integral to their overall competence (Crawford, 2005; Medina and Medina, 2015), and such qualities are important for people to perform various job roles.

The MMgmt competencies found in this study can help fill competency gaps that adversely affect the governance and management of agile projects. Sithambaram *et al.* (2021) identify lack of requisite skill sets (i.e., people skills, soft skills, and technical skills), project management competence, and understanding of agile delivery values and principles as some of the issues

affecting the governance and management of agile projects. Competencies identified in this study include those related to these—*Interpersonal communication skill, Tact and diplomacy skill, Adaptability skill, and Domain knowledge and expertise* (which includes ASD, networking, information security, use of project software tools, project management), for example. According to Sithambaram *et al.* (2021, p. 266), to address the governance-related issues and challenges facing agile projects, current trends suggest a focus on enforcing and practicing PG in agile projects with adequate understanding of agile values and principles, by people that have “the right attitude, knowledge, skills, and the ability to work well with the team”. Hence, it can be said that MMs who exhibit various competencies found in this study are able to help fill competency needs that support and advance agile PG practice.

6.2.2 Competencies of Agile Leaders and Project Leaders’ Agile Mindset Competency

Profile

This study shows there are similarities between MMgmt competencies found in this study and competencies of agile leaders in related research. For instance, Neubauer *et al.* (2017) found that agile leaders possess four distinctive and vitally important personality characteristics, which differentiate them from traditional leaders: they posit that agile leaders are engaged, humble, adaptable, and visionary. These personality characteristics match those in this study (Table 32).

Table 32: Comparison of MM competencies from this study with agile leader personality characteristics

Neubauer <i>et al.</i> 's (2017) agile leader personality characteristics	Description	MM personal competencies from this study
Engaged	They have a willingness to listen, interact, and communicate with internal and external stakeholders combined with a strong sense of interest and curiosity in emerging trends.	<ul style="list-style-type: none"> • Effective in communication • Concise in communication • Communicative • Team spirit • Willingness to learn and stay up-to-date
Humble	They are able to accept feedback and acknowledge that others know more than they do.	<ul style="list-style-type: none"> • Willingness to learn and stay up-to-date • Broad-minded and open-minded
Adaptable	They accept that change is constant and that changing their minds based on new information is a strength rather than a weakness.	<ul style="list-style-type: none"> • Adaptable • Broad-minded and open-minded
Visionary	They have a clear sense of long-term direction, even in the face of short-term uncertainty.	<ul style="list-style-type: none"> • Foresight • Focused and consistent

In comparison with results of this study, the ‘engaged’ characteristic matches the *Effective in communication, Concise in communication, Communicative, Team spirit, and Willingness to learn and stay up-to-date* personal competencies. The ‘humble’ characteristic also matches the *Willingness to learn and stay up-to-date* and *Broad-minded and open-minded* personal competencies. The ‘adaptable’ characteristic matches the *Adaptable* and *Broad-minded and open-minded* personal competencies while the ‘visionary’ characteristic matches the *Foresight* and *Focused and consistent* personal competencies. These similarities underscore the potential and relevance of MMs given that MMs—who embody and exhibit the aforesaid personal characteristics—are capable of supporting agile teams and organisations as agile leaders by helping agile teams to navigate unpredictable project situations, and helping organisations to thrive in competitive and ever-changing business environments. The similarities above also suggest personal characteristics from this study that may distinguish agile MMs from traditional MMs.

Comparing the findings of this study with Mikhieieva *et al.*’s (2022) agile mindset competency profile for project leaders (which includes MMs) that operate in agile settings suggests that several identified MM competencies relate to the profile (Table 33 below). Considering descriptions of Mikhieieva *et al.*’s (2022) competencies in Table 14 (see Subsection 2.7.1 of Section 2.7 above) and those from this study in Table 27 (see Subsection 4.3.4 of Section 4.3 above), some identified MM competencies are relevant and relate to top-rated competencies that are important for agile project leaders. Examples include *Integrity and openness, Interpersonal communication skill, Communicating effectively and keeping stakeholders informed, Adaptability skill, Broad-minded and open-minded, and Willingness to learn and stay up-to-date*, which cut across input, personal, and output competences. Besides the top-rated competencies, several MM competencies are also relevant and related to other competencies in the project leaders’ agile mindset competency profile—*Issue resolution skill, Resourceful, Building rapport and maintaining productive working relationships, Emotional intelligence skill, and Analytical and innovative*, for example. This study, however, did not find evidence to support the competencies ‘Reliability’, ‘Tolerance to ambiguity’, ‘Self-reflection’, ‘Interdisciplinarity’, and ‘Assertiveness’.

Table 33: Comparison of MM competencies from this study with project leaders' agile mindset competency profile

Mikhieieva <i>et al.</i> 's (2022) agile mindset competency profile for project leaders (competencies in descending order of importance)		MM competency from this study	Competence subcategory from this study
1.	Honesty	Confident and courageous	Results-oriented personal competence
		Integrity and openness	People-oriented personal competence
2.	Communication	Interpersonal communication skill	Socio-relational input competence
		Concise in communication	Results-oriented personal competence
		Communicative	People-oriented personal competence
		Effective in communication	People-oriented personal competence
		Communicating effectively and keeping stakeholders informed	Socio-relational output competence
3.	Flexibility	Adaptability skill	Delivery input competence
		Adaptable	Results-oriented personal competence
		Broad-minded and open-minded	People-oriented personal competence
4.	Readiness to learn	Willingness to learn and stay up-to-date	Results-oriented personal competence
		Broad-minded and open-minded	People-oriented personal competence
		Learning and keeping up-to-date with knowledge and information	Business output competence
5.	Reliability	Nil	Nil
6.	Conflict resolution	Issue resolution skill	Delivery input competence
		Escalation skill	Delivery input competence
		Tact and diplomacy skill	Socio-relational input competence
		Resourceful	Results-oriented personal competence
		Impartial	People-oriented personal competence
		Tactful and diplomatic	People-oriented personal competence
7.	Cooperation	Managing and resolving project challenges	Delivery output competence
		Interpersonal relationship skill	Socio-relational input competence
		Team spirit	People-oriented personal competence
		Building rapport and maintaining productive working relationships	Socio-relational output competence
8.	Emotional intelligence	Planning, coordinating, and facilitating team interactions and efforts for self-organisation	Delivery output competence
		Emotional intelligence skill	Socio-relational input competence
		Calm and emotionally intelligent	People-oriented personal competence
		Broad-minded and open-minded	People-oriented personal competence
9.	Innovation fostering	Expressing emotional intelligence and persuasiveness in challenging project situations	Socio-relational output competence
		Analytical and innovative	Results-oriented personal competence
10.	Feedback culture	Broad-minded and open-minded	People-oriented personal competence
		Communicating effectively and keeping stakeholders informed	Socio-relational output competence
11.	Tolerance to ambiguity	Nil	Nil
12.	Self-reflection	Nil	Nil
13.	Interdisciplinarity	Nil	Nil

	Mikhieieva <i>et al.</i> 's (2022) agile mindset competency profile for project leaders (competencies in descending order of importance)	MM competency from this study	Competence subcategory from this study
14.	Assertiveness	Nil	Nil

MM competencies from this study are also comparable with meta-components pertaining to the agile project leader profile, which according to Mikhieieva *et al.* (2022), are crucial for managing agile (or hybrid) projects successfully. Two meta-components, viz., ‘possession of agile project experience’ and ‘possession of agile hard skills’, link with the *Domain knowledge and expertise* and *Demonstrating domain knowledge and expertise* competencies. Another meta-component is ‘agile coaching skills’, which links with the *Teaching and coaching skill*, *Communicative*, and *Teaching and coaching others* competencies. MMs that possess and exercise the ability to teach and coach other team members are instrumental to team development. By sharing and transferring knowledge and providing professional guidance (for example P6 supporting his team in following the agile approach as Scrum Master), such MMs empower teammates and facilitate their learning so that they know what to do or how to act in particular situations during agile project delivery. Being communicative can help to avert knowledge gaps and key person risk: these have the potential to destabilise agile teams and cause significant disruption to project delivery as was the case in HOLDCOY. Hence, the willingness to share knowledge is vital in agile project settings. This study did not identify ‘possession of an agile mindset’ as an important competency for agile MMs. However, it identifies *Domain knowledge and expertise* and *Demonstrating domain knowledge and expertise* competencies, which include knowledge and understanding of ASD. In order to thrive in agile project settings, one could argue that MMs may need to (a) move away from traditional behaviours and mindset, (b) adapt, and (c) cultivate agile-friendly competencies so that they can operate in line with the tenets of the agile philosophy. Notwithstanding that competencies from this study did not cover all 14 competencies and four meta-components from Mikhieieva *et al.*'s (2022) work, there are similarities. This suggests that MMs who possess, nurture, and exercise the comparable competencies exhibit many leadership attributes.

6.2.3 Competencies for Managing Activities in ASD projects, Self-organisation and Transferable Competencies, and Competencies Required from IS MMs in SSA

The results of this study are also consistent with findings in previous research regarding competencies that are important in agile teams for managing activities in ASD projects. For example, *Tact and diplomacy skill* and *Adaptability skill* are similar to ‘Negotiation’ and ‘Adaptability to change’ competencies, respectively, which da Costa Filho *et al.* (2022) identify as ‘interpersonal competencies’ that are important in agile software teams for managing activities in ASD projects. Also, *Domain knowledge and expertise* (which includes ASD, networking, information security, use of project software tools) relates to ‘Technology knowledge’, which is one of the ‘technical competencies’ that are needed for the same purpose. On the other hand, several competencies found in this study were not identified in da Costa Filho *et al.* (2022)—*Understanding of tacit relationship structures and social dynamics*, *Team competence knowledge*, *Escalation skill*, and *Meeting deadlines*, for example. This suggests additional competencies that are important in agile software teams which can be leveraged to manage intra and inter-team relationships, assign the right tasks to the right people (who have the right competencies to deliver what is expected), escalate issues promptly, and accomplish expected deliverables and solution deployments by agreed deadlines.

The competencies of MMs identified in this study reflect those required for self-organisation. According to Moran (2015, pp. 196–197), self-organisation is “a critical success factor in agile projects”, and it “requires adaptability, openness and a willingness to learn and change on the part of team members”. This implies that individuals working in self-organised teams—including MMs—need to possess these competencies which match *Adaptability skill*, *Adaptable*, *Integrity and openness*, and *Willingness to learn and stay up-to-date*. Therefore, MMs that nurture and exercise the above competencies exhibit self-organisation attributes. This is of note given that a team’s self-organisation and performance is influenced by various factors (Karhatsu *et al.*, 2010), including competencies (Doblinger, 2022).

The validation study findings suggest that a selection of MM competencies from this study may be seen as transferable, and applicable to traditional MMs as well. According to Misra and Khurana (2017), examples of transferable competencies for IT professionals include oral communication

skills, problem-solving skills, leadership qualities, and flexibility—these competencies are reflected in the findings of this study, which supports the validation findings. This is advantageous given that transferable competencies are deemed important by many employers, hence they should be included in competency frameworks (Brown, 2020). Additionally, transferable competencies “are relevant and helpful across different situations and areas of life” and they are “essential for professional competence” (Nägele and Stalder, 2017, p. 748).

Findings from this study resonate with those of Kevor and Boakye (2022) as regards competencies required from contemporary IS MMs. Kevor and Boakye (2022) identified top ten IS competencies—out of 49 IS competencies—that IS MMs in sub-Saharan Africa (SSA) are required to embody and exhibit. The authors obtained data from IS experts, which included experts from Nigeria. There are similarities between the findings from this study and findings from their study: the two sets of findings are comparable. Firstly, this study shows similarities with Kevor and Boakye’s (2022) top ten IS competencies required from IS MMs (Table 34).

Table 34: Comparison of MM competencies from this study with top ten IS competencies required from IS MMs in SSA

Kevor and Boakye’s (2022) top ten IS competencies required from IS MMs		MM competency from this study	Competence subcategory from this study
	Individual foundational competencies		
1.	Ability to collaborate and work with teams	Coordination skill	Delivery input competence
		Interpersonal relationship skill	Socio-relational input competence
		Team spirit	People-oriented personal competence
		Building rapport and maintaining productive working relationships	Socio-relational output competence
		Planning, coordinating, and facilitating team interactions and efforts for self-organisation	Delivery output competence
2.	Ability to be flexible and adapt to change	Adaptability skill	Delivery input competence
		Adaptable	Results-oriented personal competence
		Broad-minded and open-minded	People-oriented personal competence
		Maximising resources	Delivery output competence
3.	Ability to effectively make decisions	Decision-making skill	Delivery input competence
		Autonomous and decisive	Results-oriented personal competence
4.		Tact and diplomacy skill	Socio-relational input competence

Kevor and Boakye's (2022) top ten IS competencies required from IS MMs		MM competency from this study	Competence subcategory from this study
	Ability to negotiate with internal and external stakeholders	Tactful and diplomatic	People-oriented personal competence
5.	Ability to demonstrate leadership skills	Leadership and people management skill	Delivery input competence
		Willingness to lead and follow	People-oriented personal competence
		Leading and owning project implementation	Delivery output competence
6.	Ability to demonstrate creativity	Analytical and innovative	Results-oriented personal competence
7.	Ability to solve problems independently	Issue resolution skill	Delivery input competence
		Resourceful	Results-oriented personal competence
		Managing and resolving project challenges	Delivery output competence
8.	Ability to think critically	Analytical and innovative	Results-oriented personal competence
9.	IS specific competencies: • Monitor technology trends and innovate by exploiting an emerging method or technology	Willingness to learn and stay up-to-date	Results-oriented personal competence
		Analytical and innovative	Results-oriented personal competence
		Learning and keeping up-to-date with knowledge and information	Business output competence
	• Manage IS projects and programmes and apply broadly used project management tools and techniques	Domain knowledge and expertise	Business input competence
		Demonstrating domain knowledge and expertise	Business output competence
		Successfully completing agile project and its associated activities and tasks with an effective team	Delivery output competence
		Implementing agile project delivery approach	Delivery output competence
	• Develop and implement IS/IT policies	Domain knowledge and expertise	Business input competence
		Demonstrating domain knowledge and expertise	Business output competence
		Implementing agile project delivery approach	Delivery output competence
	• Ability to manage and implement IS security and risks	Domain knowledge and expertise	Business input competence
		Demonstrating domain knowledge and expertise	Business output competence
10.	Domain of practice competency: • Demonstrate an understanding of the specific business or domain processes	Domain knowledge and expertise	Business input competence
		Demonstrating domain knowledge and expertise	Business output competence

Kevor and Boakye (2022) identified 'Ability to be flexible and adapt to change' as an important competency for contemporary IS MMs, which is consistent with findings from this study. Given

that agile teams are “flexible and adaptable with team members interchanging roles” (Drury-Grogan and O’Dwyer, 2013, p. 1097), this competency should be seen as a must-have for any manager involved in ASD project delivery. MMs need to have the ability to consider and conform to necessary changes and adjustments that may be required to improve or support how agile project teams operate. This may involve reflecting on the way an agile project team works over a period of time, and where changes are needed, participate in seeking and adopting new ways to ensure the team achieves its shared goals, as was the case in HOLDCOY. Being flexible and adaptable is crucial for MMs to enable them navigate unpredictable project situations, such as developing necessary know-how impromptu to support project delivery, as was the case in BANKCOY. Also, there may be times of resource unavailability when team members that are required to handle certain project tasks are lacking. In such situations, MMs need to be flexible and be able to adapt; fill in the gaps and maximise resources by taking up some of the unattended tasks themselves and/or delegating some of them to other team members, as was the case in HOLDCOY. Unwillingness to change on the part of managers is a barrier to agile transformation (Dikert *et al.*, 2016). For organisations seeking to transit to agile, inflexible personnel can make agile uptake difficult (Mahanti, 2006), and undesirable MMgmt resistance reported in the literature (e.g., Kalenda *et al.*, 2018) may be due to or exacerbated by lack of agile-compatible competencies in MMs. However, if MMs are able to develop the right competences that are useful for them to function effectively in agile teams (e.g., input, personal, and output competencies identified in this study), they can play important roles in agile teams and projects: fostering team performance and supporting PG practice to achieve successful project outcomes.

Secondly, besides the top ten IS competencies, Kevor and Boakye’s (2022) identified other IS competencies required from IS MMs, which fit closely with this study’s findings. For example, they identified ‘Ability to effectively manage time’, ‘Conduct IS strategic analysis and planning’, ‘Ability to manage business relationships’, ‘Ability to communicate orally’, ‘Ability to demonstrate written communication skills through reports’, ‘Ability to demonstrate high emotional intelligence’, and ‘Ability to resolve conflicts in a unit and the organisation’. These fit closely with MM competencies found in this study like *Time management skill*, *Strategy awareness*, *Building rapport and maintaining productive working relationships*, *Interpersonal communication skill*, *Emotional intelligence skill*, and *Issue resolution skill*, for example. On the

other hand, several MM competencies found in this study do not relate to any competencies reported in Kevor and Boakye (2022). Table 35 highlights the MM competencies in question.

Table 35: MM competencies from this study not reported in Kevor and Boakye (2022)

MM competency from this study	Competence subcategory from this study
Teaching and coaching skill	Delivery input competence
Prioritisation skill	
Supervisory skill	
Escalation skill	
Understanding of tacit relationship structures and social dynamics	Socio-relational input competence
Team competence knowledge	Business input competence
Foresight	Results-oriented personal competence
Focused and consistent	
Confident and courageous	
Proactive	
Impartial	People-oriented personal competence
Communicative	
Integrity and openness	
Liberality–rigidity balance	
Management style flexibility	
Shared project ownership mindset	
Meeting deadlines	Socio-relational output competence
Teaching and coaching others	

6.3 Reflection on the Research

6.3.1 Research Trustworthiness

In line with Lincoln and Guba (1985), the trustworthiness of this qualitative research is established using the following criteria: credibility, dependability and confirmability, transferability, and being reflexive during research.

- Credibility of findings is ensured using observations, triangulation (involving various interview respondents and data collection forms to corroborate findings), and member

checking (which involved sharing collected data with participants to obtain clarifications and clear up misconceptions). In addition, actual data, quotes and examples are specified and cited from original data to ensure findings (1) are tightly linked to identifiable study participants and settings, and (2) can be verified independently and objectively (Atkins and Sampson, 2002). Data records, as well as use of TNA and supporting tools for data analysis (e.g., Microsoft Word) help to ensure this.

- Dependability and confirmability are ensured by recruiting another researcher to serve as an auditor and perform a dependability and confirmability audit using audit trail, i.e., “a residue of records stemming from the inquiry” (Lincoln and Guba, 1985, p. 319). The auditor provides a second opinion by examining the research steps employed and collected data to ensure data stability and consistency in findings, and to ascertain whether data analysis process and interpretation have been performed in accordance with standard research procedures (Lincoln and Guba, 1985). To promote research quality and rigour, I developed an audit feedback form, which was issued to the auditor alongside excerpts of collected data, findings, research instruments, and details of the research process covering paradigmatic, theoretical, and methodological choices. The audit feedback regarding the research process (research design, coding process, etc.) confirms data stability and consistency in findings, as well as conformity with standard research procedures (see Appendix AC).
- Transferability is promoted by providing rich, elaborate descriptions of the research process and period, participants, experiences, and behaviours, as well as context and conditions under which the phenomena under study occurred in the investigated settings. This will enable readers to judge for themselves whether research findings are transferable to other settings.
- I recognised the need to be reflexive with self-awareness so as to stay conscious of personal biases, positionality, philosophical stance, methodological decisions, values, interests, relationship to research participants, and effect of such relationship on the research. Below is a summary of the ways in which I might have influenced this research.
 - *Domain knowledge and middle management experience:* I have extensive knowledge of the practice domain in which the practice-based problem being investigated exists. Being knowledgeable about the domain can be beneficial for research interactions and tasks. For

instance, I relied on my theoretical and practical understanding of PG and agile methods to facilitate observation protocol development in this study. Nonetheless, my domain knowledge may potentially engender bias due to unconscious domain-related preferences I may have. I also have significant personal experience working as a MM in ASD teams and projects within Nigeria. Consequently, I am familiar with the issues facing MMs in agile settings—this inspired my research. I identify with the MMs in the case studies. I can relate to the experiences reported and various MMgmt roles and competencies identified.

- *Participant recruitment:* Using convenience sampling, I recruited case study companies and participants from within my professional networks and LinkedIn professional connections to facilitate quick participant recruitment. I have pre-existing relationships with the case study companies and participants (e.g., previous employment relationships, previous alma mater relationships, professional interactions). The pre-existing relationships might have biased participants' opinions, behaviours, or responses regarding the research subject. However, there is no evidence to suggest this was the case except for the profusion of positive views and perceptions of participants, which may be linked to positivity bias (Aithal and Tan, 2021).
- *Conceptual lens and paradigmatic preferences:* In interpretive research “the choice of theory is subjective” (Walsham, 2006, p. 325). I am an exponent of AT and the interpretive philosophy. AT allows researchers to examine and understand an activity from different facets while interpretivism allows researchers to examine and understand a phenomenon through the subjective views and interpretations of people who experience said phenomenon. These predilections influenced the theoretical and methodological choices that informed and guided this research.
- *Interview questions:* In order to minimise time overrun during case study interviews, I considered the kind of interview responses that would be needed to answer the RQs, prior to the interviews. Consequently, from the interview questions set, I took note of specific questions that were essential to address the RQs. However, in doing this, other important questions may have been omitted. While this may be considered preference towards certain questions, it is noteworthy that I did not take a position for or against any research

outcomes. It was helpful to have an awareness of possible interview responses so that they could be easily followed up during interviews.

6.3.2 Research Limitations

Fundamentally, the nature of qualitative research, such as case study research, is subjective. Hence, a researcher may make a “biased interpretation based on responses from biased interviewees” (Bhattacharjee, 2012). Gray (2022) notes that research participants can provide biased responses, which they feel a researcher might be expecting. Particularly when participants think the researcher is representing senior management, they may feel “reluctant to provide honest answers if these are critical of the organization” (Gray, 2022, p. 167). While this might be possible considering that my investigations in the two case companies had the support of senior management, there is no evidence to suggest this was the case. Notwithstanding, my use of several data sources in this study and involvement of a research auditor may help to reduce effects of interpretation and interviewee biases, as well as strengthen validity of findings. Also, involvement of participants with different job roles and from different hierarchical levels may help safeguard against interviewee bias. There is also the possibility of positivity bias considering the profusion of positive views and perceptions (Aithal and Tan, 2021) of the case study and validation study participants who were selected from my professional networks. My pre-existing relationships with the participants might have influenced them towards providing positive opinions unconsciously. To help mitigate bias, I made every effort to remain neutral and not favour positive information during data analysis and when making inferences.

The two case studies are limited to agile-practicing companies and small-scale ASD projects in Nigeria and the finance industry. Although the two selected companies were using agile methods for projects, they were transitioning towards agile from a more traditional organisational approach, with less-than-the-highest agile maturity levels. They are therefore different from companies that have been set up as agile where there might be much flatter organisational structures and high agile maturity levels. In hindsight, selecting companies with very high agile maturity would have been preferable. Also, the agile experience of some participants spanned as short as eight months to one year, with most having only three to five years’ experience. It is possible that this influenced how the participants practiced ASD, their views, and the MMgmt roles and competencies identified.

Generalisation of inferences from a case setting to another organisation or context may be difficult because inferences made in case studies tend to be highly contextualised (Bhattacharjee, 2012). The findings in this study might benefit companies where MMgmt is not part of their organisational structure and corporate culture, but possibly to a small extent. The small number of companies involved in this research may limit generalisability of findings to the two cases. However, this does not devalue the scientific worth of the findings given that in interpretive research “a theory’s pertaining only to the setting where it was developed would not detract from its validity or scientific status” (Lee and Baskerville, 2003, p. 230). The validation study aimed to ascertain the extent to which the case study findings matched the realities in other settings to facilitate generalisability, but the validation findings are not empirical. Although, the validation findings provide evidence to suggest the case study findings may be generalisable outside Nigeria and the finance industry, I exercise caution in generalising them due to the small sample size and inclusion of only small-scale ASD projects. Nonetheless, this research provides interesting insights regarding the roles and competencies of MMs in ASD projects from a PG perspective. The companies that were studied are representative of companies that use agile approaches. Therefore, speculation can be made that companies with like contexts, structures, and projects may derive instructive insights from this research.

Regarding data collection, this research involved a short period of fieldwork. This was due to COVID-19 pandemic, which led to the decision to involve only two companies for data collection as there were significant disruptions to business activities and movement restrictions worldwide. The research may have benefited from a longer fieldwork duration and selection of more companies to gain more insights from participants’ experiences and their PG activities. Nonetheless, within the limited fieldwork period and from the small sample, useful data was collected leading to the identification of 25 roles and 54 competencies of MMs in agile PG settings.

Regarding research scope, a limitation of this research is that it delivers two limited instantiations of the APGov framework, with scope of application and in-depth focus limited to unearthing the roles of MMs and competencies of MMs in the *Division of labour* and *Tools* components, respectively. Despite this limitation, the research delivers two models that deepen our understanding of the kind of roles that agile MMs perform and pertinent competencies for MMs

in ASD project settings. I encourage future research to investigate PG in more ASD projects by applying the APGov conceptual framework to deliver full instantiations that include other components and concepts of the framework, at the same time helping to further demystify the PG phenomenon in ASD projects. Also, the research does not determine the most important roles and competencies in the set of MMgmt roles and competencies identified therein so as to ascertain relative importance of each role and competency. In addition, the research did not identify specific competencies that are required for the performance of specific MMgmt roles in agile PG, but rather competencies that are important for MMs in the agile domain. The research did not consider the ‘how-to’ associated with responsibilities under the respective MMgmt roles, such as the skills, personality traits, tools, methods, techniques, and approaches that MMs would need to apply to perform the duties that are defined in each role description. The direct linkage between the MM roles and competences was not established. Furthermore, the research did not consider the ‘how-to’ associated with the identified MMgmt competencies, such as the specific techniques, options, and approaches that MMs would need to learn, as well as apply in different project situations as they exercise various competencies. Nonetheless, this study provides a repertoire of important MM competencies that have emerged from agile project teams, and also suggests personal characteristics that may distinguish agile MMs from traditional MMs based on comparison of findings with existing agile research.

6.3.3 Reflection on Activity Theory Application in the Research

This study presented an opportunity to adopt AT for the development of the APGov conceptual framework, which was used to investigate PG and MMgmt in ASD projects. Following its conclusion, the study provides insights into intricacies of agile PG with respect to MMgmt roles and competencies. The study also presents an opportunity to ascertain the extent to which my experience using AT compares with the views and experiences of other researchers (e.g., Wiser *et al.*, 2019). In terms of strengths, I found AT helped me to examine and understand an activity from different facets. Also, it facilitates interpretation, reporting, and discussion of findings, whilst also providing a certain degree of flexibility in the way it can be applied. For example, AT supports incorporation of and fusion with other theories as was the case in this study. Regarding its limitations, Wiser *et al.* (2019) identified several AT limitations summarised in Table 36 (see Appendix C for detailed descriptions).

Table 36: Limitations of AT (adapted from Wiser et al., 2019)

ID	AT limitation	Description
L1	Theoretical nature	AT is an explanatory theory, which does not provide sufficient design recommendations.
L2	Abstract nature	The activity system (AS) is too abstract for a standardised application in all research fields.
L3	Applicability	Activity analysis is too complex and time-consuming.
L4	Missing context	AT misses relevant context such as information about the organisation or new technologies.
L5	Activity networks	An activity shall be seen within a network of neighboring activities.
L6	Scope of activity	Often it is unclear what an activity is and how activities, actions, and operations have to be categorised.
L7	Time dimensions	Changes in an activity through time cannot be documented.

Regarding *L1*, I agree that AT does not prescribe sufficient design guidelines and recommendations to aid its application. I was left at the mercy of my own design creativity and understanding of the works of activity theorists. *L1* may prove particularly challenging for researchers who have limited creative design abilities. Having standardised design guidelines and recommendations would be useful to researchers. As for *L2*, that AT does not help with the identification and mapping of precise elements in some activities; in this research this was not the case because I found AT supported me in mapping the agile PG activity and developing the APGov framework. AT supported the identification and mapping of the roles and competencies of MMs to the *Division of labour* and *Tools* components, respectively. Regarding *L3*, I agree that AT is complex and time-consuming. It is difficult to comprehend at first glance. It requires intense review of literature on the theory to understand the various concepts and constructs. As for *L4*, whilst AT supports abstraction of an activity's division of labour, I agree that it lacks the means to enable description of hierarchical composition and breakdown of responsibilities therein. To circumvent this limitation, a researcher needs to have in-depth knowledge of actor roles and responsibilities. Regarding *L5*, whilst I agree that a central activity operates amid other interconnected activities, consideration of other activities outside the agile PG activity is beyond the scope of this research. Hence, I cannot speak to this limitation. As for *L6*, it was not difficult for me to determine the activity to investigate, i.e., the agile PG activity. AT supports examination of an activity in breadth and depth (Crawford and Hasan, 2006; Foot, 2014). However, if care is

not taken, there is the tendency for researchers to be drawn into situations where they go ‘off-course’ when analysing data, which may contribute to the time-consuming nature of AT. Hence, it is vital for researchers to set scope boundaries to guide and control data analysis. As for *L7*, I did not go into documenting evolutionary changes that occurred in the agile PG activities over time within the examined cases because it is beyond the scope of this research. Hence, I cannot speak to this limitation.

Chapter Seven: Conclusion

This research on the roles and competencies of MMs in agile PG was conducted using a qualitative and interpretive approach involving two Nigerian case studies. It culminated in the development of two thematic models. Firstly, a model that conceptualises various roles that MMs perform during agile PG and provides insights into MM impact on agile software teams and projects. Secondly, a model that conceptualises various competencies that are pertinent for MMs to operate effectively in agile project environments, thereby representing competencies that make a good agile MM. The two models were also assessed by expert agile practitioners. This chapter draws attention to the significance of the research by presenting the theoretical contributions and practical implications, and concludes the thesis by presenting trajectories for future research.

7.1 Significance of the Research

This theory-centric research, which investigates the roles and competencies of MMs in agile PG, has resulted in research outcomes that bring interesting perspectives to the ‘MMgmt in agile’ question. The study offers contributions to IS theory and implications for IS practice. It is expected that the findings of this study will benefit researchers, MMs, prospective MMs, senior management, agile teams, HR personnel, hiring managers, and traditional MMs transitioning to the agile way of working.

7.1.1 Contributions to Information Systems Theory

From a theoretical standpoint, this research contributes to the ‘MMgmt in agile’ debate with the hope of prompting scholarly discussions on the topic. To the best of my knowledge, this is the first time that AT has been used to investigate PG to unmask MMgmt in ASD projects. It is also the first time the tripartite view of competence proposed by Crawford (2005) has been combined with AT to categorise and describe various competencies that are useful for MMs to have in order to successfully function in agile software teams and projects. Furthermore, it is the first time the agile PG framework proposed by Lappi *et al.* (2018) has been combined with AT in order to investigate PG and MMgmt in ASD projects. The theoretical contributions are described below.

1) Development of APGov Conceptual Framework as a Theory of Agile PG

The first theoretical contribution is the activity-oriented PG (APGov) conceptual framework that aided this research. This study develops the APGov framework using AT as the underlying principal theory. Incorporating other theories and frameworks (Kujala *et al.*, 2016; Crawford, 2005; Lappi *et al.*, 2018; Nyandongo and Khanyile, 2019; Vlietland and van Vliet, 2015) into AT in the agile PG context demonstrates the flexibility of AT. By combining AT with other theories, this research has produced an initial theoretical framework of agile PG. This research introduces the APGov conceptual framework by applying AT to agile PG and MMgmt research. The APGov framework represents a ‘theory of agile project governance’ comprising various components and concepts based on AT. In essence, this study proposes that the underlying structure of PG activities in ASD projects comprises *Subject, Tools, Object, Community of significant others, Division of labour, Rules and norms, Motivation, Outcome, Actions, Operations, Contradictions, and Zone of proximal development*. This study presents two limited instantiations of the framework based on two Nigerian case studies within the finance industry. The APGov framework may be useful to researchers for investigating agile PG activities and their inherent components in organisations across different geographical regions and industries, to ensure they consider and report on the various PG components and realities therein when investigating the agile PG phenomenon. Ultimately, the APGov framework lends itself as a methodological development with the potential to advance PG and MMgmt research in agile project environments.

2) Identification and Development of Middle Managers’ Roles in Agile PG

The second theoretical contribution, which builds on the APGov framework and answers RQ1, i.e., *What are the roles of middle managers in agile project governance within small-scale agile software development projects in Nigerian organisations?*, is the *Model of middle management roles in agile project governance* (M1). This study delivers this contribution by identifying and developing a model of 25 roles that MMs perform during agile PG within Nigerian small-scale ASD project settings. The model contributes to the establishment of a theoretical foundation to help researchers, agile practitioners, and organisations at large better understand and appreciate the value, extent of involvement, and contributions of MMgmt in PG activities for ASD project implementations. Adopting a PG view in this study helps to shed light on various roles that MMs take on when participating in the governance and delivery of ASD projects. This allows us to

develop a deeper understanding of the way they perform these roles in real project contexts whilst working alongside other PG actors. Also, by adopting the PG view, the study relates the various MMgmt roles to five areas during agile PG: *Planning and coordination for project alignment and execution*, *Continuous improvement and organisational change*, *Agile and technical leadership*, *Monitoring*, and *Capability building*. Regarding *Continuous improvement and organisational change*, this study identifies and posits it as a potential discrete dimension of agile PG that should be explored further. The results of this study are consonant with existing literature regarding the roles of agile managers, roles found in ASD project teams, and continual relevance of MMs in ASD. MMs can be agile facilitators as this study has shown. The study helps us to understand MMs as leaders within hierarchical settings and important multirole actors in the governance and delivery of ASD projects. The study also suggests that some of the PG roles that MMs perform are also performed within agile development teams. Hence, agile PG roles may not be exclusively performed by MMgmt. This study offers empirically grounded insights that may change beliefs regarding the role and relevance of MMgmt in ASD project settings.

3) Identification and Development of Middle Managers' Competencies in Agile PG

The third theoretical contribution, which is built using the APGov framework and answers RQ2, i.e., *What competencies are important for middle managers to function effectively in Nigerian small-scale agile software development projects?*, is the *Model of middle management competencies in agile project governance* (M2). This study delivers this contribution by identifying and developing a thematic model of 54 competencies of agile MMs. The model has emerged from investigating real agile PG contexts in Nigerian small-scale ASD project settings and represents an important suite of multivariate and pertinent competencies that MMgmt in agile environments can exercise and maximise for optimum performance during the governance and delivery of ASD projects. This model contributes towards establishing a theoretical foundation regarding the various competencies that are important for MMs to possess, apply, and cultivate when working alongside ASD teams and governing ASD projects. The study provides insight into a research area that has neither previously received targeted attention nor been thoroughly examined. The present research broadens our understanding of competency expectations for MMgmt in ASD projects. The study relates the various MMgmt competencies to five competence aspects, viz., *Socio-relational*, *Delivery*, *Business*, *Results-oriented*, and *People-oriented* aspects.

The study further categorises each competency into the three elemental aspects of competence: *Input*, *Personal*, and *Output* aspects. M2 appears to comprise transferable competencies, and based on validation study findings, this study may have identified competencies that prospective MMs may overlook as pertinent ones that they need to acquire and develop for agile MMgmt responsibilities i.e., *Tact and diplomacy skill*, *Shared project ownership mindset*, *Integrity and openness*, and *Liberality–rigidity balance*. The results of the study shed light on what constitutes a competent agile MM and provide new research on the topic.

7.1.2 Implications for Information Systems Practice

There are several implications from this study for IS practice in industry. The two models—M1 and M2—developed in this study have implications for agile-practicing organisations and project teams. Beneficiaries may be impacted by the study in the following ways.

1) Project Governance in Agile Software Development Projects

M1 may benefit MMs, prospective MMs, agile teams, and senior management teams by helping them to better understand the various roles that MMs can play in agile PG practice, which may lead to stronger organisation–project strategic connections and project success, as well as foster better working relationships between MMs and their teammates in agile project teams. Therefore, senior management teams are encouraged to involve agile MMs in strategic exchanges as they may possess unique technical–operational knowledge and insights regarding project work and complexities on the ground. Participation of MMs in strategic exchanges with senior management may reinforce project teams’ commitment, dedication, and ownership of ASD projects to ensure mission–critical initiatives are realised with short time to value.

Also, M1 may be useful for creating RACI matrices for responsibility assignment in ASD projects. The model may help to better clarify the MMgmt PG roles, and duties that are expected of people that perform those roles. Hence, the model may help to set the expectations of MMs taking up the PG roles as well as helping them to understand the expectations of those roles. ASD teams may benefit from M1 when defining and clarifying the boundaries of roles during projects with respect to project-specific roles that MMs perform. PG roles performed by MMs may likely vary from organisation to organisation considering that PG governance structures, practices, and

requirements in organisations are highly contextual. Therefore, with regards to M1, company culture, direction, size, and geographical contexts may influence or limit the adoption and practice of some of the PG roles in companies.

Based on validation study findings, M1 may be useful for project auditing in organisations and agile teams with respect to PG arrangements in ASD projects prior to project commencement, as well as assessing PG arrangements during project implementation. For this auditing purpose, M1 may be useful for (a) identifying and specifying which MMgmt PG roles are needed in projects based on project needs (thereby ensuring requisite roles are included), and (b) verifying that specified PG roles are being covered during projects.

M2 may be useful to organisations in learning about important competencies that MMs in their agile project teams may need to develop and exercise in the interests of PG, based on each organisation's governance requirements and preferences. M2 has the potential to help agile project teams assess themselves in the interests of PG to determine competency gaps and identify current strong points and desired competencies. Also, MMs' awareness of competencies in M2 may help them acclimatise to the agile way of working and better understand what is expected of them so as to effectively support ASD project delivery and governance. This may also help minimise MMgmt resistance to agile transformation initiatives and associated teams conflicts. Hence, use of the model may help preserve team stability and project congruity, as well as good project health.

Senior management and other project stakeholders may find the models useful when forming project teams to help ensure the right people are allocated to the right projects. The models may be useful for creating project team member profiles comprising tags of competencies and PG roles that MMs can perform. Such profiles may prove useful for identifying people that are suitable for certain ASD projects based on their capabilities and roles they have performed in previous projects.

2) Middle Management Recruitment for Agile Software Teams and Projects

Recruitment is a vital process in any organisation. Job descriptions and job advertisements are used to specify the skills and traits that are requisite or useful for the successful completion of tasks associated with advertised jobs (Gilli *et al.*, 2022). Person specifications are also used for

this purpose (Williams, 2022). HR personnel and hiring managers in organisations may be able to adopt the M1 and M2 for the production of job descriptions and person specifications when recruiting MMs into their agile software teams. The models may help recruiters and hiring managers to select the sort of MMs they seek by enabling them to produce job descriptions and person specifications that are tailor-made for recruitment of MMs into agile software teams and projects. This may facilitate thorough and better recruitment conversations with potential candidates so as to determine their suitability and make informed candidate selections.

M1 may be useful to organisations for creating archetypes of MMgmt positions for recruitment purposes—archetypes of managers and senior staff engineers, for example. It may be useful for specifying the roles and responsibilities that individuals being recruited into MMgmt job positions will need to perform in ASD projects. However, these roles and responsibilities may vary across organisations due to varying organisational contexts, cultures, and preferences. Also, HR personnel and hiring managers may benefit from using M1 as a resource to formulate role-based and skill-based questions and create interview questionnaires for MMgmt recruitment, thereby allowing recruiters to ascertain and understand how potential candidates perform particular PG roles in projects they have been part of.

Given that M2 provides a range of competencies, organisations may benefit from using it for recruitment purposes in order to ensure they recruit the right MMs with the right competencies at the right levels. The model may help hiring managers to think more holistically about core competencies they need from their MMs—from multiple aspects—rather than focusing solely on specific aspects (e.g., technical skills). In situations where organisations may lack competency models that can help hiring managers to identify and decide on specific competencies that are required in candidates for MMgmt positions in ASD teams, M2 may be helpful as a guidance model to meet such a need—different sub-sets of competencies may be required for different MMgmt positions depending on organisation-specific preferences and needs.

3) Middle Management Performance Management

M1 and M2 may have implications for performance management in organisations with respect to assessment of their agile MMs. Potentially, use of the models might not only enable organisations

to determine whether or not MMs are achieving performance expectations, it might also help them identify specific areas MMs need to develop. This way, organisations may be able to provide personalised support that may help MMs to unlock their potentials and improve their performance. With respect to this, organisations may benefit from the models by using them as performance framework resources to help create and define specific criteria and indicators for assessing the performance of their MMs in project-specific roles. For this purpose, organisations may need to customise the models to clearly define organisation-specific performance assessment scope, specific performance assessment objectives, preferred performance-level criteria/scales, and relative weights to suit organisational needs and environments.

7.2 Trajectories for Future Research

For the benefit of academia and industry, future research using qualitative or quantitative approaches should be carried out to examine the roles and competencies of MMs in PG within additional ASD projects—small-scale and large-scale ASD projects—in finance, other industries, and other countries. This may help to address several limitations of this study discussed in the previous chapter. For example, future case studies can be conducted for longer periods with a larger sample size to further validate and generalise the findings of the present study and build upon same. Also, ethnographic research can be adopted for longitudinal examination of the PG and MMgmt phenomena in ASD project settings. Furthermore, quantitative research can be adopted to determine the relative importance of the MMgmt roles and competencies in agile PG with respect to M1 and M2, respectively.

The following future research directions are suggested to build on current findings regarding M1:

- i. Determine additional PG roles that MMs perform to support agile teams during agile PG in order to facilitate ASD project success.
- ii. Determine specific competencies that MMs need to have to effectively perform each role and support their agile teams for project success. This should identify the specific knowledge, skills, personality traits, tools, methods, techniques, and approaches that MMs would need to apply to perform the duties that are defined in each role description. This may be useful for recruitment, learning and development, and performance management purposes. Future

research aimed at synthesising M1 with M2 to form a single meta-model could also be undertaken.

- iii. Investigate how contextual factors—project size, organisation size, direction, culture, and geographical location and regions—influence the adoption and practice of the various MMgmt PG roles in different organisations. Results from such studies may be useful for understanding underlying factors that influence and determine the PG roles that MMs perform in ASD project settings and why certain roles may not be applicable.

The following future research directions are suggested to build on current findings regarding M2:

- i. Determine the ‘how-to’ associated with the MMgmt competencies that are described in the model. The research should identify specific techniques, options, and approaches that current and prospective agile MMs may want to learn, as well as apply in different project situations as they exercise the various competencies.
- ii. Determine how the competence aspects and competencies in M2 influence MMgmt and project team performance, as well as PG outcomes in ASD projects.
- iii. Investigate the contextual factors that may influence the exercising of various MMgmt competencies in ASD projects. The research should aim to determine factors that enable and inhibit the application of the MMgmt competencies identified in this study.

Further examination of MMgmt could develop insight into how much variety there is in MMgmt structures and responsibilities in different agile-practicing organisations and projects (small-scale and large-scale ASD projects), as well as determine where the commonalities and differences are.

This study suggests that MMgmt in the *Gatekeeper* role serves as single point of accountability, oversight, and delivery assurance for ASD projects. In this role, MMs are held accountable for project performance and outcomes by senior management in terms of PG compliance and project delivery. This implies that challenges encountered in ASD projects impact MMgmt, either directly or indirectly. A challenge that is experienced by a project stakeholder during the PG activity can affect how that stakeholder performs, and ultimately how the team and project as a whole performs. Given that research regarding MMgmt in ASD projects is nascent and largely uncharted, it would be beneficial to examine the challenges that impact MMgmt in agile PG and associated remedies

that are useful in practice. Findings from such research would deepen our understanding of the complexities in agile PG from a MMgmt perspective by identifying challenges and root causes that threaten PG plain sailing, as well as the practical and useful remedies for project stability.

Continuous improvement and organisational change should be investigated in depth as a potential discrete dimension of agile PG. The future research should aim to ascertain what this phenomena entails in PG activities, the underlying mechanisms and dynamics, and the impact on PG and vice versa. Findings from the research may be useful for the extension of existing agile PG frameworks.

Finally, future research should also include further studies to empirically test the APGov conceptual framework in more agile PG settings in order to provide full instantiations of the framework, validate it, modify or extend it, and ultimately ensure it is effective and practical in enabling better understanding of the PG phenomenon in ASD projects.

In conclusion, this study is an attempt to provoke a rethink by practitioners and academia regarding the place of MMs in ASD project settings. It found that MMs are pivotal to PG practice and the effectual functioning of ASD teams in the examined Nigerian cases. This indicates that MMs may have an important role to play in other organisations too. The study also draws attention to the reality that Nigerian organisations utilise agile methods for their software projects, which MMs can successfully orchestrate, facilitate, and support. It contributes to filling a gap in knowledge as to the scope of MMgmt involvement and impact in agile PG and agile teams by offering alternate, clarifying, and optimistic views about the MMgmt role in ASD project environments. The study also unearths competency expectations for agile MMs. On a final note, it is hoped that findings of this study will help stir a consequential awakening within the agile research community to pursue further exploration of the 'MMgmt in agile' phenomenon.

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Appendices

Appendix A: Corporate Governance Values for Project Governance

Table A1: Corporate values and governance (adapted from Burke, 2013)

Project selection	The corporate governance process ensures that the selected projects align with the business case, the statement of requirements, and the corporate vision and values statements.
Stakeholders	The governance ensures that the selected business case aligns with the stakeholders' requirements (needs and expectations), and that the stakeholders are engaged at a level that is commensurate with their importance to the project and the organisation.
Level of risk	The governance ensures that the level of project risk is within the corporation's acceptable level of risk—this filters out high risk ventures.
Project organisation structure	The governance ensures that the project organisation structure's roles, responsibilities, authority and performance criteria are clearly defined, so that everyone working on the project knows who is responsible for what and who is reporting to whom.
Authority	The governance ensures that the project manager is given the authority to use company resources, and this authority is assigned in the agreed manner (outlined in the project charter). This ensures that the assigned authority is commensurate with responsibility.
Statement of requirements	The governance ensures that the statement of requirements is based on relevant and realistic market research data to give an accurate assessment of what the company needs to do to maintain competitive advantage. The statement of requirements underpins the whole project management process; this means that if the needs are inaccurate then the business case and the project will be compromised.
Business case	The governance ensures that the business case not only provides a feasible solution to the identified requirements but also ensures that the business case justifies the allocation of company resources and funds.
Scope management	The governance ensures that the scope is fully defined, the scope changes are approved by nominated people and scope creep is avoided.
Project initiation	The governance ensures that the project is formally initiated by the appointed person—the project sponsor or the project manager.
Go/no-go decision	The governance ensures that the go/no-go decision made at the beginning of each phase is made by the appointed person (project sponsor) in conjunction with the project manager and the project steering board.
Project charter	The governance ensures that the project charter clearly outlines what is required and how it will be achieved and issues authority for the project manager to use company resources.
Planning and control	The governance ensures that the project planning and control process follows the steps outlined in the project plan (issue instructions, expedite procurement, measure progress, guide the project to completion).
Quality control	The governance ensures that the quality control mechanism is in place to confirm the work is completed to the required condition.
Progress reporting	The governance ensures that there are clearly defined criteria for reporting progress to the nominated members of the project organisation.
Project success	The governance ensures that the project manager's critical success targets are clearly defined (time, cost, quality, etc.).

Communication	The governance ensures that project information between all the project stakeholders is communicated efficiently.
Documentation	The governance ensures that the project documents are effectively communicated, controlled and stored for retrieval in the agreed manner.
Issues management	The governance ensures that there is an appropriate mechanism to resolve the project issues.
Reviews and closeout reports	The governance ensures that the formal phase reviews and project closeouts are conducted to confirm completeness and acceptance as outlined in the phase charter or project charter, together with identifying lessons learnt.

Appendix B: Atkins and Sampson (2002) Guidelines and Application

Table B1: Atkins and Sampson (2002) guidelines and their application in the research process

Dimension	Guideline ID	Description	Application Summary	Chapter(s) Relating to Guideline Application
Way of Thinking	G1	Provide an argument for why a case study is appropriate.	<ul style="list-style-type: none"> • Walsham (1993, p. 14) asserts that “the most appropriate method for conducting empirical research in the interpretive tradition is the in-depth case study”. Hence, case study design is well-suited because this interpretive study, which draws on the viewpoints and experiences of study participants, aims to investigate the PG activities in ASD projects in order to determine the roles and competencies of MMs in agile PG by following a theoretical framework, which is derived principally from activity theory (AT): APGov conceptual framework. • According to Eisenhardt (1989, p. 548), a theory that is “developed from case study research is likely to have important strengths like novelty, testability, and empirical validity, which arise from the intimate linkage with empirical evidence”. This multiple-case study provides a pragmatic picture regarding MMgmt in ASD projects in the form of empirically derived novel theories (models) and insights that shed light on the roles MMs perform, and competencies that are important for them to have as they govern and deliver ASD projects in agile teams. 	Chapter Three: Research Methodology
	G2	State philosophical stance and perspective. Take account of bias when performing data analysis.	<ul style="list-style-type: none"> • Interpretivism maintains that reality should be studied and understood through the subjective views and interpretations of people who experience a given reality (Bhattacharjee, 2012). Therefore, the interpretive paradigm is suitable for this study as it allows the researcher to obtain and interpret participants’ experiences vis-a-vis PG and MMgmt in ASD projects. • Data analysis involved use of a coding framework. Thematic network analysis (TNA) was applied within the APGov framework (the base descriptive theory for the coding framework) so as to focus analysis. 	Chapter Three: Research Methodology
Way of Controlling	G3	Define and use some form of quality control measures.	<ul style="list-style-type: none"> • Papers for literature review were required to be related and relevant to the phenomena under study. • A case selection criteria was defined for selection of appropriate cases and participants. • A pilot case study was performed to review and refine case study protocol instruments. • A validation interview study involving six expert agile practitioners was conducted to ascertain the potential usefulness of the two models that were developed in this study in order to conceptualise the roles and competencies of MMgmt in agile PG settings and obtain critical feedback. 	Chapter Two: Literature Review Chapter Three: Research Methodology Chapter Five: Validation of the Two Models Throughout the thesis and Chapter Six: Discussion

Dimension	Guideline		Application Summary	Chapter(s) Relating to Guideline Application
	ID	Description		
			<ul style="list-style-type: none"> • Research trustworthiness is established by ensuring credibility (observations, triangulation, member checking), dependability and confirmability (audit exercise, audit trail and research records), transferability (thick description), and being reflexive during research (Lincoln and Guba, 1985). 	(Reflection on the Research section)
	G4	Ensure that the results are credible.	<ul style="list-style-type: none"> • Credibility of results is ensured by the use of observations, triangulation (involving various interview respondents and data collection forms to corroborate findings), and member checking (Lincoln and Guba, 1985). • In addition, actual data, quotes and examples are specified and cited from original data to ensure findings (1) are tightly linked to identifiable study participants and settings, and (2) can be verified independently and objectively (Atkins and Sampson, 2002). This is ensured through the use of data records, TNA, and supporting tools for data analysis (e.g., Microsoft Word). 	<p>Chapter Three: Research Methodology, and Chapter Six: Discussion (Reflection on the Research section)</p> <p>Chapter Four: Multiple Roles and Competencies of Middle Managers in Agile Project Governance</p>
	G5	Determine how to draw conclusions and justify the results through the appropriate use of theory.	<ul style="list-style-type: none"> • This study has produced two distinct models viz., (a) <i>Model of middle management roles in agile project governance</i> (M1), and (b) <i>Model of middle management competencies in agile project governance</i> (M2). Conclusions are drawn and justified based on the findings in original data, which help to deconstruct MMgmt roles and competencies in agile PG activities within the two cases through within-case and cross-case analysis, and utilising the APGov framework as the main theoretical lens. 	<p>Chapter Three: Research Methodology</p> <p>Chapter Four: Multiple Roles and Competencies of Middle Managers in Agile Project Governance</p> <p>Chapter Five: Validation of the Two Models</p> <p>Chapter Six: Discussion</p> <p>Chapter Seven: Conclusion</p>
Way of Working	G6	Construct a clearly formulated question that describes an important IS issue or problem of interest.	<ul style="list-style-type: none"> • Two RQs were formulated to define the scope and focus of this research. The RQs represent important IS problems of interest that were identified from a review of relevant literature. • The literature review primarily focused on PG in ASD projects, ASD in Nigeria, MMgmt in agile project delivery, competencies in agile project teams and competencies for IS MMs. 	<p>Chapter One: Introduction</p> <p>Chapter Two: Literature Review</p>

Dimension	Guideline		Application Summary	Chapter(s) Relating to Guideline Application
	ID	Description		
	G7	Create a first cut conceptual framework.	<ul style="list-style-type: none"> • Following literature-based theoretical considerations, I developed an APGov conceptual framework as an analytical tool to facilitate analysis and understanding of MM roles and MM competencies in agile PG activities so as to address the RQs. • The APGov conceptual framework served as a guide and reference from the outset informing research design, data collection and analysis, interpretation of findings, reporting and discussion of findings. 	Chapter Three: Research Methodology
	G8	Devise first cut case study questions.	<ul style="list-style-type: none"> • The instruments below were part of the case study protocol that was applied in this research: <ul style="list-style-type: none"> ▸ I developed an interview protocol, which comprised of semi-structured interview questions based on the RQs and the components and concepts of the APGov framework, and aimed at obtaining in-depth accounts from participants regarding PG and MMs in their ASD projects. ▸ I developed an observation protocol, which indicated possible behaviours and aspects to be observed. These behaviors and aspects (which were in the form of questions for the observer) were deemed relevant and served as a guide to help understand the PG and MMgmt dynamics in the observed case setting. ▸ I developed a <i>Company Profile and Project Profile Questionnaire</i>, which contained a set of questions for obtaining industrial context information relating to each case setting. 	Chapter Three: Research Methodology
	G9	Make explicit the research approach.	<ul style="list-style-type: none"> • This study adopts the interpretivist philosophy and multiple-case design approach. • Data collection involved face-to-face and online semi-structured interviews, direct non-participant observation through observer-as-participant role, company documents, questionnaire, web-based platforms (company websites and LinkedIn profiles, emails and instant messaging chats), and telephone. • Analysis of collected data involved TNA, which was applied within the APGov framework. 	Chapter Three: Research Methodology
	G10	Perform a pilot case study.	<ul style="list-style-type: none"> • A pilot case study was conducted as a “dress-rehearsal” (Atkins and Sampson, 2002, p. 105) to assess and fine-tune the case selection criteria, interview protocol, and observation protocol prior to the main case studies. The pilot study led to the development of a company-project profile questionnaire. 	Chapter Three: Research Methodology
	G11	Determine criteria for selecting the appropriate case and participants.	<ul style="list-style-type: none"> • A case selection criteria was determined in the multiple-case design, ultimately targeting technology-enabled companies in Nigeria that use agile methods for small-scale agile software projects and participants (senior management, MMs, lower-level workforce) with ASD experience. 	Chapter Three: Research Methodology

Dimension	Guideline		Application Summary	Chapter(s) Relating to Guideline Application
	ID	Description		
	G12	Refine the case study questions based on lessons learnt from the pilot study.	<ul style="list-style-type: none"> Based on the pilot case study outcome, minor adjustments were made to the interview questions and observation protocol details to make them more suitable for the actual case studies. 	Chapter Three: Research Methodology
	G13	Revisit the research purpose/question and modify the conceptual framework as necessary.	<ul style="list-style-type: none"> A minor adjustment was made to the RQs based on pilot case study outcome and reflection: a change in RQ wording for clarity and focus. The outcome of the pilot case study confirmed strong alignment between the case study protocol instruments (i.e., interview protocol and observation protocol) and the RQs and APGov framework. This ensured that required and useful data was obtained from the two case study environments. The APGov conceptual framework went through several revisions during its development. 	Chapter One: Introduction Chapter Three: Research Methodology
Way of Supporting	G14	Choose appropriate methods for collecting data. Ensure that these are described in enough detail.	<ul style="list-style-type: none"> Data collection methods suitable for qualitative and interpretive case study research were employed for this study and described in detail, viz., interviews, observation, company documents, questionnaire, other supplementary data sources (company websites and LinkedIn profiles, emails, instant messaging chats, and telephone conversations). 	Chapter Three: Research Methodology
	G15	Employ a systematic way to analyse the data. Ensure that these are described in enough detail.	<ul style="list-style-type: none"> Data analysis techniques suitable for qualitative and interpretive case study research were employed for this study and described in detail, viz., thematic network analysis (TNA), which was applied within the APGov framework to enable organisation and interpretation of case study findings. 	Chapter Three: Research Methodology
Way of Communicating	G16	Create a plan for the final report.	<ul style="list-style-type: none"> The thesis report details the entire research process and experience, resulting in inferences and conclusions that answer the RQs. The thesis structure covers the fundamental research elements including problem statement, RQs, research objectives, literature review, conceptual framework development, research methodology, multiple-case findings, validation of models, discussion of findings and research reflection (trustworthiness, limitations, reflection on AT application), contributions to theory and practice, and areas for future research. 	Entire thesis report
	G17	Determine how the case study findings might be transferable to other settings.	<ul style="list-style-type: none"> Providing thick description of the study environment and context, such as characteristics of the case sites and participants, behaviours, experiences, and specific conditions under which findings were observed, can facilitate transferability of finding to other companies, people, or industry settings (Lincoln and Guba, 1985). 	Chapter Three: Research Methodology Chapter Four: Multiple Roles and Competencies of

Dimension	Guideline		Application Summary	Chapter(s) Relating to Guideline Application
	ID	Description		
			<ul style="list-style-type: none"> • The validation study also facilitates generalisation of the research findings. The aim of validation study is to obtain critical feedback and ascertain the potential usefulness of the two developed models, their strengths and limitations, as well as get a sense of the extent to which the research findings agree with the experiences of agile practitioners in other companies. 	<p>Middle Managers in Agile Project Governance</p> <p>Chapter Five: Validation of the Two Models</p> <p>Chapter Six: Discussion</p>
	G18	Determine how to present the findings to the academic and practitioner communities.	<ul style="list-style-type: none"> • This thesis report has been structured and produced in a manner that is accessible for the benefit of readers in academia and industry. As much as possible, efforts have been taken to present the research findings in detail using clear and lucid statements. • The thesis report will be available to the public in portable document format (PDF) on the Central Lancashire Online Knowledge (CLOK) platform: the online repository of the University of Central Lancashire, which stores the university's digital intellectual assets. • This study has produced three conference-related research outputs and a blog post. 	Entire thesis report

Appendix C: Limitations of Activity Theory

Table C1: Limitations of AT (adapted from Wiser et al., 2019)

AT limitation	Description
Theoretical nature	<i>Design recommendations:</i> AT is a contemporary explanatory theory; however, it does not provide or prescribe sufficient design guidelines and recommendations to support its use for analysis of IS settings.
	<i>Contradictions:</i> The concept of contradictions has been criticised for being nebulous, which makes it susceptible to misinterpretation. It can be difficult to distinguish the root causes of contradictions from their symptoms when using AT.
Abstract nature	<i>Comprehensiveness:</i> Activity theorists find fault with the level of abstraction AT permits. Contemporary application of AT tends to overlook key AT concepts and oversimplify its application. Although AT is effective in capturing the activities and encapsulates essential data, there is the tendency to obscure other ‘seemingly non-essential’ aspects of an activity, which may pose a challenge for (a) novice activity theorists who may feel AT is the ‘cure-all’ of analysis, or (b) seasoned activity theorists who adopt a ‘one-track mind’ during their research.
	<i>Standardisation:</i> The abstractness and limited comprehensiveness of AT gives researchers a certain degree of flexibility in the way they apply it. However, flexibility makes it difficult to actually replicate, compare, and criticise the various ways researchers apply AT in their studies.
Applicability	The complex and nebulous nature of AT’s concepts, constructs, and definitions can make it difficult to apply—an issue that is particularly problematic for new AT adopters. Also, the complex and perceived cumbersome nature of AT makes its application time-consuming.
Missing context	<i>Organizational context:</i> Contextual omissions are possible in AT. AT specifies that the subject is the main ‘lens’ through which human activity is viewed and analysed. However, a ‘full picture’ of an activity system may not completely emerge from the perspective of a single actor. Hence, the greater the number of perspectives a researcher is able to capture and incorporate in a study, the greater the contextual richness and completeness of the analysis and results.
	<i>Hierarchical power relations:</i> AT makes provision for abstracting division of labour in activities. However, describing the hierarchical arrangement and breakdown of responsibilities can be difficult. To achieve this, a researcher will need to have deep knowledge regarding each actor’s role and the interrelationships between the roles of various actors. This can be cumbersome.
	<i>New technologies:</i> Activity theorists experience difficulty when using AT to investigate 21st century technological advancements (e.g., social media, virtual reality). Taking social media for example, the difficulty lies with interpretation of its dual identity using AT, given that social media “is as technical as a tool but also as social as a community” (Wiser et al., 2019, p. 887).
Activity networks	An activity takes place in the midst of other interconnected activities that may or may not share the same objective, but have some form of interdependence. This poses a challenge in the application of AT because it does not provide a standard way of documenting, illustrating, and analysing a multiactivity environment and the interconnections (e.g., shared objects, shared tools).
Scope of activity	<i>Meaning of activity:</i> It is argued that in AT, the meaning of ‘activity’ is ambiguous because it can mean “the state of being active or for conducting a task”, which in reality can include an undertaking that involves a broad inclusion of human society, or one that is of a much narrower scale (Wiser et al., 2019, p. 888). Hence, this can pose a challenge to researchers when deciding the scope of the unit of analysis for their research.
	<i>Hierarchical activity structure:</i> Alternation occurs between an activity (macro-level), its actions (meso-level), and operations (micro-level). Regarding this, AT has been criticised for not having an all-inclusive model that allows researchers to depict the hierarchical arrangement of an examined activity to support detailed analysis, while also showing the actions and operations that are performed individually and collectively by actors.

AT limitation	Description
Time dimensions	AT allows activity theorists to document and illustrate point-in-time snapshots of activities. However, this does not adequately satisfy the needs of studies that seek to understand and analyse the history and transition of activities and their components from one state in time to another.

Appendix D: Overarching Action and Operation Categories

Table D1: Derived overarching action and operation categories of the APGov conceptual framework

Overarching Action and Operation Categories	Kujala <i>et al.</i> (2016) Six Dimensions	Lappi <i>et al.</i> (2018) Six Dimensions	Vlietland and van Vliet (2015) Nine Propositions	Nyandongo and Khanyile (2019) Four Components
Monitoring	1. Monitoring	1. Monitoring	<p>Proposition 8 - Information visibility positively impacts coordination practices.</p> <p>Proposition 9 - Automation of status and progress tracking in the chain positively impacts information visibility.</p>	<p>1. Continuous monitoring</p> <ul style="list-style-type: none"> • Risk mitigation • Metrics Strategy • Tools for monitoring • ROI <p>2. Transparency</p> <ul style="list-style-type: none"> • Status reporting via daily stand-ups • Policies , guidelines and procedures
Coordination	2. Coordination	2. Coordination	<p>Proposition 1 - Embedded coordination practices within and between Scrum teams positively impact delivery predictability.</p> <p>Proposition 3 - Matching priority improves front to back coordination practices.</p> <p>Proposition 5 - Alignment between Scrum teams positively impacts delivery predictability</p> <p>Proposition 6 - Matched priority setting positively impacts the alignment between Scrum teams.</p> <p>Proposition 7 - Coordination practices positively impact the alignment between Scrum teams.</p> <p>Proposition 8 - Information visibility positively impacts coordination practices.</p>	<p>2. Transparency</p> <ul style="list-style-type: none"> • Status reporting via daily stand-ups • Policies , guidelines and procedures <p>3. Collaboration</p> <ul style="list-style-type: none"> • Product backlog management by business • Iteration demos • Retrospectives
Goal setting	3. Goal setting	3. Goal setting	<p>Proposition 2 - Matching priority over the front to back chain positively impacts delivery predictability.</p> <p>Proposition 3 - Matching priority improves front to back coordination practices.</p> <p>Proposition 4 - The implementation of decision making strategies improves matched priority setting.</p> <p>Proposition 6 - Matched priority setting positively</p>	Nil

Overarching Action and Operation Categories	Kujala <i>et al.</i> (2016) Six Dimensions	Lappi <i>et al.</i> (2018) Six Dimensions	Vlietland and van Vliet (2015) Nine Propositions	Nyandongo and Khanyile (2019) Four Components
			impacts the alignment between Scrum teams.	
Identification, definition, and assignment of roles and responsibilities	4. Roles and decision-making power	4. Roles and decision-making power	Nil	Nil
Decision-making	4. Roles and decision-making power	4. Roles and decision-making power	Proposition 4 - The implementation of decision making strategies improves matched priority setting.	4. Enablement <ul style="list-style-type: none"> • Decision making and rights • Knowledge sharing
Capability building	5. Capability building	5. Capability building	Nil	4. Enablement <ul style="list-style-type: none"> • Decision making and rights • Knowledge sharing
Incentives	6. Incentives	6. Incentives	Nil	4. Enablement <ul style="list-style-type: none"> • Decision making and rights • Knowledge sharing

Appendix E: APGov Conceptual Framework

Table E1: APGov conceptual framework composition

S/No.	Concept	Framing question	Description
1.	Subject	Who is involved in carrying out the PG activity?	The individual or group that is undertaking the PG activity (e.g., senior management, MM, developer, agile project team as a group), and from whose viewpoint the activity is analysed.
2.	Object	Why is the PG activity taking place?	The problem situation or focus of the PG activity (e.g., governing and completing ASD project). It is an objectified motive: the thing-to-be-acted-upon.
3.	Rules and norms	Are there any rules, norms, processes, procedures, methods, policies, practices, regulations governing the PG activity?	Regulations, norms, conventions (explicit and implicit) that constrain/ govern the PG activity. These may include PG rules, policies, principles, procedures, processes, and standard practices methods (e.g., agile methods) that the subject is expected to follow or comply with when acting on the object.
4.	Community of significant others	What is the environment in which the PG activity is being carried out? Who are the other actors in the PG activity?	Individuals or groups other than the subject who have the same general object, but are distinct, and with whom the subject interacts, i.e. other stakeholders. This includes other internal and external actors associated with the PG activity.
5.	Division of labour	Who is responsible for what when carrying out the PG activity and how are the roles organised?	Represents the roles, responsibilities, and hierarchy of various actors in the PG activity and indicates the way tasks are divided.
6.	Tools	By what means is the subject carrying out the PG activity?	A thing used by the subject (or members of community of significant others) to act on the object in order to achieve the outcome. Tools can be physical (material) or abstract (non-material) PG tools. Examples of physical PG tools include agile methods' artifacts, workplace software applications, technologies, documented policies and procedures, and various project-related documentation. Examples of abstract PG tools include job-specific competences and competencies, models, frameworks, product vision, project goals, and team goals.
	Job-specific competences tools – Input competences	What is the knowledge, skill, understanding and experience of the subject (or community), which they bring to the job in order to perform it in the PG activity?	Represents the knowledge, skills, understanding, abilities, expertise, and experience of the subject (or members of community of significant others), which they bring to their job—including those developed and acquired in the course of doing the job—in order to perform it in the PG activity. It refers to abilities and capabilities possessed by the subject (or members of community of significant others) as a result of experience, qualifications, education or training, which enables them to do their job in the PG activity.
	Job-specific competences tools – Output competences	How is the subject (or community) demonstrating their ability and capability (using their knowledge, skills, understanding, or experience), to perform their job in the PG activity?	This concerns demonstrable performance, i.e., the ability to apply and demonstrate held knowledge, skills, expertise, experience, personality characteristics when performing a job in the PG activity. It is the demonstration of abilities and capabilities by the subject (or members of community of significant others) in performing their job to acceptable levels of job performance in the PG activity.

S/No.	Concept	Framing question	Description
	Job-specific competences tools – Personal competences	What is the personal attribute of the subject (or community), which they bring to the job in order to perform it in the PG activity?	The personality characteristics that enables the subject (or members of community of significant others) to do their job in the PG activity. The personal attributes, character, personality of the subject (or members of community of significant others), which they bring to the job in order to perform it in the PG activity.
7.	Outcome	What is the (desired) outcome from the PG activity?	The outcome (expected results) of the PG activity, which is the transformed object (e.g., a governed and completed ASD project).
8.	Motivation	What is the stimulus for the PG activity?	The reason(s) for the PG activity taking place. Motivations behind activities can vary.
9.	Action	What action is performed by the subject in the PG activity?	A conscious goal-driven deed or effort targeted at and performed upon the object by the subject in order to achieve an outcome in the PG activity. It is essentially a deed (or occurrence) that is not unconscious, routinised or automatic. Examples are monitoring; coordination; goal setting; identification, definition, and assignment of roles and responsibilities; decision-making; capability building, and incentives actions.
10.	Operation	What operation is performed by the subject in the PG activity?	A nonconscious, routinised or automatic deed (or occurrence), which is targeted at and performed upon the object by the subject in order to achieve an outcome in the PG activity. Examples are monitoring; coordination; goal setting; identification, definition, and assignment of roles and responsibilities; decision-making; capability building, and incentives operations.
11.	Contradictions	What are the imbalances that occur in components of the PG activity, between components, between a pre-intervention stage and post-intervention stage in the PG activity, or between the PG activity and a neighboring activity?	Imbalances (tensions, process breakdowns, issues, conflicts, misalignments, problems, clashes, and challenges) that occur in individual components of the PG activity (primary contradiction), or between components (secondary contradiction), or between a pre-intervention stage and post-intervention stage in the PG activity (tertiary contradiction), or between the PG activity and a neighboring activity (quaternary contradiction).
	Primary contradiction	What is the imbalance that occurs in a particular component of the PG activity? Do the PG activity actors experience any issue in the activity, relating to a particular component?	An imbalance (tensions, process breakdowns, issues, conflicts, misalignments, problems, clashes, and challenges) that occurs in one component of the PG activity. It can occur in any of the following six components – subject, tools, rules and norms, object, division of labour, and community of significant others.
	Secondary contradiction	What is the imbalance that occurs between two components of the PG activity? Do the PG activity actors experience or have any issue in the activity, relating to two components?	An imbalance (tensions, process breakdowns, issues, conflicts, misalignments, problems, clashes, and challenges) that occurs between one component of the PG activity and another component. It can occur between any of the following six components – subject, tools, rules and norms, object, division of labour, and community of significant others.
	Tertiary contradiction	What is the imbalance that occurs between a pre-intervention stage and post-intervention stage in the PG activity? Do the PG activity actors experience or have any issue with an intervention that was introduced to	An imbalance (tensions, process breakdowns, issues, conflicts, misalignments, problems, clashes, and challenges) that occurs between different developmental stages of the PG activity. It is experienced between a pre-intervention stage and post-intervention stage in the activity. For example, following occurrence of a

S/No.	Concept	Framing question	Description
		resolve or manage a secondary contradiction issue?	secondary contradiction (e.g. conflict between subject and a software tool), an intervention (e.g. new software tool) is introduced into the PG activity to resolve or manage the issue. However, the introduced intervention (new software tool) subsequently leads to another issue that disrupts the modus operandi in the PG activity.
	Quaternary contradiction	What is the imbalance that occurs between the PG activity and a neighboring activity? Do actors in another activity experience or have any issue with outputs from the PG activity?	An imbalance (tensions, process breakdowns, issues, conflicts, misalignments, problems, clashes, and challenges) that occurs between the PG activity and other neighboring activities. For example, where an intervention to address a contradiction in the PG activity is successful, however, the said intervention creates issues for another neighboring activity that utilises services or products from the PG activity.
12.	Zone of Proximal Development	In what area or aspect of the PG activity has a contradiction been experienced, observed or occurred, but no intervention has yet been introduced to resolve or manage the contradiction?	The condition whereby the PG activity experiences a contradiction in a certain aspect, and consequently, a form of intervention (e.g. assistance, solution or change) is needed to resolve or manage resulting issues in order to achieve a more stable activity environment.

Appendix F: Case Study Ethics Approval



13th February 2020

Amanda Gregory
School of Physical Sciences and Computing
University of Central Lancashire

Dear Amanda

Re: Science Ethics Review Panel Application
Unique Reference Number: SCIENCE 0019

The Science Ethics Review Panel has granted approval of your proposal application 'Governance in agile information technology projects: Investigating the role of middle managers and mediating factors'. Approval is granted up to the end of project date*.

It is your responsibility to ensure that

- the project is carried out in line with the information provided in the forms you have submitted
- you regularly re-consider the ethical issues that may be raised in generating and analysing your data
- any proposed amendments/changes to the project are raised with, and approved, by the Ethics Review Panel
- you notify EthicsInfo@uclan.ac.uk if the end date changes or the project does not start
- serious adverse events that occur from the project are reported to the Ethics Review Panel
- a closure report is submitted to complete the ethics governance procedures (Existing paperwork can be used for this purposes e.g. funder's end of grant report; abstract for student award or NRES final report. If none of these are available use e-Ethics Closure Report Pro forma).

Yours sincerely

A handwritten signature in black ink that reads 'Emma Threadgold'.

Emma Threadgold
Vice-Chair
Science Ethics Review Panel

* for research degree students this will be the final lapse date

NB - Ethical approval is contingent on any health and safety checklists having been completed, and necessary approvals gained as a result.

Appendix G: Case Study Participant Information Sheet



Governance in Agile Information Technology Projects: Investigating the Role of Middle Managers and Mediating Factors

Please take time to read and consider the following information. If anything is unclear or you would like more information, please contact us using the details at the end of the form.

What is the study about?

In technology-enabled organisations where agile methodologies are used, project governance helps ensure the necessary oversight, procedures, tools, manpower and support (e.g. management support) are in place for agile IT projects so as to enable agile teams develop and release IT solutions that meet business needs. However, the role of middle managers in the governance of agile IT projects is not clearly defined nor well-understood. This study will explore what middle managers do in relation to project governance in agile IT projects, and identify underlying issues and possible solutions to aid project governance practice.

What is the purpose of the Interviews, Observations and Document analysis?

We need to understand (a) the role of middle managers in the governance of agile IT projects that you have been working on or been responsible for, and (b) the underlying factors that influence project governance practices in your projects. We will start the study by interviewing some members of your agile teams and other stakeholders to collect perspectives and suggestions. In addition, we will be observing some project activities, as well as analysing documents such as sprint/iteration retrospectives reports, procedures, organisational structure and other documentation relevant to the study.

Who is undertaking and funding the study?

This research is being undertaken by the Agile Research Network (ARN), a research collaboration between the University of Central Lancashire (UCLan) and the Open University, both located in the UK. ARN is funded by the Agile Business Consortium and the two Universities.

Who has reviewed the study?

This study has been reviewed and approved by the UCLan Ethics Review Panel for Science.

Why have I been approached?

You have been approached because you have been identified as a stakeholder or a project team member for agile IT projects that are being undertaken by your organisation.

What does taking part involve?

You are being invited to take part in this study. Data will be collected using (a) interviews (b) observations, and (c) document analysis. Interviews will be conducted either face-to-face, by telephone, or by online communication tools such as Skype or Zoom. Interviews will last about 90 minutes. They will be conversational in style but guided by a set of questions. Observations of normal project activities such as sprints/iterations, daily standups, iteration retrospectives, iteration planning, sprint/iteration reviews and other relevant meetings, will take place at various points throughout the project.

With your consent, researchers will take notes during observations. Interviews will be audio taped, so that we have a record of what was discussed. All notes will be anonymised so that the role of the participant is noted

Version 1, November 2019

(e.g. project manager, software engineer, product owner, business analyst, etc.), but no names will be stored with the data. Also data such as age, date of birth and address will not be collected.

What are the possible benefits of taking part?

The research will contribute to knowledge and practice in project management, project governance, and the use of agile methodologies. The findings will help to improve project governance practices in agile IT projects by helping to identify and understand (a) the role of middle managers, (b) the tensions and corresponding solutions that address them, (c) the competencies needed for middle managers to function effectively in self-organising agile teams, and (d) success factors and obstacles of project governance in agile IT projects.

Will my taking part in this study be kept confidential?

All information collected will be kept anonymous. All data will be kept on a secure, password-protected server at UCLan, which only the researchers can access. All data will be kept for a maximum of 5 years in line with the University's ethical guidelines and will then be destroyed. You will be given a participant identification number and your information will be aligned with this identification number, rather than your name.

What will happen to the results of the study?

The results of the study will be used to improve project governance in agile IT projects at your organisation. Research results may also be published as PhD thesis, reports, presentations, whitepapers, articles, and other publications. The names of the organisations and participants who have taken part in the research will not be identified in these publications.

Do I have to take part?

Participation is entirely voluntary. If you are happy to take part, we will ask you to sign the attached consent forms and give them to us at an interview or observation. Even if you agree to participate you are still free to withdraw at any time without giving a reason. If you choose to withdraw, you will be asked to provide your issued identification number. Once you have withdrawn from the study, data you provided will be deleted/destroyed. However, if you are taking part in an observation, removal of data will not be possible after the activity has been completed because we can't identify you at this stage.

A decision to withdraw, or a decision not to take part, will not be recorded or reported within the final report or to your employer.

What if I have any questions or complaints about the study?

If you have any questions or complaints please contact one of the researchers:

Principal investigator: Dr Peggy Gregory, Senior Lecturer, 01772893284, ajgregory@uclan.ac.uk

Co-investigators: Maduka Uwadi, PhD Student, 07570700824, mcuwadi@uclan.ac.uk

Professor Ian Allison, 01772892505, iallison@uclan.ac.uk

Professor Helen Sharp, 01908653638, helen.sharp@open.ac.uk

Dr Diane Strode, Research Associate, diane.strode@open.ac.uk

Dr Leonor Barroca, Senior Lecturer, 01908654864, leonor.barroca@open.ac.uk

If you wish to take a complaint further please contact the University Officer for Ethics at UCLan: OfficerForEthics@uclan.ac.uk. Please include the study name or description, the principal researcher, and the substance of your complaint in your email.

Appendix H: Case Study Interview and Observation Consent Forms

H.1: Interview Consent Form



Governance in Agile Information Technology Projects: Investigating the Role of Middle Managers and Mediating Factors

INTERVIEW CONSENT FORM

Please tick the boxes provided to indicate 'YES' to the following statements:

I understand that participation is entirely voluntary and that I won't be paid for my participation. I may withdraw and discontinue participation at any time in this study.	<input type="checkbox"/>
I have read and understood the information sheet and I have had the opportunity to ask questions.	<input type="checkbox"/>
I agree to interviews being audio-recorded and/or written notes being taken so that the interviewer can properly capture all information that I will provide during interviews.	<input type="checkbox"/>
I agree to written notes being taken during observations.	<input type="checkbox"/>
I agree to the use of my opinions, perceptions, information and experiences in the study.	<input type="checkbox"/>
I understand that my participation will be anonymous and any details that might identify me or my employer in a clear and detailed manner will not be included in reports or other publications produced from the study.	<input type="checkbox"/>

Signature:	Date:
Name of researcher taking consent:	
Signature:	Date:

H.2: Observation Consent Form



Governance in Agile Information Technology Projects: Investigating the Role of Middle Managers and Mediating Factors

OBSERVATION CONSENT FORM

Please tick the boxes provided to indicate 'YES' to the following statements:

I understand that participation is entirely voluntary and that I won't be paid for my participation. I may withdraw and discontinue participation at any time in this study.	<input type="checkbox"/>
I have read and understood the information sheet and I have had the opportunity to ask questions.	<input type="checkbox"/>
I agree to written notes being taken during observations.	<input type="checkbox"/>
I agree to the use of my opinions, perceptions, information and experiences in the study.	<input type="checkbox"/>
I understand that my participation will be anonymous and any details that might identify me or my employer in a clear and detailed manner will not be included in reports or other publications produced from the study.	<input type="checkbox"/>

Signature:	Date:
Name of researcher taking consent:	
Signature:	Date:

Appendix I: Case Study Interview Protocol

I.1: Interview Protocol



Governance in Agile Information Technology Projects: Investigating the Role of Middle Managers and Mediating Factors

Interview Protocol

Semi-structured questions for individual interviews to address **Research Question 1** are indicated below. Interview questions will be in several stages:

Participant ID:

STAGE 1: Some information about the participant

1. Introduction to the study. Check they have read the Participant Information Sheet, signed the Consent Form and their participation is voluntary. Invite questions for clarification.
2. Obtain demographic information from participant:
Please can you tell me your current job role in the organisation?
Further probe – Where is your position in the organisational structure of the organisation?
- How long have you been employed in this organisation?
- Are you supervised by other members of staff? If so please explain.
- Do you supervise other members of staff in your organisation and agile project team? If so please explain.

Is interviewee a middle manager? Yes No
3. Record any previous experience in IT, agile methodologies, agile software development, and agile project management:
Please can you tell me your professional background?
Further probe - How many years of IT experience do you have?
- How many years of IT experience do you have using agile methodologies?
- What agile methodologies have you used for agile IT projects?
4. Record current experience in IT, agile methodologies, and agile project management.
What agile IT project are you currently working on? Please describe.
Further probe – If there is no current agile IT project being worked on, what was the most recent agile IT project you worked on? Please describe.

STAGE 2: Specific questions relating to project governance

5. What does the term 'agile project governance' mean to you in relation to agile IT projects?
6. How important is project governance in your agile IT project? Please explain.
7. How is project governance applied/performed in your agile IT project? Please describe the step-by-step process.
Further probe – Who are the other stakeholders involved in each step/stage?
- What are the responsibilities of those involved in each step/stage? What do they do?
- What is the community/environment in which this activity is carried out (fixed location, dates, time)?
- What is the desired outcome of each step/stage of the project governance process?
- What are the tools and artefacts used in project governance in your agile IT project in terms of

softwares, documents, reports, methods, etc.?

- What rules, norms, policies, regulations or procedures do you follow for project governance in your agile IT project?

8. Why do you perform project governance in your agile IT project? *This is the object/end*

Further probe – What is the desired outcome from performing project governance in your agile IT project?

9. What is your role and contribution in the project governance of your agile IT project in terms of (A) project monitoring, (B) coordinating, (C) project goal setting, (D) capability building, (E) assigning of roles, and decision-making, and (F) incentives (e.g. rewards, bonus, promotion)? Please explain with examples.

Further probe – How do you do it? What specific actions do you take?

- Why do you take these actions?

- Which of these roles and contributions is strategic, tactical, and operational?

- What kind of tools and artefacts (e.g. softwares, documents, etc.) do you use for project governance in your agile project with regards to (A) project monitoring, (B) coordinating, (C) goal setting, (D) capability building, (E) assigning of roles, and decision-making, and (F) incentives (e.g. rewards, bonus, promotion)? Please explain the purpose of each tool and artefact?

- Do you experience any challenges, obstacles, tensions or disadvantages when using these tools and artefacts?

- What are the strengths and limitations of these tools and artefacts?

- What rules, norms, procedures, policies or regulations do you follow and adhere to for project governance in terms of (A) project monitoring, (B) coordinating, (C) project goal setting, (D) capability building, (E) assigning of roles, and decision-making, and (F) incentives?

- Do you experience any challenges, obstacles, tensions or disadvantages with regards to these rules, norms, procedures, policies or regulations? Please explain

- What are the strengths and limitations of these rules, norms, procedures, policies or regulations?

- What are the responsibilities of other people involved in (A) project monitoring, (B) coordinating, (C) project goal setting, (D) capability building, (E) assigning of roles, and decision-making, and (F) incentives?

- Do you interface with other business functions, and stakeholders in your agile IT project? Please explain with specific examples.

10. **Skip this question if interviewee is a middle manager based on question 2 above:**

What is the role and contribution of middle managers in the project governance of your agile IT project(s) in terms of (A) project monitoring, (B) coordinating, (C) project goal setting, (D) capability building, (E) assigning of roles, and decision-making, and (F) incentives? Please explain with examples.

Further probe – Which of these middle manager roles and contributions is strategic, tactical, and operational?

– What tools, artefacts, or documents do middle managers use for (A) project monitoring, (B) coordinating, (C) project goal setting, (D) capability building, (E) assigning of roles, and decision-making, and (F) incentives?

- What rules, norms, procedures, policies or regulations do middle managers follow and adhere to for (A) project monitoring, (B) coordinating, (C) project goal setting, (D) capability building, (E) assigning of roles, and decision-making, and (F) incentives?

11. What knowledge and skills should middle managers possess in order to work effectively with agile teams and achieve the goals of an agile IT project? Please explain with specific examples.

12. What personality traits and attributes should middle managers possess in order to work effectively in agile IT projects? Please explain with specific examples.

13. How can middle managers demonstrate their competencies when working in agile IT projects? Please explain with specific examples.

14. What challenges, obstacles, tensions or disadvantages have you experienced in your agile IT project(s) when dealing with: (A) internal team (B) external team (C) middle managers (D) senior management (E) rules, processes, policies, procedures and regulations, (F) tools, softwares and other artefacts used at work? Please explain with specific examples.

- Further probe** – How did you overcome the challenges, obstacles, tensions or disadvantages?
 - What process did you follow to resolve the challenges, obstacles, tensions or disadvantages?
 - What was the role and contribution of middle managers in resolving and overcoming the challenges, obstacles, tensions or disadvantages?
15. What is the history of project governance practice with regards to your agile IT projects?
 Further probes - Is there any difference between past project governance processes or procedures and current processes or procedures? Please explain with examples.
 16. Does the size of agile IT project (small scale/large-scale agile project) have any effect on project governance?
 17. Are there other dimensions, aspects or facets of project governance in agile IT projects besides monitoring, coordinating, goal setting, capability building, assigning of roles and decision-making, and incentives?

STAGE 3: Additional questions relating to competencies, skills, tools, and artefacts in project governance of agile IT projects

18. Can you describe the competencies, knowledge and skills that you apply when working with your self-organizing agile teams in your project?
Further probe – How do you apply these competencies, knowledge and skills?
 - Do you encounter any challenges, obstacles, tensions or disadvantages when applying these competencies, knowledge and skills?
 - How do you develop these competencies?
 - What is the most important competency?
 - How do you assess and evaluate your competencies to ensure that you are adequately supporting your agile teams?
 - What kind of support is available to you in the organisation to meet your training and development needs?
19. What are the factors that influence the development and use of your competencies when working on agile IT projects?
20. Is there any difference between the ways you used tools and artefacts in the past and how you use them currently? Please explain with examples.

STAGE 4: Additional questions relating to division of labour and communities in project governance of agile IT projects

21. What are the roles and responsibilities of middle managers in your agile IT project? Please explain with specific examples.
Further probe – Which of these middle manager roles and responsibilities is strategic, tactical, and operational?
22. How are tasks coordinated within your teams in agile IT project? Please explain with specific examples.
Further probe - Who is involved in each of the activities and what do they do?
 - What role and contributions do middle managers make in regards to coordination?
 - How important is coordination?
 - Why do you carry out coordination in your agile IT project?
23. How is goal setting performed so that project/iteration goals are clear and aligned with business strategy and direction? Please explain with specific examples.
Further probe - Who is involved in each of the activities and what do they do?
 - What role and contributions do middle managers make in regards to goal setting?
 - How important is goal setting?
 - Why do you carry out goal setting in your agile IT project?

24. How is monitoring performed in order to ensure that your agile teams stay focused, accomplish their tasks, and deliver project expectations? Please explain with specific examples.
Further probe - Who is involved in each of the activities and what do they do?
 - What role and contributions do middle managers make in regards to monitoring?
 - Why do you carry out monitoring in your agile IT project?
 - How important is monitoring?
25. Are there tangible or intangible incentives in the organisation that motivate you and/or the agile team when working on agile IT projects? If so, please explain with specific examples.
Further probe – What role and contributions do middle managers make in regards to incentives?
 - Why do you offer incentives in your agile IT project?
 - How important are incentives?
26. How is capability building managed to ensure that your agile teams have necessary capabilities, skills, training and development to accomplish their work? Please explain with specific examples.
Further probe - Who is involved in each of the activities and what do they do?
 - What role and contributions do middle managers make in regards to capability building?
 - How important is capability building?
 - Why do you carry out capability building in your agile IT project?
27. Can you explain how your agile teams make decisions? Please explain with specific examples.
Further probe – How important is decision-making?
 - What decisions can/do you make? Please include specific examples.
 - Which of these decisions are strategic, tactical, and operational?
 - Who makes each of these types of decisions?
 - What role and contributions do middle managers make in regards to decision-making (strategic, tactical, and operational)?
 - What is your/their decision-making authority/rights in the agile IT project?
 - What is your/their decision-making power in agile IT projects?
 - How would rate your decision-making capability in agile IT projects?
 - Why do you engage in decision-making activities in your agile IT project?
28. How do your agile teams determine and assign roles and responsibilities in the project? Please explain with specific examples.
Further probe - Who is involved in each of the activities and what do they do?
 - What role and contributions do middle managers make in regards to determining and assigning roles and responsibilities?
 - How important is the determination and assigning of roles and responsibilities in your agile IT project?
29. What kind of support do you receive from: (A) internal team (B) middle managers (C) senior management? Please explain with specific examples.
30. Is there anything else that you feel is important to discuss with regards to project governance and the role of middle managers in your agile IT projects, which has not been covered in previous questions?

I.2: Interview Steps

- Schedule the interviews in collaboration with participants. Following my introduction to the two agile project teams by the contact persons, i.e., Group CIO (P4) in HOLDCOY and CIO (P21) in BANKCOY, I agreed interview dates and times with participating team members in collaboration with the contact persons.
- On the day of the interview, arrive the venue ahead of time and finalise interview setup before the participant arrives. The setup finalisation includes having the participant information sheet, consent form, and note-taking materials in hand, and performing a final test to confirm the digital recording instrument is functioning properly. The face-to-face interviews were recorded using a digital voice recorder, while the virtual interview was conducted and recorded using GoToMeeting online meeting software.
- Commence interview session by acknowledging the participant's voluntary participation.
- Confirm that participant has read the participant information sheet. If the response is not affirmative, provide the participant with a copy of the participant information sheet.
- Reiterate that interviewee comments will be anonymous and confidential.
- Inform the participant that the interview will be recorded, and participant consent is required.
- Obtain verbal consent and ask the participant to fill and sign the informed consent form.
- Invite questions from the participant for any clarifications required before asking the interview questions.
- Ask the various interview questions following the order in the interview protocol while recording the session digitally, and also taking notes as a backup in case the digital recording fails.
- Ask follow-up probing questions to elicit further responses from the interviewee as necessary.
- Check the time regularly to ensure the interview session does not overrun the planned interview duration more than necessary.
- If it happens that time is running short, focus on asking the most important interview questions that would help obtain useful data to address the RQs. In preparing for the interviews, I took note of several critical interview questions that I felt were essential to help answer the RQs. These were fundamental questions that were directly linked to the RQs.

- Once the interview time is up, thank the interviewee for participating in the interview session and stop the recording.
- Write down any immediate ideas or insights obtained from the interview to supplement the recording and review the recording and notes afterwards.
- Prepare collected data for analysis by determining and applying transcription approach to convert interview recordings to textual data.

Appendix J: Case Study Observation Protocol

J.1: Observation Protocol



Governance in Agile Information Technology Projects: Investigating the Role of Middle Managers and Mediating Factors

Observation Protocol

Protocol to observe project activities of an agile IT project such as daily standups, iteration retrospectives, iteration planning, iteration reviews and other relevant events/meetings involving middle managers and other project stakeholders is indicated below.

Section 1 Event Description

This section details a brief description of the event being observed.

Observation date:	
Observation start time:	
Observation end time:	
Name of event under observation:	
Purpose of event under observation:	
Roles of participants under observation:	
Number of participants under observation:	

Section 2 Observation Notes

This section details the behaviours/aspects being observed and observation notes.

Behaviours/aspects being observed	Observation notes
<ul style="list-style-type: none"> ➤ What agile methodology is being used? ➤ What are the roles and responsibilities and how were these were decided? <ul style="list-style-type: none"> ○ How important are these roles and responsibilities? ➤ Are discussions constructive and collaborative? <ul style="list-style-type: none"> ○ Who talks and who listens? ➤ What type of resources are available (technology, tools, internal and external manpower with necessary competencies and skills)? ➤ How are the resources utilised? ➤ What documentation is been used/produced? <ul style="list-style-type: none"> ○ How is it being used? ➤ How are middle managers and other team members undertaking their responsibilities? 	

Behaviours/aspects being observed	Observation notes
<ul style="list-style-type: none"> ➤ How are middle managers collaborating with other team members? ➤ What are the tensions in the interactions between middle managers and other team members? <ul style="list-style-type: none"> ○ How are tensions handled and resolved? ➤ What actions are taken? Who takes them? ➤ What are the contributions of middle managers? <ul style="list-style-type: none"> ○ What competencies and skills do they use? ○ What expertise and experience do they bring to projects? ➤ What type of management support is provided? ➤ What are the issues facing middle managers and other team members? ➤ How are decisions being made and what type of decisions? <ul style="list-style-type: none"> ○ Who makes the decisions? ○ What is their decision-making power? ○ What is their decision-making authority? ○ What is their decision-making capability? 	

J.2: Observation Steps

- Determine the dates and times for the project meetings to be observed and obtain consent. Following my introduction to the TECHCOY agile project team by the contact person, i.e., Group CIO (P4), I ascertained the team's daily Scrum, sprint planning, and MPR meeting schedules. In collaboration with the contact person, TECHCOY divisional CEO (P9), and Head of Operations (P1), I fixed dates and times to observe selected project team meetings, also noting the venues. Participant information sheets and observation consent forms were made available to team members.
- Maintain communication with the contact person in order to stay informed of any changes to the agreed observation dates, times or venues due to changes in the team's work schedules.
- On the day of observation session, arrive the team meeting venue ahead of time so as to commence observation from the start of the meeting.
- Record observation date and start time.
- Observe the happenings in the project team meeting as an outside observer using the observation protocol. Write down the happenings as observational data.
- Stop the observation at the end of the meeting or when data saturation has been reached, which is when data being collected does not produce new insights.
- Record the time observation ended.

Appendix K: Company Profile and Project Profile Questionnaire



Governance in Agile Information Technology Projects: Investigating the Role of Middle Managers and Mediating Factors

Company Profile and Project Profile Questionnaire

This questionnaire gathers basic information about a single agile IT project, the company (your organisation) carrying out the project, and the agile methodology used in that project.

This questionnaire should be completed by a person in the organisation who works with, or is part of the project team that is carrying out the agile IT project. The person may be a **manager, supervisor, team leader**, or has a similar role.

This questionnaire should take about 20 minutes to complete. The questionnaire is entirely voluntary.

You cannot be identified in this questionnaire and the information gathered will not be made available to your organisation. The information gathered will be used in the research study.

Further information about this study is provided in the **Participant Information Sheet** provided with this questionnaire.

Section 1 General Company Background

This section gathers information about your organisation.

1. What industry sector does your company operate in?

Tick all that apply

- | | | |
|---|--|---|
| <input type="checkbox"/> Financial and Banking services | <input type="checkbox"/> Manufacturing | <input type="checkbox"/> Education |
| <input type="checkbox"/> Technology | <input type="checkbox"/> Professional services | <input type="checkbox"/> Agriculture |
| <input type="checkbox"/> Government | <input type="checkbox"/> Healthcare | <input type="checkbox"/> Non-profit |
| <input type="checkbox"/> Energy and Utilities | <input type="checkbox"/> Telecommunications | <input type="checkbox"/> Insurance |
| <input type="checkbox"/> Entertainment and Media | <input type="checkbox"/> Retail | <input type="checkbox"/> Transportation |
| <input type="checkbox"/> Oil and Gas | <input type="checkbox"/> Other: _____ | |

2. What type of organisation are you?

Tick only one

- We are an organisation that uses technology and agile methodologies to support our business operations
- We are a technology company that uses agile methodologies to support our business operations
- Other, please specify: _____
-

3. Approximately how many employees does your organisation have?

_____ OR if you don't know please tick this box

4. Please briefly describe the nature of your organisation's business:

5. What type of organisational structure does your organisation have?

Tick only one

- Hierarchical structure Matrix structure
 Divisional structure Other, please specify: _____

6. What type of distribution of organisational units does your organisation have?

Tick only one

- Distributed (multiple locations in one country) Single location in one country
 Distributed (multiple countries) Other, please specify: _____

7. What type of IT services does your organisation use or undertake?

Tick all that apply

- We have IT infrastructure and networking services to support the operations of:
 the organisation external customers
- We provide specific products for external customers by:
 providing service/support of software products developing bespoke software
 completing one-off contracts supplying off-the-shelf software
 customising off-the-shelf software
- We have in-house software development team to support the operations of the organisation by:
 carrying out our own bespoke development
 customising open source software or off-the-shelf software purchased from outside source
 providing service/support of software products
- We have provide in-house IT Helpdesk team to support the operations of the organisation
- We outsource our IT services
- Other, please specify:
-

8. Approximately how many staff are involved in IT services (i.e. IT department/unit) in your organisation?

_____ OR if you don't know please tick this box

9. Approximately how many staff are involved in software development in your organisation?

_____ OR if you don't know please tick this box

10. Which agile method do you use in your organisation?

Tick all that apply

- | | |
|--|---|
| <input type="checkbox"/> Scrum | <input type="checkbox"/> Dynamic System Development Method (DSDM) |
| <input type="checkbox"/> Kanban | <input type="checkbox"/> We created a unique methodology |
| <input type="checkbox"/> Extreme Programming (XP) | <input type="checkbox"/> We tailored an existing methodology |
| <input type="checkbox"/> Scaled Agile Framework (SAFe) | <input type="checkbox"/> Other, please specify: _____
_____ |

11. Approximately how many projects has your organisation carried out using the selected agile method(s)?

_____ OR if you don't know please tick this box

12. How long has your organisation been using the selected agile method(s)?

- Less than 6 months Up to 6 months Up to 1 year Up to ____ years (*state how many years*)

Section 2 Project Description

*This section gathers information about a single agile IT project. Please select one **agile IT project** which you are currently working on in your organisation which is using an agile method. If no agile IT project is currently being carried out, please select one **agile IT project** that was recently completed in your organisation using an agile method.*

13. Please briefly describe the purpose of this project:

Example – A software project to enable customers make payments and view transactions on mobile app

14. What is the status of the project?

Tick only one

- Completed Underway Terminated

15. If your project is completed or terminated: what was the duration of the project? _____

Otherwise: what is the estimated duration of the project? _____

16. What is the nature of this project?

Tick all that apply

- | | |
|---|---|
| <input type="checkbox"/> New system/product | <input type="checkbox"/> Maintenance of existing system/product |
| <input type="checkbox"/> Enhancement of existing system/product | <input type="checkbox"/> Other, please specify: _____
_____ |
| <input type="checkbox"/> Replacement of existing system/product | |

17. What criteria do you use to determine when your agile IT project is completed?

Tick only one

- System/product is handed over to testers Client/user department sign-off
 System/product is being used by end-users Other, please specify: _____
 System/product moves into maintenance phase _____

18. How many **full-time employees** are involved in this project? (E.g. 3 developers, 2 testers, 1 scrum master, 1 project manager, 1 product owner, etc.)

19. How many **part-time employees** are involved in this project? (E.g. 3 developers, 2 testers, 1 scrum master, 1 project manager, 1 product owner, etc.)

20. How many **consultants/vendors** are involved in this project? (E.g. 1 agile coach, 1 IT consultant)

21. How many agile teams are in the project team? _____

22. How is the project team located?

- In the same physical location In different physical locations

23. Approximately how many end-users will use the system/product being worked on in this project?

_____ OR if you don't know please tick this box

24. Which business area will the system/product from this project support?

Tick all that apply

- | | | |
|---|---|--|
| <input type="checkbox"/> HR | <input type="checkbox"/> Banking | <input type="checkbox"/> Procurement |
| <input type="checkbox"/> Sales | <input type="checkbox"/> Inventory management | <input type="checkbox"/> Admin services |
| <input type="checkbox"/> Finance and accounting | <input type="checkbox"/> Marketing | <input type="checkbox"/> Legal services |
| <input type="checkbox"/> IT services | <input type="checkbox"/> Management information/
business intelligence | <input type="checkbox"/> Other, please specify: _____
_____ |

25. Who will use the system/product being worked on in this project?

Tick all that apply

- your organisation external customers

26. Which agile method do you use in this project?

Tick all that apply

- Scrum Dynamic System Development Method (DSDM)
 Kanban We created a unique methodology
 Extreme Programming (XP) We tailored an existing methodology
 Scaled Agile Framework (SAFe) Other, please specify _____

27. Which agile practices do you use in this project?

Tick all that apply

- Time-boxed iterations (sprints) Daily stand-ups
 Iteration reviews Iteration retrospectives
 Iteration planning Other, please specify _____

28. What is the typical length of iterations (sprints) in this project?

Tick only one

- 1 week Flexible lengths
 2 weeks No iterations
 1 month Other, please specify _____

*Thank you for taking part in this study.
The researcher will collect the completed questionnaire from you.*

Appendix L: Data Sources of Case Studies

Table L1: HOLDCOY data sources (Level: Senior management, Middle manager (MM), Lower-level workforce (LOW))

Data Source	Details					
Data Source	Participants	Job Title	Level/ Team	Duration of IT Experience	Duration of Agile Methods Experience	Interview Duration
Nine semi-structured interviews (eight face-to-face interviews and one virtual interview using GoToMeeting online meeting software), audio recordings, virtual interview recording, and transcripts	P1	Head of Operations, alias Acting Chief Operating Officer of TECHCOY division, and Solution Delivery Manager	MM. Member of agile team delivering project (solution delivery)	4.5 years	2 years	2 hours 33 minutes
	P2	App Support Team Member (Software Engineer)	LOW. Member of agile team delivering project (development)	2 years	1 year	48 minutes
	P3	Product Enhancement Team Member (Software Engineer)	LOW. Member of agile team delivering project (development)	3 years	8 months	57 minutes
	P4	Group Chief Information Officer of HOLDCOY	Senior management	15 years	11-12 years	1 hour
	P5	Project Manager and Business Analyst	LOW. Member of agile team delivering project (solution delivery)	3 years	3 years	1 hour 12 minutes
	P6	Head of Technology and Scrum Master, alias Acting Chief Technical Officer of TECHCOY division, Technical Lead, and Technical Director	MM. Member of agile team delivering project (development)	17 years	6 years	1 hour 6 minutes
	P7	Head of Business Development, alias Acting Chief Commercial Officer of TECHCOY division	MM. Member of agile team delivering project (business development)	2 years	1 year	59 minutes
	P8	Operational Excellence Manager	MM. Member of internal team interfacing with the agile team delivering project (operational excellence)	10 years	5 years	1 hour 27 minutes
	P9	CEO of TECHCOY division	Senior management. Member of agile team delivering project	14 years	6-8 years	1 hour 25 minutes
	Meeting observations and notes	Observation of three team meetings, viz., daily Scrum meeting (30 minutes), weekly sprint planning meeting (3 hours), and monthly performance review (MPR) executive session (4 hours 40 minutes).				
Company documents	Company's organisational structure document.					
Emails and instant messaging	Follow-up email and instant messaging correspondence with interviewees to clarify interview and observation data.					
Company profile and project profile questionnaires	Two completed company profile and project profile questionnaires were filled by the Head of Operations (Participant 1, MM) and HOLDCOY's Head of Human Resources (Participant 10, Senior management) respectively. The Head of Human Resources was not considered an agile practitioner in this study, therefore, his profile details are not included. However, he provided useful company profile information. The questionnaires are not for quantitative analysis. They were used to facilitate collection of data for describing the case organisation and project.					
Website and LinkedIn profile	Corporate website and LinkedIn profile served as useful resources to obtain background information about the company, such as company history, organisational structure, types of job roles in their workforce, locations and regions of operation, industry of operation, products and services, and customer base.					
Telephone conversation	Unrecorded telephone conversations with participants took place during fieldwork to clarify and validate collected data.					


Table L2: BANKCOY data sources (Level: Senior management, Middle manager (MM), Lower-level workforce (LOW))

Data Source	Details					
11 face-to-face semi-structured interviews, audio recordings, and transcripts	Participants	Job Title	Level/Team	Duration of IT Experience	Duration of Agile Methods Experience	Interview Duration
	P11	Project and Change Coordinator	MM. Member of agile project team that delivered project (project management office)	14 years	2 years	57 minutes
	P12	E-channels Manager	MM. Member of agile project team that delivered project (e-channels/ADC)	5 years	1 year	50 minutes
	P13	DevOps Lead	MM. Member of agile project team that delivered project (research & development)	13 years	5 years	56 minutes
	P14	IT Operations Manager	MM. Member of agile project team that delivered project (IT operations)	10 years	3 years	30 minutes
	P15	Enterprise Solution and Service Desk Lead	LOW. Member of agile project team that delivered project (IT operations)	8 years	3 years	51 minutes
	P16	Information Security and Assurance Lead	MM. Member of agile project team that delivered project (IT security)	12 years	4 years	1 hour
	P17	Senior E-channels Officer	LOW. Member of agile project team that delivered project (e-channels/ADC)	7 years	5 years	59 minutes
	P18	Head of Service Delivery	MM. Member of agile project team that delivered project (service delivery)	18 years	5 years	37 minutes
	P19	Database Administrator	LOW. Member of agile project team that delivered project (IT operations)	6 years	3 years	1 hour 6 minutes
	P20	IT Application Administrator	LOW. Member of agile project team that delivered project (IT operations)	8 years	2 years	1 hour
	P21	Chief Information Officer, alias Executive Director, Innovation Technology and Digital Finance	Senior management	14 years	10 years	1 hour
Company documents	Company's organisational structure document and a Release and Deployment Management Guidelines document					
Instant messaging	Follow-up instant messaging correspondence with interviewees to clarify interview data.					
Company profile and project profile questionnaire	One completed company profile and project profile questionnaire was filled by the Project and Change Coordinator (Participant 11). The questionnaire is not for quantitative analysis. It was used to facilitate collection of data for describing the case organisation and project.					
Website and LinkedIn profile	Corporate website and LinkedIn profile served as useful resources to obtain background information about the company, such as company history, organisational structure, types of job roles in their workforce, locations and regions of operation, industry of operation, products and services, and customer base.					


Appendix M: Excerpts of Coding Evidence

M.1: Excerpts of Coding Evidence in Microsoft Word (Interview Data)


<p>P1 Coordinating, in terms of...so now there are different types of coordination. Is it coordinating on the project management aspect, coordinating on the development aspects? Coordinating on development aspects is done by the Head of Technology [middle manager]; coordinating on the project management aspects is done by Head of Operations [middle manager].</p> <p>R Okay. Okay but, you also coordinate? You also contribute to coordination too?</p> <p>P1 Yeah. So, the Head of Operation that is me. So, coordination of the testing; so sorry testing project management, business analysis part I do that, as Head of Operations I do that but coordination in terms of the development work item the actual like maybe oh you're supposed to do it this way in terms of the code, the writing of the code, Head of Technology does that, but the facilitation of the Scrum meeting I do that as well to ensure that each person knows the task they are supposed to work on but, how to now achieve that task in the development process is what the Head of Technology coordinates.</p>	<p>M Microsoft July 11, 2020 MM role-coordinator</p> <p>Reply Resolve</p> <p>M Microsoft MM role-coordinator</p>
<p>P1 Yes, yes, exactly, so more like a KPI. So, if you don't do scanning that which is done on TeamCity, like I mentioned, there's a penalty to that as well. So, all of these processes fall...so apart from just reporting on, giving updates on projects, my SDLC compliance is being checked, my scanning compliance is being checked. We have also, then, in terms of the regression testing, automated regression test, ensuring all automation cases and everything are built. So, those are the things then. Also, things that are now leadership in terms of like maybe mitigation for losses in terms of losses on the application, how to prevent losses or loss of data and so on. So, those are the things that I report when we're having such meetings, then technology as well, then operations. So, we have those meetings monthly, then quarterly that's when we review what has been achieved for that quarter, then we have the final one which is the yearly one which is where we plan for the year, and we do like a five-year forecast.</p>	<p>M Microsoft July 11, 2020 Areas of MM reporting during monthly performance review meeting, quarterly review meeting, and yearly review meeting with top management</p> <p>MM as strategist for monthly, quarterly and yearly planning.</p> <p>MM as a boundary spanner interfacing with top management</p> <p>MM as a process owner ensuring adherence and compliance with project governance processes within the agile team.</p> <p>Reply Resolve</p>
<p>P3 Yeah, they [middle managers] are the key decision makers, like the team key decision makers, but then, of course, they don't make decisions on their own, they seek like opinions from the team members to know if these decisions are favorable. It's not that they just make decisions on their own.</p> <p>R Okay. And what about incentives, things like promotion, bonuses, performance related things, do they play any role there?</p>	<p>M Microsoft September 24, 2020 MM as decision-maker. Despite being key decision-makers, MMs do not make decisions unilaterally, they consult other team members and get their opinions to ensure that the decisions are appropriate and favorable to the team and for the project. Very good quote.</p> <p>Reply Resolve</p>
<p>P3 Okay, I think it should be product dependent... like it should vary from team to team, but then they [middle managers] should have a general knowledge of how the product they are working on works, like how each of the components work, even if they don't know how to write out the codes; they just know how it works, so that to make it easy for them to approve requests or to like appeal for changes if need be. So, they have to have a general knowledge of products, yeah. It's very important, general knowledge.</p> <p>R Anything else?</p> <p>P3 Yeah, then okay, the other ones not product-based but have a good knowledge of the softwares that are used in the process, like the Jira, the Bitbucket, the Zoho People, like knowing how they operate and how they can be used for the achievement of the set goals.</p>	<p>M Microsoft Input competence - Product knowledge; MM should have general knowledge about the product being developed in the project. They must not know how to write the software codes however they should know how the product works. They should know the product components & functionalities in order to easily manage and approve requests from the team as well as request for changes to be made whenever necessary.</p> <p>M Microsoft September 19, 2020 Input competence - Knowledge of workplace software used in the project. MM should know how each software is used to perform tasks that will facilitate the achievement of set project goals.</p>

P6	<p>Because we don't have people that can replace them when they are away at the moment with high [inaudible 00:26:32] to put in this office, not a lot have been very interesting. So, that's two roles completely missing and when they go into banks, we start having issues because that's an environment we don't control. So, we can't even like...we haven't even total control of when they come back. So, for the day, I'm going to have to take up some tasks that they should have worked on and I have to share some of their tasks for others to do, so...</p>	<p>a governed agile IT project in which the agile team worked in their highest capacity (achieved their possible best, utilizing</p> <hr/> <p> Microsoft October 07, 2020 MM as auxiliary resource (Head of Technology & Scrum Master) MM as a resource maximizer (Head of Technology & Scrum Master)</p> <p>Reply Resolve</p>
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P11	<p>Okay let's just take the process approach. The process approach is we do Sprint alignments whereby we sit down, but prior to the starting of the Sprint to ensure each stakeholder understands what is being required prior to the Sprint whereby each of the release units, being the change of request, we analyse it. We ensure that each stakeholder understands the deliverables attached to these units. So, in that approach we get...once they understand the requirement or the deliverables for each of the release units, we get estimates. So, once we have the estimates, we can actually now have a fair understanding of the timeline for the monthly Sprints. So, once all the deliverables have been done and QA has done the coding...I mean DevOps has done the coding, QA has validated, security has confirmed...given security assurance, UAT has been signed-off, we have a monthly Go or No-Go meeting whereby we sit down..., I sit down with the CIO and then show him or make him understand this is how far we've done as per this monthly Sprint - this is what is going, this is what has been finalized, this is what is pending, this is the deliverables as far as the release units is concerned and has been met. Is it okay for us to proceed into production? So that's a Go or No-Go meeting. So, the CIO [inaudible] takes that decision, if we can proceed into production with this package, monthly Sprint package. So that's just the process.</p>	<p>2. Supports the agile team to resolve escalated project issues (see PCC comment in page 12 below).</p> <p>3. Acts as project sponsor (see PCC comment in page 20 below).</p> <p>MM as a COORDINATOR. PCC (MM) interfaces (boundary spanning) with senior management (CIO) and provides senior management with project sprint progress reports and feedback. For example, during the monthly Go or No-Go meeting, PCC updates the CIO on the happenings in each sprint in terms of completed tasks, pending tasks, requirements and deliverables that have been met, and seeks senior management approval for the agile team to deploy completed deliverables to the production environment.</p> <p>Rules and norms-Colocation. The agile team was located in the same physical environment during the project.</p> <p>Rules and norms-Collaboration.</p> <p>Physical tool-Production environment</p>
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<p>R Okay what's personality traits and attributes should middle managers possess in order to work effectively in Agile IT projects, personality traits and attributes?</p> <p>P12 Okay you must be, you must be... you must be somebody that listens a lot.</p> <p>R Okay.</p> <p>P12 So, you must also have team spirit, you must be an extensive researcher.</p>		<p> Maduka Chinedu Uw... September 25, 2021 MM personal competence-Be a good listener</p> <p>MM personal competence-Be a person that has team spirit: a team player.</p> <p>MM personal competence-Be an extensive researcher-desirous for knowledge.</p> <p>Reply Resolve</p>
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M.2: Excerpts of Coding Evidence in Microsoft Word (Observation Data from Weekly Sprint Planning Meeting)

	<p>Head of Operations highlights the tasks that need to be moved to the new sprint. For one of the tasks in the new sprint, Head Ops explained the purpose of this particular task in order to give clarity to the team. Head Ops was the one creating the sprint on Jira.</p> <p>In setting up the new sprint, Head Ops also specified and highlighted various tasks that should be done in the new sprint. Head Ops was asking the teammates what they needed to do for the next sprint in order to complete setup of the new sprint.</p>	<p> Maduka Chinedu Uwadi... December 05, 2021 MM as product owner (Head Ops)</p> <p>MM as goal definer and interpreter (Head Ops).</p> <p>Reply Resolve</p>
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Appendix N: Middle Management Roles and Descriptions with Data Examples

Table N1: Organising themes and basic themes identified in HOLDCOY (P1 – P9) and BANKCOY (P11 – P21) regarding MM roles in agile PG with data examples

Organising Theme	Basic Theme	Description of Basic Theme	Role Example (Representative Quote)
1.	Planning and Coordination for Project Alignment and Execution	Coordinator	<p>Coordinates project work through agile delivery, assigns tasks, and communicates progress and situational reports to senior management and other stakeholders, acting as bridge between different stakeholders in the project by interfacing between the agile project team and other stakeholders (e.g., other internal teams, customers and other external stakeholders) so as to facilitate and advance the project according to allocated timeline and resolve any impediments, thereby ensuring that project work is successfully completed by the agile project team and other stakeholders in an aligned, organised, and harmonious manner with minimum disruption and clear understanding of the project requirements.</p>

“in the coordination, okay we work with clients, with banks, and then in the coordination he’s [Head of Operations] responsible for making sure that we book appointments with the banks... like today now some of our team members reported at the banks, they didn’t like come to work here... So, they [MMs] make sure that you get booked by these banks because you cannot just enter the bank and access their domain..., they [MMs] make sure that you get booked and then when you get to the bank you get received and everything you need to work with at the bank are ready, but then even here too, they also have a general coordination, they are very helpful” (P3, Product Enhancement Developer, LOW).

“I facilitate every..., whether it’s the weekly Scrum, whether it’s the daily Scrum or whether it’s the retrospective that is at the end of each iteration, that’s when you have the retrospective, I’m the one that always facilitates this communication... Coordinating on development aspects is done by the Head of Technology [MM]; coordinating on the project management aspects is done by Head of Operations [MM]... So, the Head of Operation that is me. So, coordination of the testing; so sorry testing, project management, business analysis part I do that, as Head of Operations I do that, but coordination in terms of the development work item the actual like maybe oh you’re supposed to do it this way in terms of the code, the writing of the code, Head of Technology does that, but the facilitation of the Scrum meeting I do that as well to ensure that each person knows the task they are supposed to work on but, how to now achieve that task in the development process is what the Head of Technology coordinates... we have a monthly meeting in which we meet with [names of senior management members]... in that meeting, I talk from the operational aspect... Yeah updates on..., in terms of operational stuff. So, based on one: the first thing is projects... when there are issues in terms of maybe when the Project Manager [P5, Project Manager and Business Analyst, LOW] is trying to get some requirements from stakeholders, either the stakeholder is spending a lot of time or not or there are delays, once the Project Manager escalates to me I don’t just go to the person which is the like the staff that is supposed to provide the requirements at the bank. I also go to speak with top-level person at the bank, whether maybe it’s the

Organising Theme	Basic Theme	Description of Basic Theme	Role Example (Representative Quote)
			<p><i>ED [Executive Director] or a senior manager at the bank, explain to this person that see what is causing delay in the delivery of this project” (P1, Head of Operations, MM).</i></p> <p><i>“when we have projects or tasks or anything it is my job to assign these tasks and coordinate development” (P6, Head of Technology and Scrum Master, MM).</i></p> <p><i>“their [middle management] role is actually very critical. Because after the project is awarded and different stakeholder sessions has been held with customer..., external sessions, the project middle managers are responsible to work closely with all the internal teams and the contacts at the external team to ensure that every single deliverable as stated in the business requirement documentation..., document are completed, tested and delivered, full stop. That is their job. They have to follow it up in toto and ensure that it is actually not just delivered but delivered within the time allocated for it” (P4, Group Chief Information Officer, senior management).</i></p> <p><i>“I’m the coordinator when it comes to sprints and agile and also our monthly iteration. So, I coordinate between DevOps, the QA, the user or the requester, then also align all this coordination with my line manager, which is the CIO... For the agile IT project, coordinating now is to ensure that stakeholders understand the requirements of the project or the active sprint, which ever one is ongoing. Then also, that we have each document, artifact ready. Then two..., three, each resource or stakeholder aligns with time estimates or timeline of the project. Then also manage conflict, then communicate to other stakeholders or other external unit outside of IT the progress and status of the projects” (P11, Project and Change Coordinator, MM).</i></p> <p><i>“So, the coordination of that project [BANKCOY ASD project] lies on my table. So, I coordinate what every other person has to do with the various timeline apportioned to them: the network needs to be ready by a certain time, so we need to deliver the network at a certain time... So, we need to have developments done at this level, we need to have integration done at this time, we need to have security checks at this time blah blah blah and so on and so forth. So, when Iteration 1 is done, every concerned stakeholder must have passed through the phase and delivered on their parts” (P12, E-channels Manager, MM).</i></p> <p><i>“we realised quickly that you need to have one person who’s actually in charge of the whole end-to-end value chain for instance right. Like that</i></p>

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			<p><i>person is like bringing everybody together on the same, if you want to look at it as a..., if you want to look at the value chain as a role, like this guy is the guy who makes sure that everybody actually lead to the same road, because the road is where you define your starting point, your end goal point... in this role [value chain owner role] now, you can do it..., sometimes it can be one person, sometimes you can..., depending on the complexity and then the weight of the project as well, you can link that person with also the business analyst or the owner from the functional perspective, right. The [BANKCOY ASD project name] project, for instance, it was two people: you have like the Change Lead [Project and Change Coordinator] and then you had the Product Manager [E-channels Manager], basically. The two together, they were driving this. Because the end goal is to have a successful project” (P21, Chief Information Officer, senior management).</i></p> <p><i>“Of course, within my own team right I mean one, I take responsibility within my team right and basically it’s just to coordinate my teammate” (P16, Information Security and Assurance Lead, MM).</i></p> <p><i>“I am in charge of the IT operations unit, making sure the infrastructure is ready to be handed over to development guys. Making sure the connectivity between ourselves and provider is available. Making sure that the IT operational readiness is also done properly before it does transition into the production environment. And then, after its in production environment, making sure that the processes that we’ll be managing with are all properly done, they are documented, we test them out and in the event that there is any change or whatever that needs to be done to it, making sure that we go back and revisit it. So, essentially, I coordinate that, of course, with the other sub-unit managers as well” (P14, IT Operations Manager, MM).</i></p>
	Strategist	Engages in strategic practices and interactions (e.g., discussions with senior management to agree strategic direction) in order to devise viable ways to accomplish project goals and expectations, and ensure that (a) project challenges are addressed, (b) project needs (e.g., required resources) are provisioned, (c) members of the agile project team remain dedicated and committed, and (d) there is a continuous	<p><i>“when we are having a financial review or non-financial review at the end of each year, I have a list based on my planning for the year and how we intend to rollout for the year. I have the list of developers or employees that we need to add to the team to ensure that we don’t lose track... Although in the yearly forecast those roles were already stated that we will need them... I plan for the roles which will be needed each year... we have a project roadmap, myself, the CEO [TECHCOY divisional CEO], the Chief Commercial Officer [Head of Business Development], the Head of Technology as well, we always discuss every time in terms of how do we want, in terms of roadmap, what next... in terms of product roadmap, I’m</i></p>

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		alignment between the project and business strategy to achieve set objectives.	<p><i>involved... I find every strategic way to ensure that we achieve this go live at the shortest time possible through incremental delivery, which the agile process, which the agile methodology gives us the permission to do... in terms of my decision-making or my planning, it's just to ensure that I have that, I do that strategic project management, strategic planning to ensure that, and to ensure that the resources, everybody is up and like dedicated and committed to ensure that we achieve this [project]" (P1, Head of Operations, MM).</i></p> <p><i>"I prefer a team that is fluid and has a good level of autonomy right. For that to happen they [MMs] need to understand the strategy right and why that strategy is important right. Both..., that will be the strategy for the whole year, the strategy for the quarter, and then for the month. They need to understand the strategy for the month right. And then I also have weekly strategy reviews right [with the MMs]; its informal. It's not like we sit down and have a formal meeting. We just talk about the strategy and I'm like I'm reminding them [MMs]. I'm making sure it is..., it is..., it's top of mind for them right. It's not something that [inaudible], it's top of mind. So, I always have that conversation. And why I do that is so that they [MMs] have the right context, they have the right understanding of what needs to be done so that they can go into you know those operational planning sessions and actually come up with you know actionable goals, relevant goals right, goals that are aligned" (P9, TECHCOY divisional CEO, senior management).</i></p> <p><i>"for example, the technology [external vendor's technology solution] used was somehow, I don't want to use old version, but an earlier technology that even myself and some members of the team had to learn. So, also with respect to that, to implement..., to conform to the technology being used by the provider [external vendor team], I had to decide on what we had to use internally. So, I did research to pick the best tools for us to use, and also to learn about the technology that we were integrating with, which was outside the scope of what we were doing but for that project we had to do that... The external provider was expecting a specification: A, B, Z, but my team was understanding it as A, B, C due to knowledge gap that we didn't know Z. So, how that was solved was to call the team [agile project team] together... Because external [external vendor team] is just telling us that with this [task output], this is supposed to be working, this this is not working. Just to now have meeting with internal [agile project team] like, 'Okay, if there's need to do more research about...','. Just to emphasise</i></p>

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			<p><i>that it's not about what you know how to do or how you are doing it, it's about you having to do it according to what is required. If it means you have to go and learn; just seek support... That was how that was overcome" (P13, DevOps Lead, MM)</i></p>
	Adviser and Negotiator	<p>Advises project stakeholders (e.g., senior management) on project governance rules and norms which need to be followed to safeguard project outputs, using their experiential knowledge, as well as negotiating project adjustments and timelines to ensure project governance processes are followed.</p>	<p><i>"what I try to do most times is I try to explain to the senior management whenever we're having this our monthly meeting or quarterly performance meeting that these things [PG rules and procedures]..., they are things that okay, we need to properly address... for instance now, we were supposed to go live on this our [name of TECHCOY ASD project] project as at January. But I made them [senior management] understand that this issue, that issue, this thing, this thing, all these things [PG rules and procedures] needs to be done. We need to do proper scanning of our applications. We need to do proper automated testing of our applications and so on... they [senior management] also understood and they're okay, 'yes, go, we'll give you some months' grace to achieve this thing'" (P1, Head of Operations, MM).</i></p> <p><i>"These guys; I mean the other stakeholders have worked right, and tirelessly overnight like [inaudible] information security [sub-team] will just go and test and come; 'Oh, this is security flaw. We need to fix it alright'. Now, how do we now ensure all of us come to board, one, getting things done, and then by not compromising our policy alright? The only thing we have to do now is to, one, to communicate this in terms of risk..., from the risk perspective what we are seeing for them [other agile project team members] to understand. That is from the communication part. The second part of it now is that, in collaborating with them [other agile project team members] how can we now collaborate with them? We don't just pick issue and dump it, of course we can also use our expertise to say, okay we can recommend – to say this is how you can also achieve this thing alright. And while they are doing as well, we also support them. That is what I mean by I mean in terms of collaborating with stakeholders. So, this is what we did when I'm trying to collaborate with our stakeholders right, and then just to support them basically... We just play advisory role in terms of security alright, and assurance to the management that one, this application has been tested and it is okay" (P16, Information Security and Assurance Lead, MM).</i></p>
	Project Manager	<p>Oversees the agile project team's project management function and performs project management duties, and ensures team members</p>	<p><i>"I also supervise the project management team... coordinating on the project management aspects is done by Head of Operations [a MM]... I do that strategic project management, strategic planning to ensure that and to</i></p>

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		perform project tasks with dedication, commitment, as well as provide regular reporting and feedback regarding status of their assigned tasks.	<p><i>ensure that the resources, everybody is up and like dedicated and committed to ensure that we achieve this [project]” (P1, Head of Operations, MM).</i></p> <p><i>“Head of Operations: the COO [a MM], like he doubles as the project manager too... he [Head of Operations, MM] has another team member that is the project manager... that helps him in the management of the whole process” (P3, Product Enhancement Developer, LOW).</i></p> <p>Exchange during interview of P17 (Senior E-channels Officer, LOW):</p> <p><i>P17: “I am actually the deputy project manager for the project - for the [BANKCOY project name] project.”</i></p> <p><i>Researcher: “Who was the manager?”</i></p> <p><i>P17: “[Name of E-channels Manager]”</i></p> <p><i>Researcher: “He was the project manager?”</i></p> <p><i>P17: “Yes. So, I was the deputy for the [BANKCOY project name] project”.</i></p> <p><i>“I’ll say the project manager also try to meet individuals, one way or the other, to know how far, what has been the challenge, where are they now, on one-on-one basis most times... there must be daily feedback as to every task, that okay, this is what we have been able need to achieve, because in Trello there are laid down tasks and there are timelines for those tasks. So, the project’s manager, that’s the Change officer [Project and Change Coordinator, MM], follows each stakeholder, so there must always be feedback daily” (P19, Database Administrator, LOW).</i></p>
	Decision-Maker	Contributes to key decision-making in the agile project team (e.g., technical decisions, product roadmap decisions, staff promotion decisions, process modification decisions, project timeline decisions, product design decisions), enables decision-making in the agile project team to advance project delivery through collaborative autonomous decision-making, which helps ensure that the team operates as a self-managed entity.	<p><i>“they [MMs] are the key decision-makers, like the team key decision-makers, but then, of course, they don’t make decisions on their own, they seek like opinions from the team members to know if these decisions are favourable. It’s not that they just make decisions on their own”. (P3, Product Enhancement Developer, LOW).</i></p> <p><i>“no technical decision gets made as far as [TECHCOY division name] is concerned without my approval... If the decision will be regarding how something works or tools needs to be used, what needs to be deployed, what needs to be brought onboard and it is directly within [TECHCOY division name], I can actually make those decisions without direct authorisation from the CEO [TECHCOY divisional CEO, senior management]” (P6, Head of Technology and Scrum Master, MM).</i></p> <p><i>“in terms of decision-making, in terms of product roadmap, I’m involved. In terms of decision-making for staff promotion or staff promotion or maybe we say the staff is underperforming and like performance for the</i></p>

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			<p><i>staff in the year, I do that... but in terms of things like additions to our SDLC compliance, if I see there's a loophole like I advise, so those are the things I come up with, I share it to the OpEx [Operational Excellence] team before sharing it with my team. Once OpEx agrees that yes, we can proceed with this, I share it with the team and I tell them that going forward this is how it's going to be done in terms of the SDLC" (P1, Head of Operations, MM).</i></p> <p><i>"they are middle managers, so they have the authority to take some certain decisions, like as..., take a certain decision. Let's say for instance, when we are estimating on the timeline for each project or each deliverables, they have the authority to say, 'Oh, this timeline allocated is not..., we can't realise it', or 'It's not realisable. So, we need to adjust it'" (P11, Project and Change Coordinator, MM).</i></p> <p><i>"That's what the product owner [E-channels Manager, MM] is also there for—they say, 'okay we have done this one fast, so let's do this', 'Ah no, this one has changed because now let's adjust this design and blah blah'. That's..., he can make..., he [E-channels Manager, MM] can take the decisions quickly based on the mandate also given to him. For some decisions he has to come back to the Change advisory board, but sometimes there are certain things that he can actually adjust at this level because it's not really like critical" (P21, Chief Information Officer, senior management).</i></p> <p><i>"So, I did research to pick the best tools for us to use, and also to learn about the technology that we were integrating with, which was outside the scope of what we were doing but for that project we had to do that. I was the one that decided those tools and technology that we used" (P13, DevOps Lead, MM)</i></p>
	Resource Maximiser	Manages human and material resource shortfalls in the agile project team and project by (a) utilising available team members to relieve other team members who are inundated with project tasks or fill responsibilities of missing project roles by distributing unattended and outstanding tasks to those available, and (b) identifying and leveraging redundant material resources (e.g., unused IT server resources) to fill material resource gaps in the project so as to maintain unhindered project delivery.	<p><i>"we want to make sure the team is working at their highest capacity and we are maximising the resource we have to the fullest. We still have a lot of missing roles, a lot of roles yet to be occupied... sometimes you need to carry on the roles of people that are missing. So, the target of all these things is to maximise the resource we have... let me give you an example, like today I'm sending in two people into the banks... now I mean, two roles missing which we also need their functions... Because we don't have people that can replace them when they are away at the moment... So, for the day, I'm going to have to take up some tasks that they should have worked on and I have to share some of their tasks for others to do" (P6, Head of Technology and Scrum Master, MM).</i></p>

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			<p><i>“So, when we hit brick wall..., specific example was when we are supposed to provide a separate database server in that project, and it was valued at about ninety million and the bank is not ready to take that huge cost at that time. So, we had to improvise. So, the manager in charge that [inaudible] and said, ‘Okay, we have a database server that we can also use’ ... That instead of having to acquire new license for a new database server, why not create an instance on this existing server that we have not used up space on, and that was what we did, and we were able to move faster. We were able to cut costs. And so, we were able to leverage his [Enterprise Solution and Service Desk Lead] skill... the only area we could have tension will be in the area of timeline; timeline in like okay we need to have this at X period of time and from the look of things this will not be delivered at that time. Then, I as the coordinator will want to ensure..., want to prevail on the manager that, ‘We need to have this, you have to deliver it’. So, in a case where we have other resource they can support to ensure that timeline is met, we just rally around to see, ‘Okay how can we be of help while you are doing your [inaudible], can somebody else be doing the server provisioning? So, what can you be supported with?’, and all of that. So..., so bringing in some team spirit into the game also help a lot to avoid friction” (P12, E-channels Manager, MM).</i></p>
	Supervisor	Oversees project work and performance of the agile project team by working closely with team members and following up with assigned task items to ensure the project work is progressing and completed as expected without hindrance.	<p><i>“we also want to make sure these guys are not working out of scope. So, we iterate continuously, we do that daily and I also have times in the day which they need to report in; ‘What’s the progress of your work?’, ‘How far have you gotten with it?’, ‘Are you facing any challenges?’, ‘Is there something I need to know?’, ‘Is there a blocker?’, ‘Is there a reason why you even wouldn’t be able to continue working?’ I have hours in the day when you [team members] report that in... Sometimes myself, I need to be on field to actually supervise things on my own, not all the time, just once in a while... you [MM] must be able to supervise. It’s very important” (P6, Head of Technology and Scrum Master, MM).</i></p> <p><i>“I supervise the tester or automation tester, I also supervise the project management team, also the business analyst team” (P1, Head of Operations, MM).</i></p> <p><i>“they [MMs] are the first point of contact for each unit whereby they lead... So, they [MMs] ensure the resource reporting to them actually delivered on what is expected” (P11, Project and Change Coordinator, MM).</i></p>

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	Goal Definer and Interpreter	Contributes to defining and interpreting project goals and requirements (such as those emerging from customer or senior management interactions), which are broken down and explained to the agile project team so that team members and other stakeholders can understand what needs to be done and why such goals should be achieved.	<p><i>"they've promised the bank [customer], 'Oh, this is going to be done in this time, you are going to go live this time'. So they [MMs] have their ultimate goals of what we're supposed to achieve, so they also help come and break it down, make us understand it, and why we must meet those deadlines" (P2, App Support Developer, LOW).</i></p> <p><i>"So, in terms of the project goal, it's not..., if it were to be a traditional life cycle, probably the product owner will be the one setting the goals and the developers will just be working on the goal, here we don't do that, we brainstorm and everybody decides on how the goal, the goal should be" (P1, Head of Operations, MM).</i></p> <p><i>"Yeah, regarding the [BANKCOY project name] project, the goal was set by [name of the Chief Information Officer]... and of course it was..., we had our own bilateral meeting where we interpreted what these goals will be and how to accomplish it... So, what we did was to understand each of these goals and how to accomplish it in relation to the [BANKCOY project name] project" (P18, Head of Service Delivery, MM).</i></p> <p><i>"I would say the middle manager on my understanding is a project owner, which was more of like the E-Channels manager. He's the one that gathered requirements from the internal team and then liaise with the provider [external vendor team] to ensure there's synergy and then all requirements are well understood by both parties: internal and external provider [external vendor team]... Okay what I mean by technical alignment is that we are having two technical teams, the external party [external vendor team] had their own technical specification; we had our own. So, I was able to be the one in the meeting to make sure that both teams..., to explain every detail of the technical design to their own [team] so that they can understand our technical specification. And it was my responsibility to interpret their own technical requirements and understand it 100%, and to be able to relate that to every stakeholder internally" (P13, DevOps Lead, MM).</i></p>
	Auxiliary Resource	Serves as additional help and support to fill resource gaps in the agile project team by taking up other job roles in the team when resources are lacking, thereby helping to prevent lapses that may adversely affect team productivity and project delivery.	<p><i>"sometimes you need to carry on the roles of people that are missing. So, the target of all these things is to maximise the resource we have... let me give you an example, like today I'm sending in two people into the banks... now I mean, two roles missing which we also need their functions... Because we don't have people that can replace them when they are away at the moment... So, for the day, I'm going to have to take up some tasks that they should have worked on... Especially in an agile environment. You must make sure that if any member of the team leaves today you can</i></p>

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			<p>replace them. That making sure is not that you actually have to replace them, but you need to make sure that the loss of one member does not lead to a lapse in the team” (P6, Head of Technology and Scrum Master, MM).</p> <p>“Because we did not have a tester at that time because our tester just resigned... at that time the Head of Technology [a MM] now had to always ensure that he reviewed that code, but if it’s an application layer code item, task item, either myself [a MM] or the Project Manager looks at it” (P1, Head of Operations, MM).</p> <p>Observation from Sprint Planning Meeting in HOLDCOY:</p> <p>“On the day of the sprint planning meeting, the App Support developer was away from work. During the meeting, the Head of Operations and the Head of Technology and Scrum Master began to brainstorm on who would work on the tasks that the App Support developer left outstanding. Head of Operations wanted one of the Product Enhancement developers to take up some of the outstanding tasks in question, but the Product Enhancement developer had a lot of work to deal with. The Head of Technology and Scrum Master in contributing to the assignment of tasks to take up the tasks left by the App Support developer, said he would go ahead and work with the Product Enhancement developer to tackle the outstanding tasks under the App Support duties.”</p>
	Motivator	<p>Motivates the agile project team by inspiring, encouraging, and influencing team members to act or respond in a manner that is desired of them, thereby promoting commitment, dedication, and task ownership in the team so as to achieve results and project success, as well as providing incentives (e.g., recognition and staff promotion for good performance and organising team bonding activities to keep team members motivated, relaxed, and reinvigorated to tackle project commitments), empowers and motivates team members to learn new software development technologies and develop their competence through knowledge sharing, trusting and valuing others in the team and encouraging autonomy by allowing them to contribute in making project-related choices and deciding</p>	<p>“you need your team members to be motivated because in an agile project, the only way an agile project can succeed is if your team members actually own this project and own each task... so it’s more of an incentive that oh, if you do more tasks and if you complete more tasks, at the end of each month you would be recognised... So at least just to encourage, so that by next month every other person will know that men I need to continue to collect more tasks and complete more tasks so that at the end of the month I’ll also be like the staff of the month. So those are things I try putting in place as incentives for, so even apart from promotion, these are just things that within our division we’re trying to do to ensure that yes the team is always happy and the team is always motivated week in, week out to achieve results” (P1, Head of Operations, MM).</p> <p>“What we do is try to organise team bonding exercises. So, for the last two weeks we went to an arcade centre, just to lift the spirits of the team members... So, I felt it was necessary for us not to just be work, work, work [inaudible], let us also have an avenue where we get to understand like have a regular conversation, so we went to an arcade centre where people</p>

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		<p>project work that needs to be completed so that the team can achieve shared success.</p>	<p>were just able to have fun and laugh" (P7, Head of Business Development, MM).</p> <p>"In my team I do make sure that we have a knowledge exchange hour... we just call it knowledge exchange hour but in reality it do last sometimes about five/six hours... I do make sure everybody..., you've worked for one week, Monday to Thursday, today is Friday, explain to others what you've been doing. Let them understand so that if next week you could not make it to office someone else can pick up your task and continue working on it. So, we do share those knowledge: 'Have you learnt anything new? Any new technology?'. Okay like personally, I have a couple of programming languages I'm working on so, I do share that with them too, to let them have a better understanding of the programming terminologies" (P6, Head of Technology and Scrum Master, MM).</p> <p>"they are middle managers, so they have the authority to take some certain decisions... Let's say for instance, when we are estimating on the timeline for each project or each deliverables, they have the authority to say, 'Oh, this timeline allocated is not..., we can't realise it', or 'it's not realisable. So, we need to adjust it'" (P11, Project and Change Coordinator, MM).</p> <p>"So, when we hit brick wall..., specific example was when we are supposed to provide a separate database server in that project, and it was valued at about ninety million and the bank is not ready to take that huge cost at that time. So, we had to improvise. So, the manager in charge [IT Operations Manager] that [inaudible] and said, 'Okay, we have a database server that we can also use'... That instead of having to acquire new license for a new database server, why not create an instance on this existing server that we have not used up space on, and that was what we did, and we were able to move faster. We were able to cut costs. And so, we were able to leverage his [Enterprise Solution and Service Desk Lead] skill" (P12, E-channels Manager, MM).</p>
	Product Owner	<p>Supports the agile project team as stakeholder representative to ensure the team operates with the needs and demands of stakeholders in mind, thereby ensuring continuous alignment between the team's project outputs and stakeholder expectations during project execution. Accountable for maximising product value, which is achieved by (a) developing product</p>	<p>"I'm also more of representing the stakeholders... so whatever the developers are saying, we must also ensure that it aligns with the expectation of the stakeholders... So, basically that is my own contribution, to ensure that whatever thing we [agile project team] set to achieve, it aligns with what the stakeholder is expecting" (P1, Head of Operations, MM).</p> <p>"We drop solutions per..., we drop releases per iteration. So, we always prioritise with the stakeholders, whether it's the MoSCoW model; the must</p>

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		<p>vision through product and project road mapping in collaboration with senior management, (b) implementing product vision through project execution in collaboration with the agile project team, (c) focusing on content and quality of iteration outputs and making product design decisions adaptively, (d) prioritising and ordering requirements, tasks, and releases in collaboration with stakeholders and the agile project team so that the most valuable requirements are completed and released first, (e) clarifying goals, (f) managing the backlog, and (g) sensitising customers and stakeholders on the team's product offering from the project, its value proposition, and product benefits to customers.</p>	<p><i>have, should have, so that by that we will know in terms of priority releases, which one should come first, which one should come next... So my role per say is I'll say one, I am a product owner because the Project Management team directly report to me. I'm also a product owner... for every task that enters the backlog, it's either myself or the Head of Technology that can create that task in the backlog... we have a project roadmap, myself, the CEO [TECHCOY divisional CEO], the Chief Commercial Officer [Head of Business Development], the Head of Technology as well, we always discuss every time in terms of how do we want, in terms of roadmap, what next... in terms of product roadmap, I'm involved" (P1, Head of Operations, MM).</i></p> <p><i>"So they [MMs] have their ultimate goals of what we're supposed to achieve, so they also help come and break it down, make us understand it, and why we must meet those deadlines" (P2, App Support Developer, LOW).</i></p> <p><i>"so I'm responsible for interacting with these stakeholders; the banks, the stakeholders at the banks to help more like sensitise them to the kind of product offering now we are giving..., the value proposition, and why it's better than..., or superior to existing infrastructure which they are using, which is more or less costly to them. And so my role revolves around managing their expectations" (P7, Head of Business Development, MM)</i></p> <p><i>"A middle manager here was the product owner [E-channels Manager, MM], right, of the, of the product [product of BANKCOY project], which is basically the incoming payment... But the product owner will focus more on the content, quality of the different outputs of iteration basically, right. And that was very key because it's not only about moving fast because at the end of the day you need to deliver something, which meets the requirement, which also has quality and so forth. And usually in agile project you therefore allow also to change requirement or to increase requirement and stuff like that. That's what the product owner [E-channels Manager, MM] is also there for-they say, 'okay we have done this one fast, so let's do this', 'Ah no, this one has changed because now let's adjust this design and blah blah'. That's..., he can make..., he [E-channels Manager, MM] can take the decisions quickly based on the mandate also given to him. For some decisions he has to come back to the Change advisory board, but sometimes there are certain things that he can actually adjust at this level because it's not really like critical" (P21, Chief Information Officer, senior management).</i></p>

Organising Theme	Basic Theme	Description of Basic Theme	Role Example (Representative Quote)
	Subject Matter Expert	Provides input and expertise on technical and non-technical aspects of the project (e.g., technical development, IT networking, information security, project work and status information, industry domain expertise) based on their advanced knowledge, experience or both, which they use to support the agile project team and other stakeholders for successful project delivery.	<p>“we have a monthly meeting in which we meet with [names of senior management members]... in that meeting, I talk from the operational aspect... Yeah updates on..., in terms of operational stuff. So, based on one: the first thing is projects... but because for this technology to happen, for you to run this technology you have to create a private cloud. So, in terms of the networking aspect of this [project], I am the one that handled this personally because of my level of experience because I am like..., I have a certification in networking... what I try to do most times is I try to explain to the senior management whenever we’re having this our monthly meeting or quarterly performance meeting that these things [PG rules and procedures]..., they are things that okay, we need to properly address... But I made them [senior management] understand that this issue, that issue, this thing, this thing, all these things [PG rules and procedures] needs to be done. We need to do proper scanning of our applications. We need to do proper automated testing of our applications and so on” (P1, Head of Operations, MM).</p> <p>“in the course of management in our case scenario here, there are a lot of times when you need to actually help out in that task... Like I told you from the beginning that this is an industry [finance industry] with few people with domain knowledge. So, sometimes we ourselves [middle management] need to input directly into the work... Okay like personally I have a couple of programming languages I’m working on so, I do share that with them too, to let them have a better understanding of the programming terminologies” (P6, Head of Technology and Scrum Master, MM).</p> <p>“I do a lot of market research and market study, trying to understand what our competitors are doing, where the gaps are, and how we can improve and kind of create a more superior offering to what our competitors are doing... like I said, for certain banks like [a bank in Nigeria], trying to do..., So, I know that [a bank in Nigeria] environment is constantly up because of the..., it’s a tier one bank. Rather than going to a [another bank in Nigeria] to do a transaction to [a bank in Nigeria], I will use [a bank in Nigeria] and try to do multiple transactions from [a bank in Nigeria]. So instead of using the [another bank in Nigeria] system, I will just get a [another bank in Nigeria] card and use it on a [a bank in Nigeria] system to verify that [another bank in Nigeria] works. Rather than going to [another bank in Nigeria] and trying to use a [another bank in Nigeria] card. So, I know those systems are similar... for instance</p>

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			<p><i>before any project starts, we have to have a first level high level interaction with these stakeholders, the key stakeholders. So, before we even get to that point, my first job is to understand the entity, the bank and what their need is. So, I usually do that by going through their financial statement under their executive summary. I kind of have a firm understanding of where the bank is headed for that financial year. Then the next course of action will be to look at who are these key stakeholders? So, for [TECHCOY division] now, [TECHCOY division] falls under payment and so, I'm looking at a bank like [a bank in Nigeria] who is heading payment electronic channels, who are the key guys? Then leveraging on existing relationship, because I've worked in a bank before in financial services industry. So, who do I know I'll be able to have an interaction..., a first level meeting with or even organize an introductory meeting so that we start from there. And when that hurdle is passed, the next step will be to involve the larger stakeholders who this project affects; internal control, financial control, system audit, IT, E-business, and all those stakeholders within the bank" (P7, Head of Business Development, MM).</i></p> <p><i>"I led the integration, yes. And then when it was needed for us to meet with the technical team of the provider [external vendor team], I was the interface between our team..., I actually met with their own technical team [external vendor team] to even sort some things out. So, I was like the point contact person technically, seeing to the design of technical documentation design, architectural design. The development activity I was 90% involved, integration and then deployment, actively involved too" (P13, DevOps Lead, MM).</i></p> <p><i>"These guys; I mean the other stakeholders have worked right, and tirelessly overnight like [inaudible] information security [sub-team] will just go and test and come; 'Oh, this is security flaw. We need to fix it alright'. Now, how do we now ensure all of us come to board, one, getting things done, and then by not compromising our policy alright? The only thing we have to do now is to, one, to communicate this in terms of risk..., from the risk perspective what we are seeing for them [other agile project team members] to understand. That is from the communication part. The second part of it now is that, in collaborating with them [other agile project team members] how can we now collaborate with them? We don't just pick issue and dump it, of course we can also use our expertise to say, okay we can recommend – to say this is how you can also achieve this</i></p>

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			<p><i>thing alright. And while they are doing as well, we also support them"</i> (P16, Information Security and Assurance Lead, MM).</p> <p><i>"So, when we hit brick wall..., specific example was when we are supposed to provide a separate database server in that project, and it was valued at about ninety million and the bank is not ready to take that huge cost at that time. So, we had to improvise. So, the manager in charge [IT Operations Manager] that [inaudible] and said, 'Okay, we have a database server that we can also use'... That instead of having to acquire new license for a new database server, why not create an instance on this existing server that we have not used up space on, and that was what we did, and we were able to move faster. We were able to cut costs"</i> (P12, E-channels Manager, MM).</p>
	Foreseer	Foresees potential impediments and their effects, which may hinder project implementation strategies and expected outputs – this may prompt the agile project team to take steps that will help avoid or overcome such impediments if they occur.	<p><i>"And you must always, you [MM] must try to have some kind of foresight onto..., you must see the problem before it even arises. You must be able to anticipate deadlocks in whatever implementation strategy you want to employ"</i> (P6, Head of Technology and Scrum Master, MM).</p> <p><i>"so I know what a delay, what a delay can cause and how a delay can affect things. So, I always look at the bigger picture... because when you, when you look at the bigger picture you know that a delay can cause a very long, a very long issue at the end of the day"</i> (P1, Head of Operations, MM).</p>
	Mediator	Intervenes as a middleman to help resolve conflicts between warring project stakeholders (e.g., members of the agile project team) by helping to bring about an agreement or settlement.	<p><i>"For instance, we had established our network integration with [the external vendor], and the following day, we resumed at work and discovered that we can no longer reach them. Then, there is this push around between the DevOps and the network team [part of the IT Operations sub-unit]. The network team saying their network delivery is okay; we should check the application. The DevOps is saying, no, the application is fine; we should check the network. So, what I agree as the project coordinator will be we test the two; let's ensure we are not having issues anywhere. So, let's start with network, which is the most important... So, application [the DevOps sub-unit] later discovered that it wasn't what they developed but the application..., the app it [the bank's application] is talking to from their [the external vendor] own end had issues. So eventually we were able to isolate it. It took about two or three days. We were able to isolate it. Eventually, we moved our seats to [the external vendor]-we had to seat down with their DevOps [the external vendor] and all of that. Within few hours we were able to resolve it"</i> (P12, E-channels Manager, MM).</p>

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2.	Continuous Improvement and Organisational Change	Process Owner and Improver	Accountable for implementation of prescribed project governance processes and procedures in the agile software project, facilitating retrospectives for continuous improvement in project delivery approach, ensuring inefficiencies and areas for improvement in project governance processes and procedures are identified and addressed in collaboration with other stakeholders, as well as ensuring the agile project team complies with project governance processes and rules to avoid penalties due to noncompliance.	<p><i>“whether it’s the retrospective that is at the end of each iteration, that’s when you have the retrospective, I’m the one that always facilitates this communication... if I’m having any challenge with a tool or document, I raise it up with the necessary person, especially if it’s something that is affecting my work with my developers or something that is slowing our work or something that is not allowing our work to..., I instantly raise it up and, even though it doesn’t become a company-wide process at least it would be a modified process for us at the [TECHCOY] division. So, when I encounter such issues, I speak with the person in charge to ensure..., and that’s the Operational and Excellence team; OpEx, they are the ones that actually create these documentations, these procedures and guidelines for the company. So, if I see a procedural guideline doesn’t fall into what my team needs, or it doesn’t tally with how our team is supposed to operate, then I raise it with them [OpEx team] then we can do a modification based on our own situation. Then if it’s something that now needs to be adopted company-wide, it’s adopted company-wide... So, if you don’t do scanning that which is done on TeamCity... there’s a penalty to that as well... so apart from just reporting on, giving updates on projects, my SDLC compliance is being checked, my scanning compliance is being checked... then, in terms of the regression testing, automated regression test, ensuring all automation cases and everything are built” (P1, Head of Operations, MM).</i></p> <p><i>“I am in charge of the IT operations unit, making sure the infrastructure is ready to be handed over to development guys. Making sure the connectivity between ourselves and provider [external vendor team] is available. Making sure that the IT operational readiness is also done properly before it does transition into the production environment. And then, after its in production environment, making sure that the processes that we’ll be managing with are all properly done, they are documented, we test them out and in the event that there is any change or whatever that needs to be done to it, making sure that we go back and revisit it. So, essentially, I coordinate that, of course, with the other sub-unit managers [MMs] as well” (P14, IT Operations Manager, MM).</i></p> <p><i>“For our procedures, if we are executing a project and maybe we notice one or two things that needs to be done in our procedures, we meet with the senior management or [name of Chief Information Officer] in this case” (P18, Head of Service Delivery, MM).</i></p>

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			<p><i>"the value chain owner will make sure that we comply with the different rules, we don't skip that, this, really basically following-up our governance end-to-end" (P21, Chief Information Officer, senior management).</i></p>
	Auditor	Audits each member of the agile project team to ensure each person works in line with policies, processes, and procedures that govern their project functions and activities and deliverables, identifies gaps and areas to improve in project governance processes and policies for continuous improvement in order to support each function and respective project work that needs to be completed.	<p><i>"what we do currently is on a monthly basis also we do like a process audit for each function... So, we have an audit framework right where we go through..., okay for this guy, this tester..., so we carry out the testing. We check, open the testing policy. Was there a test plan for this test activity? Were there test scripts? Confirm those evidences right in testing. We ask for those evidence from..., from the team or from the employee carrying out that function. So, once we can ascertain all those evidences then we present it in a report, in an audit report... So, in each of our policies that governed the activities performed by any resource, we have what we call effectiveness criteria where we test the effectiveness of the person carrying out this..., a particular activity right. We identify gaps, things that we need to..., that we need to improve upon in the activity or in the process" (P8, Operational Excellence Manager, MM).</i></p> <p><i>"We also have an auditing system by which I don't only audit the code you've written and everything, I also audit the performance of the work of every individual" P6 (Head of Technology and Scrum Master, MM).</i></p>
	Innovator	Fosters innovation and change to improve project governance practice in the project so that the agile project team can effectively implement project and achieve project expectations more efficiently, recommending and introducing new ideas, practices and technological work tools to the agile project team in order to improve and maintain team productivity during project delivery.	<p><i>"okay, like I said earlier, the CTO [Head of Technology and Scrum Master] and the COO [Head of Operations] they are actively involved in determining who does what and then how it's being done, the technological tools to be used like I explained earlier. So, they [MMs] play a very important role in that, and then if at any point in time the tools you are making use of, the technologies are not better or there is a better option, they are the ones that suggest that 'Okay, try out these better options'" (P3, Product Enhancement Developer, LOW).</i></p> <p><i>"So, my own job is to ensure we get results at the shortest time possible. Now, to achieve that... I have to always think of different ways to either ensure we achieve faster timelines to these goals" (P1, Head of Operations, MM).</i></p> <p><i>"So, in each of our policies that governed the activities performed by any resource, we have what we call effectiveness criteria where we test the effectiveness of the person carrying out this..., a particular activity right. We identify gaps, things that we need to..., that we need to improve upon in the activity or in the process... We engage the process owners or the task owners. We try to play the devil's advocate and find where and where</i></p>

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			<p><i>needs to improve and of course try to stimulate suggestion on areas of improvements. And if the areas of improvement requires the implementation of a new tool or a new way of thinking then we standardise it then we train the guys on how to go about it” (P8, Operational Excellence Manager, MM).</i></p> <p><i>“we introduced a new one called Postman... For testing APIs, yeah. It’s a free application that we got online so there wasn’t need to purchase any..., but there was need for knowledge of the application, so I had to start doing a crash course on how to use Postman... The way it works is when we go for standup meetings, we try to look at how we can..., how we can test application; automate testing, and how we can test using a faster method instead of doing it manually. So, when we go for such meetings, we table..., ‘These are the softwares that we browsed or checked online, and this is what we are going to use’. So, in the standup meeting we already know as a team that we’ll be using this software. So, the next thing is let’s do a research on how to use it” (P18, Head of Service Delivery, MM).</i></p>
	Rule-Maker	Formulates and introduces, enforces, and maintains custody of project governance rules and policies that guide and regulate the agile project team’s project work, which helps the team to work in a disciplined and organised manner and in compliance with prescribed organisational rules and policies.	<p><i>“on a Monday morning, you don’t want to go to the bank and run an implementation on a Monday morning. They [banks] also have what they are also trying to achieve in the banks. So on Mondays and mostly Fridays we don’t go to banks, so they [MMs] are the ones that came up with that. So Mondays, Fridays, mostly we focus on the coding tasks not implementations” (P2, App Support Developer, LOW).</i></p> <p><i>“So in terms of who does what, like I said..., I’m a custodian of polices: [TECHCOY] policies and policies that govern what a function does, the activities a function performs. So, in a way I play a role in..., I find who does what... in the project, who does what and how... Like for example, I can tell you that a tester has..., the tester within the [TECHCOY] organization..., within the [TECHCOY] environment has to do Item A..., has to perform Activity A, Activity B, Activity C, Activity D right, has to perform these activities. Because I’m in charge of formulating the policy that govern that activity of testing” (P8, Operational Excellence Manager, MM).</i></p> <p><i>“I mostly get to make the rules myself” (P6, Head of Technology and Scrum Master, MM).</i></p> <p><i>"I’m the Lead, Information Security and Assurance. I work within the IT department right, majorly is just to ensure you know in terms of information security and governance in the bank, in terms of implementation of information security standards alright, and also</i></p>

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				<p><i>working with the IT operations to ensure that..., so we have different controls in place right, and to ensure the controls are actually in place right, being IT standards that we have... for instance I am the ISO... we also ensure that we do an assurance testing for our applications. For instance, when we are deploying our applications we have to be there as well as the Information Security Officer in the team, probably during projects to ensure that our you know application system being deployed is tested and we also give assurance to the management"</i> (P16, Information Security and Assurance Lead, MM).</p>
3.	Agile and Technical Leadership	Agile Leader	<p>Adapts and helps the team to maintain agility, engages, interacts and communicates with team members with a listening ear and emotional intelligence to ascertain work or personal issues that may affect team productivity and project advancement, helps to keep the agile project team current regarding technologies they adopt for software project delivery by showing interest and curiosity for current technology trends and keeping up to date with current technologies being used in industry, encourages shared decision-making and receives and tolerates the opinions of other team members, exercises business sense which brings appreciation and clarity of business opportunities associated with a given project to the agile project team - opportunities for the organisation to rapidly introduce new products to customers through project implementation and gain competitive advantage over competitors using agile approach, and ensures the agile project team functions effectively as an agile team by ensuring that the team works and delivers in accordance with agile methodology.</p>	<p><i>"when you are bringing in a new product into a market, especially a kind of market like the financial technology market, you are, and you have this mind-blowing idea and the banks are all interested in it, you have a little period to retain that interest especially when you know we have other established switch; we have [competitor name] practically trying to introduce their own..., so you have a short timeframe to actually deliver and impress at the same time. So, the best thing is to be able to just keep working... Iterative development is like the fastest approach you can use... I try to maintain as good communication with the team as possible. I also make sure that I have a listening ear to everything coming up. I have a listening ear. I think it's not just for agile development I think it's generally for management, you need to have a good listening ear if you want to be a good manager. So, I also do make sure that everybody contributes into any decision. I will not say because I am the CTO [Acting Chief Technical Officer] I just decide for everybody. I make sure that everybody contributes into that decision, everybody has the right to express their own view whether for or against my decisions... And at the same time you [MM] must also make sure that you keep up to date with the technology. It's very important. You need to keep up to date with the technology. You need to understand the use of each of these technologies, you need to understand the pros and cons of all these technologies"</i> (P6, Head of Technology and Scrum Master, MM).</p> <p><i>"in most cases we try and like get to a very good consensus of what should be done... they [MMs] also listen to the feedbacks they get from us on"</i> (P2, App support developer, LOW)</p> <p><i>"we have the Head of Technology [MM] who is more of a Scrum Master because in a Scrum team if you don't have a Scrum Master that means your team..., your team is more or less a failed team... I facilitate every..., whether it's the weekly Scrum, whether it's the daily Scrum or whether it's</i></p>

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			<p><i>the retrospective that is at the end of each iteration, that's when you have the retrospective, I'm the one that always facilitates this communication... one quality that an agile leader must have is emotional intelligence because there are a lot of things that can be happening to developers maybe it may not even be a work related issue, it might be personal issue which is making the developer have some down time or not being able to perform properly. So, once you notice things like that, as an agile leader what I do is I come to, I speak with the person, where is the problem coming from?... from my own side if I see the way we went through our work for the week isn't fine, I'll look for another way the following week to ensure we achieve our goals"</i> (P1, Head of Operations, MM).</p> <p><i>"I'm the coordinator when it comes to sprints and agile and also our monthly iteration. So, I coordinate between DevOps, the QA, the user or the requester, then also align all this coordination with my line manager, which is the CIO"</i> (P11, Project and Change Coordinator, MM).</p> <p><i>"we introduced a new one called Postman... For testing APIs, yeah. It's a free application that we got online so there wasn't need to purchase any..., but there was need for knowledge of the application, so I had to start doing a crash course on how to use Postman... The way it works is when we go for standup meetings, we try to look at how we can..., how we can test application; automate testing, and how we can test using a faster method instead of doing it manually. So, when we go for such meetings, we table...; 'These are the softwares that we browsed or checked online, and this is what we are going to use'. So, in the standup meeting we already know as a team that we'll be using this software. So, the next thing is let's do a research on how to use it"</i> (P18, Head of Service Delivery, MM).</p> <p><i>"they are middle managers, so they have the authority to take some certain decisions... Let's say for instance, when we are estimating on the timeline for each project or each deliverables, they have the authority to say, 'Oh, this timeline allocated is not..., we can't realise it', or 'it's not realisable. So, we need to adjust it'"</i> (P11, Project and Change Coordinator, MM).</p> <p><i>"And usually in agile project you therefore allow also to change requirement or to increase requirement and stuff like that. That's what the product owner [E-channels Manager, MM] is also there for-they say, 'okay we have done this one fast, so let's do this', 'Ah no, this one has changed because now let's adjust this design and blah blah'. That's..., he can make..., he [E-channels Manager, MM] can take the decisions quickly</i></p>

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			<p><i>based on the mandate also given to him. For some decisions he has to come back to the Change advisory board, but sometimes there are certain things that he can actually adjust at this level because it's not really like critical" (P21, Chief Information Officer, senior management).</i></p>
	Technical Leader	<p>Provides technical leadership by leading software development in the project, supports the agile project team with advanced technical expertise and hands-on support, and anchors the team in appropriate development practice and ensures that software development work outputs completed by developers are within project scope and aligned with project expectations, ensures all technology requirements to accomplish the project are identified and provisioned, ensures that all necessary technical considerations for effective software development are made in order to achieve expected results.</p>	<p><i>"I'm the Technical Lead, and also take on the duties of the Chief Technical Officer... when we have projects or tasks or anything it is my job to assign these tasks and coordinate development... there are limited people with sufficient knowledge to execute this project... like I said, we have more junior developers. So, you need to like have a hands-down time with everybody to make sure what they are doing is right in line with the project. So, from there, even in execution of tasks and projects too we do keep them iterative as well because you do realize this is, like I said, it's a domain specific field. So, we also want to make sure these guys are not working out of scope... And another thing which is very important to note, in the course of management in our case scenario here, there are a lot of times when you need to actually help out in that task... not just assigning task to people and be waiting for them to just complete it. Because of this specific window. Like I told you from the beginning that this is an industry with few people with domain knowledge. So sometimes we ourselves [middle management] need to input directly into the work... I do give my sprints longer period, especially knowing fully well a lot of people in my team are still new to the domain knowledge so I do give my sprints longer period to make sure that we just achieve things" (P6, Head of Technology and Scrum Master, MM).</i></p> <p><i>"we have the Head of Technology who is more of a Scrum Master... the essence of a Scrum Master is to ensure that everything that is required in terms of the technology aspect, everything that needs to be done is actually put in place because, you know, when your development team, when they're brainstorming or saying about, okay we need to achieve this we need to achieve that, you need a Scrum Master which has the wider knowledge; which has deeper knowledge to ensure that whatever they say he also can contribute and okay say okay you're on the right track" (P1, Head of Operations, MM).</i></p> <p><i>"I led the integration, yes. And then when it was needed for us to meet with the technical team of the provider [external vendor team], I was the interface between our team..., I actually met with their own technical team [external vendor team] to even sort some things out. So, I was like the point contact person technically, seeing to the design of technical</i></p>

	Organising Theme	Basic Theme	Description of Basic Theme	Role Example (Representative Quote)
				<p>documentation design, architectural design. The development activity I was 90% involved, integration and then deployment, actively involved too" (P13, DevOps Lead, MM)</p>
4.	Monitoring	Gatekeeper	<p>Serves as a point of accountability, oversight, and delivery assurance for the agile software project, regulates project governance interactions and procedures employed by the agile project team for project delivery, performs gatekeeping checks and controls access from one state of project work to another to ensure conformity to accepted work standards (e.g., during code reviews), issues necessary approvals (or disapprovals) for code quality improvements and technical development change requests as required, controls the addition of new tasks into sprints (iterations) in order to minimise disruptions to prioritised project work during sprints, serves as first point of contact in the agile project team regarding project work undertaken by the team and ensures tasks to be completed by the team are handled by the right people with the right capabilities.</p>	<p>"And then you must also get approval from the CTO [Head of Technology and Scrum Master, MM] before you make any changes to..., any configurational changes to the server or to any of the services we make use of... after you've made changes, you've made a new input to a code, you upload it there..., you push it to Bitbucket and then the CTO [Head of Technology and Scrum Master, MM] has to review the code and then either commit it to the master or assign that you go and refactor or change some stuff in your code." (P3, Product Enhancement Developer, LOW).</p> <p>"if you already have a task on your Jira board and this task is not yet on blocked items... before you can come to me like I said earlier on, only myself or the Head of Technology has the right to create a task for a developer... before you can come to me and say I should help you add this task, you must have given me a reason why the other task, which was assigned to you earlier on, why maybe you can't complete them or why they are blocked... the first thing why that task was even assigned to you was because we prioritised the deliverables. So, if you are now saying you want an additional task what about that prioritised deliverable?" (P1, Head of Operations, MM).</p> <p>"the middle managers are the owners of the project. It's their project right and they have to ensure that the project is delivered as expected. Now what that means is that they have to consciously ensure that those governance practices are adhered to" (P9, TECHCOY divisional CEO, senior management).</p> <p>"they [MMs] are the first point of contact for each unit whereby they lead. For instance, QA [Service Delivery sub-unit], whatever challenges, whatever thing that needed to be done, the point of contact is the middle manager. So, they [MMs] ensure the resource reporting to them actually delivered on what is expected. The same goes for DevOps. The point of contact is the DevOps team lead who assigned the project tasks if possible, if it's not being handled by him, to the resource reporting to him. And he also ensures that the resource delivers within the timeline on the deliverables. The same goes to other sub-units like that. So, they [MMs] manage their own team units, indirectly ensuring that they deliver on the project deliverables... So, middle managers have the fair knowledge of the ability and capability of each of the resource reporting to them. So, as far</p>

Organising Theme	Basic Theme	Description of Basic Theme	Role Example (Representative Quote)
			<p><i>as the requirements and the deliverables of project is concerned, they know the specific resource to assign the roles based on the capability and ability of the resource under their unit” (P11, Project and Change Coordinator, MM).</i></p> <p><i>“we realised quickly that you need to have one person who’s actually in charge of the whole end-to-end value chain for instance right. Like that person is like bringing everybody together on the same, if you want to look at it as a..., if you want to look at the value chain as a role, like this guy is the guy who makes sure that everybody actually lead to the same road, because the road is where you define your starting point, your end goal point... in this role [value chain owner role] now, you can do it..., sometimes it can be one person, sometimes you can..., depending on the complexity and then the weight of the project as well, you can link that person with also the business analyst or the owner from the functional perspective, right. The [BANKCOY ASD project name] project, for instance, it was two people: you have like the Change Lead [Project and Change Coordinator] and then you had the Product Manager [E-channels Manager], basically. The two together, they were driving this. Because the end goal is to have a successful project... They [MMs] will now come and say, ‘Hey guys, this is what we propose. We’re going to structure it [BANKCOY ASD project] like this, and then it will be like this. After one month we receive this, six weeks later we see this, [inaudible] like this’, okay. Maybe we wanted six services and then they [MMs] come back and say, ‘No. After analysis actually the two services; key services this one will deliver this one first and then this one comes next’. This is the ‘how’ part basically, that’s their responsibility to structure that to inform us [senior management]... I mean for us value chain owner is middle management” (P21, Chief Information Officer, senior management).</i></p>
	Goal and Task Inspector	Tracks and inspects goals and tasks which members of the agile project team and other stakeholders are expected to complete during the project – monitoring tasks and dependencies, following up, sending reminders to stakeholders to act on their assigned tasks, and verifying project work to ensure set goals are being achieved.	<p><i>“so on project monitoring they [MMs] document... they have the outline of the goals that we’re supposed to achieve, so, and they are monitoring, they are following up on those things, ‘Oh this, has it been done?’ Whenever it’s being tested they want to see it, not just that you say it’s done, it’s done, no. They come up and see it... they’re able to monitor the progress of the project, they know what has happened and when” (P2, App Support Developer, LOW).</i></p> <p><i>“they have access to this Jira where they monitor each of the progress for each of the team members on each of the tasks that have been assigned to them... Yes, Head of Operations, yeah. So, he monitors it on Jira and then</i></p>

Organising Theme	Basic Theme	Description of Basic Theme	Role Example (Representative Quote)
			<p><i>if your tasks has been stagnant, like you are not moving it, like you are not showing that there's progress on the task, he messages you and finds out what the problem is and tries to make sure that there's progress, like make progress in the tasks that have been assigned to you" (P3, Product enhancement developer, LOW).</i></p> <p><i>"At the project initialisation, we identified these are the things we will need from them [the external vendor team] at different stages. Maintain a list of..., how will I put it? Just maintain a checklist. We had a checklist both in terms of resources, assets, and whatever we require from them. We had that checklist. And then we now had based on the project timeline, the dependencies are things even up to things like meetings, technical meetings, sign-off meetings and all those stuff. And then based on that checklist, at every stage is either 'Completed' or 'Not done yet', 'Delayed' and everything. So, we had the Excel. I used to manage that to monitor that" (P13, DevOps Lead, MM).</i></p>
	Pastoral Care Provider	Monitors the emotional state of the agile project team with empathy and emotional intelligence, interacts with team members in the agile project team at a personal level to identify personal or work-related issues affecting a person's performance and provides pastoral care support accordingly (e.g., arrange required training to address capability needs), thereby helping to promote psychological stability and psychological safety in the team by ensuring that team members are not overwhelmed by personal or work-related issues which may impact their ability to focus on their project work and accomplish project tasks.	<p><i>"one quality that an agile leader must have is emotional intelligence because there are a lot of things that can be happening to developers maybe it may not even be a work-related issue, it might be personal issue which is making the developer have some down time or not being able to perform properly. So, once you notice things like that, as an agile leader what I do is I come to, I speak with the person, where is the problem coming from?... that way we ensure that everybody's head mentally is in the game and everybody knows what they want to achieve, so, that's another thing I ensure that I do with my team. I ensure that everybody is always fine at every time. So, there will be no reason for why the work is being delayed or why the work is being slowed down... the first thing in terms of capability is we ensure that we pay for training materials for our developers and also the part about always speaking one on one with developers especially when you are seeing a sign of slow, maybe in terms of task delivery, the person doesn't deliver on time, that is part of my role to ensure..., to always call the person and say..., to ask what the problem is, what are the factors that are affecting this to ensure that that persons mind is on a job and is ready to deliver the job" (P1, Head of Operations, MM).</i></p>
5.	Capability Building	Capability Building Advocate	<p>Engages in and encourages capability building in the agile project team to ensure team members are equipped with requisite knowledge and skills to enable them work effectively in cross-</p> <p><i>"In my team I do make sure that we have a knowledge exchange hour... we just call it knowledge exchange hour but in reality it do last sometimes about five/six hours... I do make sure everybody..., you've worked for one week, Monday to Thursday, today is Friday, explain to others what you've</i></p>

Organising Theme	Basic Theme	Description of Basic Theme	Role Example (Representative Quote)
		<p>functional capacities and accomplish their project tasks, arranges and encourages training, knowledge sharing, and learning in the team, and ensures backup resources develop needed capabilities and are available to fill any human resource gaps in the agile project team in situations where primary resources are unavailable, so as to minimise key person risk.</p>	<p><i>been doing. Let them understand so that if next week you could not make it to office someone else can pick up your task and continue working on it. So, we do share those knowledge: 'Have you learnt anything new? Any new technology?'. Okay like personally, I have a couple of programming languages I'm working on so, I do share that with them too, to let them have a better understanding of the programming terminologies" (P6, Head of Technology and Scrum Master, MM).</i></p> <p><i>"we always want our guys to be cross-functional... like a PE [product enhancement developer] today can do an SI [system integrator] work. Likewise, an SI can do a PE work... so, we always ensure that each team member gets those knowledge to ensure..., so that everybody can be in the cross-functional, so that even when..., like today now our PE fell sick... even though the PE is sick right now, it doesn't mean work will stop in terms of product enhancement, because everybody is running a cross-functional, in a cross functional platform... most of our guys are developers and there's not even time to go and start attending a course. So, that's why we paid for the Udemty so that guys can always learn for themselves" (P1, Head of Operations, MM).</i></p> <p><i>"Yeah, with respect to capacity building, because we have the, for example, the technology [external vendor's technology solution] used was somehow, I don't want to use old version, but an earlier technology that even myself and some members of the team had to learn. So, also with respect to that, to implement..., to conform to the technology being used by the provider [external vendor team], I had to decide on what we had to use internally. So, I did research to pick the best tools for us to use, and also to learn about the technology that we were integrating with, which was outside the scope of what we were doing but for that project we had to do that... The external provider was expecting a specification: A, B, Z, but my team was understanding it as A, B, C due to knowledge gap that we didn't know Z. So, how that was solved was to call the team [agile project team] together... Because external [external vendor team] is just telling us that with this [task output], this is supposed to be working, this this is not working. Just to now have meeting with internal [agile project team] like, 'Okay, if there's need to do more research about...','. 'Just to emphasise that it's not about what you know how to do or how you are doing it, it's about you having to do it according to what is required. If it means you have to go and learn; just seek support'" (P13, DevOps Lead, MM).</i></p>

Organising Theme	Basic Theme	Description of Basic Theme	Role Example (Representative Quote)
	Coach	Provides assistance, training, and guidance to team members while allowing them take ownership of assigned project work for the benefit of the agile project team and project, ensures the agile project team possesses requisite knowledge, skills and capabilities to accomplish project tasks and meet project needs, assigns minor tasks to team members for their practice, learning, and capability building.	<p><i>“if there is a new software that is introduced to the team, they [MMs] are the ones that make sure that each of the team members understand how the software works... when I joined the team... the Jira app I talked about, yeah he [Head of Operations] was the one that put us through the app... put us through on how it’s being used, what each of the functionalities are and what they mean” (P3, Product enhancement developer, LOW).</i></p> <p><i>“they [developers] were only good with Android OS but we wanted them to learn iOS and we paid for Udemy... each month we were always giving them the target, so we can tell you that in this month complete ten courses and after ten courses do a demo project... my Scrum Master, which is Head of Technology... he [Head of Technology and Scrum Master] is always there to chip in; to assist them [developers] because in terms of knowledge, he’s always assisting them” (P1, Head of Operations, MM).</i></p> <p>Exchange during interview of P16 (Information Security and Assurance Lead, MM):</p> <p><i>Researcher: “In terms of capability building, did you play any role? Capability building in the [BANKCOY project name] project, did you play any role or contribution in that regard?”</i></p> <p><i>P16: “Yeah, of course in-house [training] in the Information security office [IT Security and Assurance sub-unit] ..., yes, with my team”</i></p> <p><i>Researcher: “Okay”</i></p> <p><i>P16: “..., alright, of course to expose them into different..., different framework or different setting.”</i></p> <p><i>Researcher: “What exactly did you do?”</i></p> <p><i>P16: “So, here it’s just to..., like I said, this is more to train.”</i></p> <p><i>Researcher: “Okay you trained them?”</i></p> <p><i>P16: “Yeah, just to like..., now, of course..., now, this is the first time the bank is actually exposing to..., like [BANKCOY project name]. This is a major task, which some of my guys have never been exposed to before right. So, this is more like in terms of resources capacity. Then in terms of usage of some of these applications as well, because I mean..., there are some applications they’ve not used before during this..., I mean before or during this [BANKCOY project name]. Of course, it built the capacity of my guys.”</i></p>

Appendix O: HOLDCOY - Input Competencies in Input Competence Category

Table O1: Input competencies of middle managers in agile project governance from HOLDCOY

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
Input Competence	Delivery	Teaching and coaching skill	Ability to educate other team members and facilitate their learning, transmit knowledge that will enable and empower teammates so that they know what to do or how to act in particular situations during project delivery	<p><i>“You need to make sure that you teach as a [middle] manager. You [MM] need to make sure you teach; you educate your team. So, I will cite a case scenario. There was a former COO [MM], the former COO also serving as the CTO then before I came here... He [MM] supervised the development of the project to a great extent but on his leave, it was like the team was just stuck for months; they were unable to do anything. Why? Because he was [inaudible] knowledge. You [former COO/CTO] did this research and everything, yeah you came up with a lot of concepts. But he did not educate his team and when he left, the team became useless. The company became worried, investors became worried” (P6, Head of Technology and Scrum Master, MM).</i></p> <p><i>“they [developers] were only good with Android OS but we wanted them to learn iOS and we paid for Udemy... each month we [MMgmt] were always giving them the target, so we can tell you that in this month complete ten courses and after ten courses do a demo project... my Scrum Master, which is Head of Technology... he [Head of Technology and Scrum Master] is always there to chip in; to assist them [developers] because in terms of knowledge, he’s always assisting them” (P1, Head of Operations, MM).</i></p>
		Adaptability skill	Ability to change and adapt to changes so as to achieve project goals	<p><i>“from my own side if I see the way we went through our work for the week isn’t fine, I’ll look for another way the following week to ensure we achieve our goals” (P1, Head of Operations, MM).</i></p> <p><i>“let me give you an example, like today I’m sending in two people into the banks... now I mean, two roles missing which we also need their functions... Because we don’t have people that can replace them when they are away at the moment... So, for the day, I’m going to have to take up some tasks that they should have worked on and I have to share some of their tasks for others to do... Especially in an agile environment. You must make sure that if any member of the team leaves today you can replace them. That making sure is not that you actually have to replace them, but you need to make sure that the loss</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<i>of one member does not lead to a lapse in the team” (P6, Head of Technology and Scrum Master, MM).</i>
		Coordination skill	Ability to interface with different project stakeholders and coordinate and facilitate different aspects of project work and engagements in an organised and harmonious manner to accomplish the project	<p><i>“their [MMgmt] role is actually very critical... the project middle managers are responsible to work closely with all the internal teams and the contacts at the external team to ensure that every single deliverable as stated in the business requirement documentation..., document are completed, tested and delivered, full stop. That is their job” (P4, Group CIO, senior management).</i></p> <p><i>“Coordinating on development aspects is done by the Head of Technology [MM]; coordinating on the project management aspects is done by Head of Operations [MM]... So, the Head of Operation that is me. So, coordination of the testing; so sorry testing, project management, business analysis part I do that, as Head of Operations I do that” (P1, Head of Operations, MM).</i></p> <p>Observation from Sprint Planning Meeting:</p> <p><i>“Head of Operations coordinates the meeting. Head of Operations interacts with the team members to update their Jira software tasks. Head of Operations runs through the Jira tasks, checking status of current sprint (i.e., determining the tasks that have been completed and those tasks that are still pending)”.</i></p>
		Decision-making skill	Ability to make decisions and engage in collaborative decision-making on project matters	<p><i>“So decision making, yeah, to a very good extent, they [MMs] tend to communicate it across, not that they [MMs] make the whole decisions at all times, so they tend to communicate it across. So in most cases we try and like get to a very good consensus of what should be done... So it helps me, so it makes me, like I will be able to contribute to what needs to be done and how it needs to be done, how long it will take and all of that. So in most cases, they also listen to the feedbacks they get from us on, ‘okay let’s not do it that way, let’s do it this way because of this, this and this’” (P2, App Support Developer, LOW).</i></p>
		Leadership and people management skill	Ability to lead (e.g., through servant leadership) and manage different people, exercise emotional intelligence, motivate team members, and take initiative during project delivery	<p><i>“one quality that an agile leader must have is emotional intelligence because there are a lot of things that can be happening to developers maybe it may not even be a work related issue, it might be personal issue... as an agile leader what I do is I come to, I speak with the person, where is the problem coming?... if I’m having any challenge with a tool or document I raise it up with the necessary person, especially if it’s something that is affecting my work with my</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<p><i>developers or something that is slowing our work or something that is not allowing our work to..., I instantly raise it up... As a middle-class manager you need to be a servant-leader. You [MM] need to be there for your team” (P1, Head of Operations, MM).</i></p> <p><i>“I feel the middle managers should possess three major skills. One, leadership, because one of the things I’ve learned is that, even if you have the technical skills and you don’t have that man-management skill, it’s as good as a zero delivery. Because it will just look like you might be delivering but they won’t do as much as what they are supposed to do. So that man-management... Man-management I mean is that you should be able to motivate a team” (P4, Group CIO, senior management).</i></p>
		Prioritisation skill	Ability to prioritise by collaborating with other project stakeholders to determine tasks and activities that need to be performed in a prioritised order based on importance, value, and feasibility	<p><i>“we already know the priority things in terms of delivery because in terms of incremental delivery, we know that oh the stakeholder wants this first, he wants this next, he wants that next. So, based on that priority as a team we come here, we decide and okay, these are the goals for the stakeholders, now, how do we want to achieve this? Which ones are the ones that can be achieved realistically this week? Which ones are the ones that we still need to get some other requirements for that we might not be able to fit into this week” (P1, Head of Operations, MM).</i></p>
		Issue resolution skill	Ability to identify and apply feasible problem-solving approaches and alternatives to resolve project issues amicably so as to achieve project goals	<p><i>“when there are issues in terms of maybe when the Project Manager [Project Manager and Business Analyst] is trying to get some requirements from stakeholders, either the stakeholder is spending a lot of time or not or there are delays, once the Project Manager escalates to me I don’t just go to the person which is the like the staff that is supposed to provide the requirements at the bank. I also go to speak with top-level person at the bank, whether maybe it’s the ED [Executive Director] or a senior manager at the bank, explain to this person that see what is causing delay in the delivery of this project. Once you explain that, you can tell..., either you tell the person ‘Can you schedule a meeting where all stakeholders will be involved in meeting or is this something that we can just call one or two people that are working primarily on the project at the bank?’” (P1, Head of Operations, MM).</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
		Supervisory skill	Ability to oversee and follow up with team members and their assigned tasks so as to stay up to date with their work and ensure project work is progressing and completed as expected without hindrance	“So, we also want to make sure these guys are not working out of scope. So, we iterate continuously, we do that daily and I also have times in the day which they need to report in; What’s the progress of your work? How far have you gotten with it? Are you facing any challenges? Is there something I need to know? Is there a blocker? Is there a reason why you even wouldn’t be able to continue working?... Sometimes myself, I need to be on field to actually supervise things on my own, not all the time, just once in a while... you [MM] must be able to supervise. It’s very important. Not everyone can do supervising, but I believe, of course, everybody can learn how to. You must be able to supervise a team” (P6, Head of Technology and Scrum Master, MM).
		Time management skill	Ability to effectively manage allocated time for project work and activities, and adhere to timelines	“If everybody is deviating [during project meeting discussions], I probably allow you to deviate for like one minute, maybe you’re trying to point out something on that deviation, but what happens is I always come back and I chip back in and say guys, don’t let us deviate from this, this is what we want to achieve. They will come back, we discuss, we achieve that task, move on to the next. Then I’m always time conscious. Based on what you have done so far and what is left, I always look at my time, I know, do I still have time to, or do we need to fast-track on some things and so on? So, basically I do that very well in my facilitation for the..., for the weekly scrum, for the daily scrum and for the retrospective” (P1, Head of Operations, MM).
		Escalation skill	Ability to escalate and share encountered project issues with other stakeholders on time so that escalated issues can be dealt with promptly in order to achieve project deliverables accordingly	“when there are issues in terms of maybe when the Project Manager [Project Manager and Business Analyst] is trying to get some requirements from stakeholders, either the stakeholder is spending a lot of time or not or there are delays, once the Project Manager escalates to me I don’t just go to the person which is the like the staff that is supposed to provide the requirements at the bank. I also go to speak with top-level person at the bank, whether maybe it’s the ED [Executive Director] or a senior manager at the bank, explain to this person that see what is causing delay in the delivery of this project. Once you explain that, you can tell..., either you tell the person ‘Can you schedule a meeting where all stakeholders will be involved in meeting or is this something that we can just call one or two people

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<i>that are working primarily on the project at the bank'?" (P1, Head of Operations, MM).</i>
	Socio-Relational	Emotional intelligence skill	Ability to understand what other team members are experiencing or feeling (i.e., their emotions), showing concern towards their well-being, and engaging and interacting with them appropriately with empathy and self-control during emotionally sensitive situations (e.g., conflict situations)	<p><i>"one quality that an agile leader must have is emotional intelligence because there are a lot of things that can be happening to developers maybe it may not even be a work-related issue, it might be personal issue... So, once you notice things like that as an agile leader what I do is I come to, I speak with the person, where is the problem coming from? Is it part of the work ethics, is it part of the, is it an hygiene thing in the company, or is it something that you're not happy with in the company, is it an external, is it a family related issue? So that we just, so that that way we ensure that everybody's head mentally is in the game and everybody knows what they want to achieve, so, that's another thing I ensure that I do with my team. I ensure that everybody is always fine at every time. So, there will be no reason for why the work is being delayed or why the work is being slowed down... and now emotional intelligence, it doesn't necessarily have to do with maybe if someone is not achieving his or her task, it also depends on how you communicate with your team members... your team members can maybe say some things or frustrate you to the extent that you want to shout back at them or you want to..., no, you can't afford to do that, because you need to be able to read this person's mindset. From the way the person is speaking, you need to be able to pick up and know which particular part of emotion is the person coming out from; and based on that emotion you know how to reply and address the person. So, emotional intelligence also is key. If you have that emotional intelligence you..., I'll always know the kind of emotion that this person's having at that moment and how to address that emotion in the way that when you are speaking back to the person, the person probably realises that oh, I wasn't going the right way, or the person realizes that oh okay, I should have done this better. So, that's key about a middle-class manager as well" (P1, Head of Operations, MM).</i></p> <p><i>"they [MMs] shouldn't be people that easily get angry or pissed with stuff because it's normal, but then, for the general project goals to be achieved, these traits are..., I mean there should be a way of containing..., of managing people, like managing their anger, how</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<i>they talk back at people and all that. It's very important" (P3, Product enhancement developer, LOW).</i>
		Interpersonal communication skill	Ability to listen and interact well with project stakeholders, receive complex information, break it down into its basic components and interpret it, report and present it effectively to project stakeholders in a way that is clear and understandable	<i>"Interpersonal communication very key... They [MMs] have to be able to take..., they have to be able to take a complex..., they have to be able to take something that..., a body of knowledge right or an idea that ordinarily they seem..., is seen as complex right and break it down to the first principles and communicate it to their team, and be able to also communicate it to stakeholders. What I find in communication is that right people tend to complicate things right ordinarily when they are trying to communicate. They are not sure how all the pieces you know, where all the pieces meet, or they know bits and pieces of it. So, they throw bits and pieces at you. It's key that you [MMs] are able to you know take all those ideas and comments and suggestions and sort of bring them together right to form a picture, and then communicate that picture back to them [other stakeholders]. So they [other stakeholders] even have a..., so, what happens is..., so they even have a better understanding of what they are even trying to tell you... Then communication right, being able to listen, take that, articulate, and communicate it back. Everybody..., every middle manager needs that because the middle managers are in charge of execution right, they..., they [MMs] have to understand that" (P9, CEO of TECHCOY division, senior management). "another important thing that you need to have as a manager; you need to make sure that you possess good communication skills. It's very important, the communication. At the same time, apart from just having good communication skills, like I mentioned the other time, you must also be a good listener. It's very important especially in the agile environment you must always be a good listener" (P6, Head of Technology and Scrum Master, MM).</i>
		Interpersonal relationship skill	Ability to relate, engage, and collaborate effectively with different stakeholders in a project (e.g., senior managers, team members), thereby maintaining healthy interpersonal working relationships with others so as to produce expected results	<i>"so the thing is once you go in and you speak with the top-level managers at the bank they will be able to put pressure under their staff to provide whatever is needed for software. So, that's where I actually step in. I just go in there, meet with the..., maybe like the senior manager who I'm supposed to..., on that project, and once you speak with the person, once the..., either they call another meeting to discuss... In those kind of scenarios, what I always..., when I meet</i>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<p><i>with such person I'll say we need to have another meeting... That means strategic..., so that's more like having a strategic relationship with the top people at these banks. Not necessarily like the very top guys maybe GMDs [group managing directors], no. I don't have access to those people but at least the senior managers which I know if I need someone to push or 'put fire' on the staff: maybe the normal regular staff at the bank, at least those people can actually do that. I hold that strategic relationship. I have it with all the stakeholders we are working with" (P1, Head of Operations, MM).</i></p> <p><i>"Interpersonal, very key. In fact that's..., that's like..., its non-negotiable because you're going to be meeting..., as a middle manager like myself I'm going to use myself as an example, you meet with guys, you meet with teams; cross-functional..., you meet with cross-functional teams, teams with different areas of specialisation... You're going to be interfacing with a myriad of cross-functional teams. So, you need to have some level of interpersonal skills in terms of engaging individuals" (P8, Operational Excellence Manager, MM).</i></p>
		Tact and diplomacy skill	Ability to handle sensitive people, navigate sensitive matters, situations, and conversations, and negotiate with persuasion and dialogue in order to reach an agreement	<p><i>"what I try to do most times is I try to explain to the senior management whenever we're having this our monthly meeting or quarterly performance meeting that these things [project governance rules and procedures]..., they are things that okay, we need to properly address... for instance now, we were supposed to go live on this our [project name] project as at January. But I made them [senior management] understand that this issue, that issue, this thing, this thing, all these things [project governance rules and procedures] needs to be done. We need to do proper scanning of our applications. We need to do proper automated testing of our applications and so on... they [senior management] also understood and they're okay, 'yes, go, we'll give you some months' grace to achieve this thing'" (P1, Head of Operations, MM).</i></p> <p><i>"You [MM] need to persuasion right because you can't toe..., you can't like toe the hard line with top management that you need to execute stuff with. You can't toe the hard line. So, one other thing is persuasion and dialogue right, dialogue and kind of diplomacy, ensuring that senior management or director-level management</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<i>actually pull their weight around execution of some projects” (P8, Operational Excellence Manager, MM).</i>
		Understanding of tacit relationship structures and social dynamics	Understanding of the tacit (unspoken) relationship structures and social dynamics in the project environment (e.g., within the customer organisation) in order to facilitate project communications and issue escalations and resolutions	<i>“So we know that when things don’t go right, and things don’t usually go right every time. There will always be issues. How do we escalate? What is the escalation process right?... There’s an unspoken relationship structure that exists... even amongst the stakeholders, the external stakeholders. Even though they’ve given you a formal escalation you know process, you need to understand what the informal escalation process is. It’s unspoken, which is why they..., you have to constantly communicate with the clients... So anyway, what I’m saying in essence is that there are some relationships..., there are some dynamics..., there are some social dynamics right that may exist in the organisation of your, your clients. You need to understand those dynamics. So that is very key so that you would know how to effectively escalate right. We may actually follow the escalation process and end up causing problems, you will just not get traction but you’re escalating and that’s because you ignored the unspoken or the unspoken social dynamics that exist you know in that organisation” (P9, CEO of TECHCOY division, senior management).</i>
	Business	Domain knowledge and expertise	Knowledge and understanding of different aspects of the agile project to ensure successful project delivery (e.g., project and product knowledge, customer needs and industry knowledge, agile software development, project management, IT networking, knowledge of organisation(s) and stakeholders involved in the project, project documentation, organisation processes and policies and regulations, use of project software tools)	<i>“The first thing that I will say managers [MMs] must possess is the knowledge of what agile is in the first instance. You must understand what agile is in the first instance. Then another knowledge a manager should have is a manager should be able to use the [inaudible], new and updated tools. What are the tools that should be used in this industry? What are the tools to be used in achieving this..., you must be able to use them. And not just use these tools you must be able to use their updated version. You must stay up-to-date with them” (P6, Head of Technology and Scrum Master, MM).</i> <i>“The other thing you need to know is we need to understand who the key stakeholders in the..., who your key stakeholders are outside of our organisation, this is on the client side right. Who are the key stakeholders on the client side? You need to know who they are. Who is the guy to talk to on technology? Who’s the guy to talk to to get anything implemented?... the middle managers have to understand the domain right. You [MMs] are building a product for financial services; you need to understand how that..., whatever segment of</i>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<p><i>financial services you're building for you need to understand how it works. You can't ignore it. You have to you know and acquire that knowledge... you need to acquire enough to understand why what you're building is important, why they [industry customers] need it" (P9, CEO of TECHCOY division, senior management).</i></p> <p><i>"whether it's the weekly Scrum, whether it's the daily Scrum or whether it's the retrospective that is at the end of each iteration, that's when you have the retrospective, I'm the one that always facilitates this communication... So, if you don't do scanning that which is done on TeamCity, like I mentioned, there's a penalty to that as well. So, all of these processes fall..., so apart from just reporting on, giving updates on projects, my SDLC compliance is being checked, my scanning compliance is being checked. We have also, then, in terms of the regression testing, automated regression test, ensuring all automation cases and everything are built... So, in terms of the networking aspect of this [project], I am the one that handled this personally because of my level of experience because I am like..., I have a certification in networking" (P1, Head of Operations, MM).</i></p> <p><i>"but then they [MMs] should have a general knowledge of how the product they are working on works, like how each of the components work, even if they don't know how to write out the codes; they just know how it works, so that to make it easy for them to approve requests or to like appeal for changes if need be. So, they have to have a general knowledge of products, yeah. It's very important... have a good knowledge of the softwares that are used in the process, like the Jira, the Bitbucket, the Zoho People, like knowing how they operate and how they can be used for the achievement of the set goals... Okay there are documents; SRS [Software/Systems Requirement Specification] documents that are written like the processes for each of the features on the project, each of the steps are detailed in the SRS document. A good understanding of the SRS, even if they [MMs] don't understand how codes are written and all that they should understand how each of the processes work, each part of the project" (P3, Product Enhancement Developer, LOW).</i></p> <p><i>"I do a lot of market research and market study, trying to understand what our competitors are doing, where the gaps are, and how we can improve and kind of create a more superior offering to what our</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<p><i>competitors are doing... So I think domain knowledge is very important. So, if you are going to be working in a team that is focused on financial services and delivering financial services products, you have to have some domain knowledge around financial services” (P7, Head of Business Development, MM).</i></p> <p><i>“as a middle manager [inaudible] being able to understand..., the working knowledge of the teams you are working with. You [MM] need to be able to understand what the teams you are working with do.” (P8, Operational Excellence Manager, MM).</i></p>
		Team competence knowledge	Knowledge of the capabilities, competences, and skill sets of team members	<p><i>“so in determining who does what, they [MMs] tend to..., so over time working with the tech guys, they [MMs] tend to have understood that, ‘oh when we need to do something like this, this guy always gets it done faster than this other person’. So, they tend to know how to delegate those tasks to them [team members]. Yeah, they have an understanding of who gets it done faster and better, so it allows them to like, okay, decide ‘oh, you do this, you do this’” (P2, App Support Developer, LOW).</i></p>
		Strategy awareness	Understanding of business strategy requirements and expectations in the right context in order to develop actionable project goals that are relevant and aligned with specified business strategy	<p><i>“I don’t want a team that is, that is lopsided where decision-making right, both strategic and operational leans to the executive guy. That’s a dysfunctional team right. I need a team that is fluid. I prefer a team that is fluid and has a good level of autonomy right. For that to happen they [MMs] need to understand the strategy right and why that strategy is important right. Both..., that will be the strategy for the whole year, the strategy for the quarter, and then for the month. They need to understand the strategy for the month right. And then I also have weekly strategy reviews right [with the MMs]; its informal. It’s not like we sit down and have a formal meeting. We just talk about the strategy and I’m like I’m reminding them [MMs]... So, I always have that conversation. And why I do that is so that they [MMs] have the right context, they have the right understanding of what needs to be done so that they can go into you know those operational planning sessions and actually come up with you know actionable goals, relevant goals right, goals that are aligned” (P9, CEO of TECHCOY division, senior management).</i></p> <p><i>“Why we choose to use iterative development, not because the project itself required it, or let me just say it doesn’t technically require it. But</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<p><i>when you are bringing in a new product into a market, especially a kind of market like the financial technology market, you are, and you have this mind-blowing idea and the banks are all interested in it, you have a little period to retain that interest especially when you know we have other established switch; we have [competitor name] practically trying to introduce their own..., so you have a short timeframe to actually deliver and impress at the same time. So, the best thing is to be able to just keep working and let them say, 'okay, this is fine here'. Iterative development is like the fastest approach you can use. So, it's not as if maybe technically that there is a direct need for it but project wise, it's like the best option we have at the moment"</i></p> <p>(P6, Head of Technology and Scrum Master, MM).</p>

Appendix P: HOLDCOY - Personal Competencies in Personal Competence Category

Table P1: Personal competencies of middle managers in agile project governance from HOLDCOY

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
Personal Competence	Results-Oriented	Adaptable	Personality that is flexible and open to change, and can adapt to changes so as to achieve project goals	<p><i>“from my own side if I see the way we went through our work for the week isn’t fine, I’ll look for another way the following week to ensure we achieve our goals” (P1, Head of Operations, MM).</i></p> <p><i>“let me give you an example, like today I’m sending in two people into the banks... now I mean, two roles missing which we also need their functions... Because we don’t have people that can replace them when they are away at the moment... So, for the day, I’m going to have to take up some tasks that they should have worked on and I have to share some of their tasks for others to do... Especially in an agile environment. You must make sure that if any member of the team leaves today you can replace them. That making sure is not that you actually have to replace them, but you need to make sure that the loss of one member does not lead to a lapse in the team” (P6, Head of Technology and Scrum Master, MM).</i></p>
		Foresight	Personality that can think ahead and foresee what may happen in the future within a project (e.g., problems, risks) before it happens based on observed or perceived realities and occurrences	<p><i>“And you must always, you [MM] must try to have some kind of foresight onto..., you must see the problem before it even arises. You must be able to anticipate deadlocks in whatever implementation strategy you want to employ” (P6, Head of Technology and Scrum Master, MM).</i></p> <p><i>“so I know what a delay, what a delay can cause and how a delay can affect things. So, I always look at the bigger picture... because when you, when you look at the bigger picture you know that a delay can cause a very long, a very long issue at the end of the day” (P1, Head of Operations, MM).</i></p>
		Focused and consistent	Resolute and focused on achieving project goals and expected deliverables without losing sight of them (i.e., a goal-getter), and consistent in performing project governance practices to achieve project goals (e.g., consistency in carrying out agile practices like daily Scrum, collaboration, sending regular project updates to stakeholders)	<p><i>“If everybody is deviating [during project meeting discussions], I probably allow you to deviate for like one minute, maybe you’re trying to point out something on that deviation, but what happens is I always come back and I chip back in and say guys, don’t let us deviate from this, this is what we want to achieve. They will come back, we discuss, we achieve that task, move on to the next... So, basically I do that very well in my facilitation for the..., for the weekly scrum, for the daily scrum and for the retrospective” (P1, Head of Operations, MM).</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<p><i>“They [MMs] have to be consistent... They [MM] have to be consistent right. If you say you do Scrum every day, make sure you have it every day. If you send or agree as part of..., as part of governance, you will send weekly status..., project updates, send it weekly right. Consistency very key. You have to be consistent” (P9, CEO of TECHCOY division, senior management).</i></p>
		Concise in communication	Personality that can compress large quantity of information and express it clearly and briefly in a simple form for rapid information transmission during project delivery to help achieve project goals	<p><i>“You [MM] have to be concise in your communication; you have to be concise. When you are interacting with those guys [senior management on client side] they don’t have hours... You typically would have ten minutes, fifteen minutes max to get what you need” (P9, CEO of TECHCOY division, senior management).</i></p>
		Willingness to learn and stay up-to-date	Personality that is willing to learn for continuous self-development that benefits agile project delivery, acquisitive for knowledge, cognisant and informed on current project happenings and other relevant developments (e.g., current technology tools), and keen to stay up-to-date.	<p><i>“They [MMs] should also be willing to learn because I think most times there’s that assumption that the person in the middle management role has all the knowledge. There should be that willingness to actually learn more, acquire more knowledge” (P7, Head of Business Development, MM).</i></p> <p><i>“ And at the same time you [MM] must also make sure that you keep up to date with the technology. It’s very important. You need to keep up to date with the technology. You need to understand the use of each of these technologies, you need to understand the pros and cons of all these technologies. So that’s also very important” (P6, Head of Technology and Scrum Master, MM).</i></p>
		Autonomous and decisive	Personality to make decisions on project matters and act by one's own reasoning, volition and sense of judgment regarding project matters (e.g., resolving project issues)	<p><i>“So, if, during the course of the week, the Project Manager [Project Manager and Business Analyst] doesn’t still have any luck at getting these things resolved they escalate to me, and when they escalate to me I go in there to have like a senior conversation with senior personnel [senior management on client side] and ensure that this thing happens” (P1, Head of Operations, MM).</i></p> <p><i>“no technical decision gets made as far as [TECHCOY division name] is concerned without my approval... If the decision will be regarding how something works or tools needs to be used, what needs to be deployed, what needs to be brought onboard and it is directly within [TECHCOY division name], I can actually make those decisions without direct authorisation from the CEO [CEO of TECHCOY Division, senior management]” (P6, Head of Technology and Scrum Master, MM).</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
		Confident and courageous	Confident and courageous personality with the self-assurance, willingness, and optimism to engage project stakeholders, handle project matters, and deal with project challenges when they arise	<i>“so because you [MM] have to be confident. You have to because you’re going to be talking to people a lot right. Remember I said you have to have weekly you know conversations, both informal and formal... So, you need to be confident right, not just confidence that comes from..., not confidence that comes..., that is rooted in ignorance no. Get educated. That’s why I said you need to understand the domain right..., understand the people are trying to service, their business. That helps you build confidence because you know what you are talking about. It’s not a fake it till you make it. You need to actually you know try to understand what that..., what they are doing right and that builds your confidence when you are engage them. But like I say you have to be confident; you have to engage right. Don’t be afraid speak to the CIO, speak to the CFO, speak to you know you just be confident” (P9, CEO of TECHCOY division, senior management).</i>
		Proactive	Personality that allows a middle manager to prepare and take action in advance to control and influence how a situation will occur instead of reacting to the situation after it has occurred.	<i>“Because like I told you I facilitate every Monday meeting. So, for me to come in on Monday, I must be like two steps ahead of the thinking of all team members. So, that when we’re having that discussion on Monday, I know the places that we are supposed to address, which were failures from last week. Feed it into properly addressing the team for the week and also ensuring that if we did not properly plan last week or maybe from our client last week where are the places that we feel that were not properly planned? These are the things I factor in. So, what I do most times in my weekends is..., I actually use that weekend to like get two steps ahead of the team members... So, I’m always like a step or two steps ahead of them [team members] in that thinking process. To ensure that whatever problems that were there last week are resolved and taken care of the following week” (P1, Head of Operations, MM).</i> <i>“You [MM] also should be a problem solver, someone who is proactive” (P7, Head of Business Development, MM).</i>
		Disciplined with time and resources	Personality that is: (a) disciplined and strict with time with regard to meetings and adherence to project timelines, and (b) economical and not wasteful; able to maximise project resources (e.g., human resources)	<i>“Ability to maximise available resources. You [MM] must learn how to do that. Like, for example, when I told you when our tester left impromptu, the way we had to manage to ensure that we are still delivering quality. So, ability to maximise our available resource, yeah, that is very key... If everybody is deviating [during project meeting discussions], I probably allow you to deviate for like one minute, maybe you’re trying to point out something on that deviation, but what happens is I always come back and</i>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<i>I chip back in and say guys, don't let us deviate from this, this is what we want to achieve. They will come back, we discuss, we achieve that task, move on to the next. Then I'm always time conscious. Based on what you have done so far and what is left, I always look at my time, I know, do I still have time to, or do we need to fast-track on some things and so on? So, basically I do that very well in my facilitation for the..., for the weekly scrum, for the daily scrum and for the retrospective” (P1, Head of Operations, MM).</i>
		Resourceful	Personality that can identify feasible problem-solving approaches and alternatives to resolve and overcome project issues in order to accomplish set project goals	<i>“when there are issues in terms of maybe when the Project Manager [Project Manager and Business Analyst] is trying to get some requirements from stakeholders, either the stakeholder is spending a lot of time or not or there are delays, once the Project Manager escalates to me I don't just go to the person which is the like the staff that is supposed to provide the requirements at the bank. I also go to speak with top-level person at the bank, whether maybe it's the ED [Executive Director] or a senior manager at the bank, explain to this person that see what is causing delay in the delivery of this project. Once you explain that, you can tell..., either you tell the person ‘Can you schedule a meeting where all stakeholders will be involved in meeting or is this something that we can just call one or two people that are working primarily on the project at the bank?’” (P1, Head of Operations, MM).</i>
		Analytical and innovative	Personality to analyse a situation and engage in out-of-the-box thinking to support project delivery (e.g., devising workarounds and solutions to problems)	<i>“You [MM] also should be a problem solver, someone who is proactive, and ready to think outside of the box” (P7, Head of Business Development, MM).</i>
	People-Oriented	Communicative	Willingness to teach and transfer knowledge to other team members and project stakeholders in order to prevent knowledge gap, knowledge hoarding, and key-person risk in the agile project environment	<i>“You need to make sure that you teach as a manager. You need to make sure you teach; you educate your team. So, I will cite a case scenario. There was a former COO, the former COO also serving as the CTO then before I came here... He supervised the development of the project to a great extent but on his leave, it was like the team was just stuck for months; they were unable to do anything. Why? Because he was [inaudible] knowledge. You [former COO/CTO] did this research and everything, yeah you came up with a lot of concepts. But he did not educate his team and when he left, the team became useless. The company became worried, investors became worried” (P6, Head of Technology and Scrum Master, MM).</i>

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				<p>“They [MMs] should also be willing to learn because I think most times there’s that assumption that the person in the middle management role has all the knowledge. There should be that willingness to actually learn more, acquire more knowledge, and also pass that along..., pass that down so that there is elimination of key-man risk, and associated risk” (P7, Head of Business Development, MM).</p>
		Integrity and openness	<p>Personality that is honest, straightforward, truthful, and direct without mincing words, open and transparent when dealing with team members in order to maintain trust in the agile project environment</p>	<p>“You [MM] must have unquestionable integrity. When you say yes, your [team] member has to know that it is a yes, and when you say no, your [team] member has to know that it’s a no. The moment your [team] member..., your team begins to find out that’s lacking in you, they begin to lose trust in you, and the moment they begin to lose trust in you, the project begins..., it’s everything..., whatever happens between the manager and the team affects the project as a whole. And at the same time you need to be open, very important. You need to be open” (P6, Head of Technology and Scrum Master, MM).</p>
		Tactful and diplomatic	<p>Personality that can handle sensitive people, navigate sensitive matters, situations, and conversations, and negotiate with persuasion and dialogue in order to reach an agreement</p>	<p>“what I try to do most times is I try to explain to the senior management whenever we’re having this our monthly meeting or quarterly performance meeting that these things [project governance rules and procedures]..., they are things that okay, we need to properly address... for instance now, we were supposed to go live on this our [project name] project as at January. But I made them [senior management] understand that this issue, that issue, this thing, this thing, all these things [project governance rules and procedures] needs to be done. We need to do proper scanning of our applications. We need to do proper automated testing of our applications and so on... they [senior management] also understood and they’re okay, ‘yes, go, we’ll give you some months’ grace to achieve this thing’” (P1, Head of Operations, MM).</p> <p>“You [MM] need to persuasion right because you can’t toe..., you can’t like toe the hard line with top management that you need to execute stuff with. You can’t toe the hard line. So, one other thing is persuasion and dialogue right, dialogue and kind of diplomacy, ensuring that senior management or director-level management actually pull their weight around execution of some projects” (P8, Operational Excellence Manager, MM).</p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
		Calm and emotionally intelligent	Personality that is calm under pressure, understands and appreciates what other people are experiencing or feeling (i.e., their emotions), shows concern towards their well-being, engages and interacts with them appropriately with empathy and self-control during emotionally sensitive situations (e.g., conflict situations).	<p><i>“one quality that an agile leader must have is emotional intelligence because there are a lot of things that can be happening to developers maybe it may not even be a work-related issue, it might be personal issue... So, once you notice things like that as an agile leader what I do is I come to, I speak with the person, where is the problem coming from? Is it part of the work ethics, is it part of the, is it an hygiene thing in the company, or is it something that you’re not happy with in the company, is it an external, is it a family related issue? So that we just, so that that way we ensure that everybody’s head mentally is in the game and everybody knows what they want to achieve, so, that’s another thing I ensure that I do with my team. I ensure that everybody is always fine at every time. So, there will be no reason for why the work is being delayed or why the work is being slowed down... and now emotional intelligence, it doesn’t necessarily have to do with maybe if someone is not achieving his or her task, it also depends on how you communicate with your team members... your team members can maybe say some things or frustrate you to the extent that you want to shout back at them or you want to..., no, you can’t afford to do that, because you need to be able to read this person’s mindset. From the way the person is speaking, you need to be able to pick up and know which particular part of emotion is the person coming out from; and based on that emotion you know how to reply and address the person. So, emotional intelligence also is key. If you have that emotional intelligence you..., I’ll always know the kind of emotion that this person’s having at that moment and how to address that emotion in the way that when you are speaking back to the person, the person probably realises that oh, I wasn’t going the right way, or the person realizes that oh okay, I should have done this better. So, that’s key about a middle-class manager as well” (P1, Head of Operations, MM).</i></p> <p><i>“they [MMs] shouldn’t be people that easily get angry or pissed with stuff because it’s normal, but then, for the general project goals to be achieved, these traits are..., I mean there should be a way of containing..., of managing people, like managing their anger, how they talk back at people and all that. It’s very important” (P3, Product enhancement developer, LOW).</i></p> <p><i>“I think one important thing is a good manager must have self-control, very, very important. They must have self-control” (P6, Head of Technology and Scrum Master, MM).</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
		Effective in communication	Personality that can listen and interact well with project stakeholders, receive complex information, break it down into its basic components and interpret it, report and present it effectively to project stakeholders in a way that is clear and understandable to them	<p><i>“they [MMs] have to be able to take something that..., a body of knowledge right or an idea that ordinarily they seem..., is seen as complex right and break it down to the first principles and communicate it to their team, and be able to also communicate it to stakeholders. What I find in communication is that right people tend to complicate things right ordinarily when they are trying to communicate. They are not sure how all the pieces you know, where all the pieces meet, or they know bits and pieces of it. So, they throw bits and pieces at you. It’s key that you [MM] are able to you know take all those ideas and comments and suggestions and sort of bring them together right to form a picture, and then communicate that picture back to them [other stakeholders]. So they [other stakeholders] even have a..., so, what happens is..., so they even have a better understanding of what they are even trying to tell you... Then communication right, being able to listen, take that, articulate, and communicate it back. Everybody..., every middle manager needs that because the middle managers are in charge of execution right, they..., they [MMs] have to understand that” (P9, CEO of TECHCOY division, senior management).</i></p> <p><i>“You have guys reporting to you as a middle manager. You need to be able to apportion or break down this task to the understanding of those guys that report to you... Even if it means trying to explain what this task, because the lower level guys might not really understand how all these tasks play out” (P8, Operational Excellence Manager, MM).</i></p>
		Management style flexibility	Personality that knows when to apply or combine different management styles when working with various project stakeholders across organisational levels (e.g., other middle managers, subordinates) in order to achieve results during project delivery	<p><i>“as a middle manager you need to know where, when to..., you know the different management styles right you have a..., you need to know when to pick each of the styles right. You can decide to be authoritarian; you can decide to be what’s it called? You can decide to be a manager that is more accommodating like emotional manager trying to understand the emotions of..., of your..., of the person you are relating with. But you just need to understand, you need to know when to use each of those, a combination of any of those. You need to be like hard...toe a hard line. When you need to toe a hard line, toe a hard line. When you don’t need to toe a hard outline, when you need to use a combination of both right. You make use of it to achieve your result, because as a middle manager, you have no choice. You just have to combine it... But for a middle manager, you’re probably going to be relating with guys at the same level, right, guys lower to you, or guys at the bottom of the food chain. So, you just need to..., you need</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<i>to find a way to mix..., mix it up to ensure that strategy is implemented” (P8, Operational Excellence Manager, MM).</i>
		Willingness to lead and follow	Personality that is willing to take up the responsibility to inspire, guide, and influence others to do and achieve what is expected of them, at the same time willing to follow the leadership of others	<i>“So for personality traits they [MMs] should be... willing to follow and at the same time, willing to lead when necessary, following when it’s necessary” (P7, Head of Business Development, MM).</i>
		Team spirit	Approachable, self-sacrificing, and democratic personality that can collaborate and relate well with different people and provide (or receive) necessary support as a team player for effective teamwork and achievement of shared goals	<i>“from my own point of view, is..., [a MM] should be someone that is easily..., that you can easily reach. Someone they can easily reach. Someone that can easily speak to... Someone that can sacrifice for their team members” (P4, Group CIO, senior management). “you [MM] should be a team player, recognising that other people may or may not be at the level where you are as an individual, and trying to leverage their own strength to complement someone else’s weakness” (P7, Head of Business Development, MM).</i>
		Broad-minded and open-minded	Personality that accepts feedback, tolerates different viewpoints and opinions of other team members (i.e., broad-minded), and open to new ideas and knowledge (i.e., open-minded)	<i>“I also do make sure that everybody contributes into any decision. I will not say because I am the CTO [Acting Chief Technical Officer] I just decide for everybody. I make sure that everybody contributes into that decision, everybody has the right to express their own view whether for or against my decisions” (P6, Head of Technology and Scrum Master, MM). “it helps me, so it makes me, like I will be able to contribute to what needs to be done and how it needs to be done, how long it will take and all of that. So in most cases, they [MMs] also listen to the feedbacks they get from us on, ‘okay let’s not do it that way, let’s do it this way because of this, this and this’” (P2, App Support Developer, LOW).</i>
		Shared project ownership mindset	Personality that recognises that for an agile project to succeed, each team member needs to own the project and own their respective assigned project tasks so as to promote self-organisation, accountability, and team autonomy	<i>“the only way an agile project can succeed is if your team members actually own this project and own each task... Now, if, as a boss, you are just directing, directing, directing, what will happen in that scenario is these people are just working to achieve your task, they are not owning the task as theirs... But, if you are a servant-leader you are ensuring that your team is self-organising; you are ensuring that your team members are owning their task” (P1, Head of Operations, MM).</i>

Appendix Q: HOLDCOY - Output Competencies in Output Competence Category

Table Q1: Output competencies of middle managers in agile project governance from HOLDCOY

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
Output Competence	Socio-Relational	Building rapport and maintaining productive working relationships	Demonstrate the ability to build rapport and maintain productive interpersonal working relationships with other project stakeholders (e.g., senior managers, teammates, and external project stakeholders) during project implementation	<p><i>“so the thing is once you go in and you speak with the top-level managers at the bank they will be able to put pressure under their staff to provide whatever is needed for software. So, that’s where I actually step in. I just go in there, meet with the..., maybe like the senior manager who I’m supposed to..., on that project, and once you speak with the person, once the..., either they call another meeting to discuss... In those kind of scenarios, what I always..., when I meet with such person I’ll say we need to have another meeting... That means strategic..., so that’s more like having a strategic relationship with the top people at these banks. Not necessarily like the very top guys maybe GMDs [group managing directors], no. I don’t have access to those people but at least the senior managers which I know if I need someone to push or ‘put fire’ on the staff: maybe the normal regular staff at the bank, at least those people can actually do that. I hold that strategic relationship. I have it with all the stakeholders we are working with” (P1, Head of Operations, MM).</i></p> <p><i>“so that’s where I step in actually. So up until where we’ve got approval and sign-off and stuff like that, I hand over that relationship to the Operations guys who are managing core developers, who interface with those guys. Now where that bottleneck arises, I use my relationship and leverage my relationship with these guys [project stakeholders] to get, or expedite those processes most times, expedite those processes” (P7, Head of Business Development, MM).</i></p>
		Communicating effectively and keeping stakeholders informed	Demonstrate ability to: (a) listen and interact well with project stakeholders, receive complex information, break it down into its basic components and interpret it, report and present it effectively to project stakeholders in a way that is clear and understandable, and (b) keep stakeholders informed about project happenings, progress, updates, and carry everyone along (e.g., communicating project tasks, status, and technical details)	<p><i>“so, basically, at the management level we decide what tasks needs to be done, of course, carrying along every member of the team... So, in everything we do here in this organisation, I always make sure that no matter what, I try to maintain as good communication with the team as possible. I also make sure that I have a listening ear to everything coming up. I have a listening ear. I think it’s not just for agile development I think it’s generally for management, you need to have a good listening ear if you want to be a good manager” (P6, Head of Technology and Scrum Master, MM).</i></p> <p><i>“they’ve promised the bank [customer], ‘Oh, this is going to be done in this time, you are going to go live this time’. So they [MMs] have their</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<p>ultimate goals of what we're supposed to achieve, so they also help come and break it down, make us understand it, and why we must meet those deadlines" (P2, App Support Developer, LOW).</p> <p>"in terms of project governance we ensure that we do more of collaboration with our stakeholders. We give them, most times we give them [project stakeholders] weekly, there is some we give them weekly updates of every..., of status of each project. It's not that we go really far ahead before we tell them oh, come and see the progress of what has been done so far, because majority of what we're doing is incremental delivery" (P1, Head of Operations, MM).</p>
		Expressing emotional intelligence and persuasiveness in challenging project situations	Demonstrating emotional intelligence (i.e., expressive empathy, calmness, temperament control) towards team members during challenging project situations to encourage and motivate them, and at the same time being persuasive without applying excessive pressure on team members so as to ensure assigned project tasks and set goals are accomplished in such situations	<p>"one of the ways they [MMs] can demonstrate their competences is by showing..., letting the people they are managing, the software engineers, tech guys, project managers, letting them understand that they know what they are going through. That's one of the ways they will show their competences, understanding them and making them know that, well, we understand that the timeline is short and you just need to get this done. Yeah, it still goes around their communications skills and being persuasive" (P2, App Support Developer, LOW).</p> <p>"one quality that an agile leader must have is emotional intelligence because there are a lot of things that can be happening to developers maybe it may not even be a work-related issue, it might be personal issue... So, once you notice things like that as an agile leader what I do is I come to, I speak with the person, where is the problem coming from? Is it part of the work ethics, is it part of the, is it an hygiene thing in the company, or is it something that you're not happy with in the company, is it an external, is it a family related issue? So that we just, so that that way we ensure that everybody's head mentally is in the game and everybody knows what they want to achieve, so, that's another thing I ensure that I do with my team. I ensure that everybody is always fine at every time. So, there will be no reason for why the work is being delayed or why the work is being slowed down... and now emotional intelligence, it doesn't necessarily have to do with maybe if someone is not achieving his or her task, it also depends on how you communicate with your team members... your team members can maybe say some things or frustrate you to the extent that you want to shout back at them or you want to..., no, you can't afford to do that, because you need to be able to read this person's mindset. From the way the person is speaking, you need to be able to pick</p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<i>up and know which particular part of emotion is the person coming out from; and based on that emotion you know how to reply and address the person. So, emotional intelligence also is key. If you have that emotional intelligence you..., I'll always know the kind of emotion that this person's having at that moment and how to address that emotion in the way that when you are speaking back to the person, the person probably realises that oh, I wasn't going the right way, or the person realizes that oh okay, I should have done this better. So, that's key about a middle-class manager as well" (P1, Head of Operations, MM).</i>
	Business	Demonstrating domain knowledge and expertise	Demonstrate knowledge and understanding of different aspects of an agile project to ensure successful project delivery (e.g., project and product knowledge, project documentation, customer needs and industry knowledge, agile software development, project management, IT networking, knowledge of the organisation(s) and stakeholders in the project, organisation policies and regulations, use of project software tools)	<p><i>"whether it's the weekly Scrum, whether it's the daily Scrum or whether it's the retrospective that is at the end of each iteration, that's when you have the retrospective, I'm the one that always facilitates this communication... So, if you don't do scanning that which is done on TeamCity, like I mentioned, there's a penalty to that as well. So, all of these processes fall..., so apart from just reporting on, giving updates on projects, my SDLC compliance is being checked, my scanning compliance is being checked. We have also, then, in terms of the regression testing, automated regression test, ensuring all automation cases and everything are built... So, in terms of the networking aspect of this [project], I am the one that handled this personally because of my level of experience because I am like..., I have a certification in networking... How can they [MMs] demonstrate their competences? Well, I think the way a middle-class manager can demonstrate his competency is, first off, domain knowledge. If you don't have that domain knowledge there's nothing for anybody to learn from you... if you don't even have knowledge about what you want to discuss, there is no way you can proffer solution, there's no way you can tackle any problem that comes your way" (P1, Head of Operations, MM).</i></p> <p><i>"so in determining who does what, they [MMs] tend to..., so over time working with the tech guys, they [MMs] tend to have understood that, 'oh when we need to do something like this, this guy always gets it done faster than this other person'. So, they tend to know how to delegate those tasks to them [team members]. Yeah, they have an understanding of who gets it done faster and better, so it allows them to like, okay, decide 'oh, you do this, you do this'" (P2, App Support Developer, LOW).</i></p> <p><i>"It should be in the way they..., in their [MMs] understanding of the project and then in their..., in the way they make use softwares that are</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<p><i>used in the entire agile process... The understanding of the project, the different components of the projects, it's very important in doing anything as the middle manager has to understand the project... Okay there are documents, SRS [Software/Systems Requirement Specification] documents that are written like the processes for each of the features on the project, each of the steps are detailed in the SRS document. A good understanding of the SRS, even if they don't understand how codes are written and all that they should understand how each of the processes work, each part of the project... if there is a new software that is introduced to the team, they [MMs] are the ones that make sure that each of the team members understand how the software works... when I joined the team... the Jira app I talked about, yeah he [Head of Operations] was the one that put us through the app... put us through on how it's being used, what each of the functionalities are and what they mean" (P3, Product Enhancement Developer, LOW).</i></p> <p><i>"I do a lot of market research and market study, trying to understand what our competitors are doing, where the gaps are, and how we can improve and kind of create a more superior offering to what our competitors are doing... like I said, for certain banks like [Nigerian bank A], trying to do..., So, I know that [Nigerian bank A] environment is constantly up because of the..., it's a tier one bank. Rather than going to a [Nigerian bank B] to do a transaction to [Nigerian bank A], I will use [Nigerian bank A] and try to do multiple transactions from [Nigerian bank A]. So instead of using the [Nigerian bank B] system, I will just get a [Nigerian bank B] card and use it on a [Nigerian bank A] system to verify that [Nigerian bank B] works. Rather than going to [Nigerian bank B] and trying to use a [Nigerian bank B] card. So, I know those systems are similar... for instance before any project starts, we have to have a first level high level interaction with these stakeholders, the key stakeholders. So, before we even get to that point, my first job is to understand the entity, the bank and what their need is. So, I usually do that by going through their financial statement under their executive summary. I kind of have a firm understanding of where the bank is headed for that financial year. Then the next course of action will be to look at who are these key stakeholders? So, for [TECHCOY division] now, [TECHCOY division] falls under payment and so, I'm looking at a bank like [Nigerian bank C] who is heading payment electronic channels, who are the key guys? Then</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<p><i>leveraging on existing relationship, because I've worked in a bank before in financial services industry. So, who do I know I'll be able to have an interaction..., a first level meeting with or even organize an introductory meeting so that we start from there. And when that hurdle is passed, the next step will be to involve the larger stakeholders who this project affects; internal control, financial control, system audit, IT, E-business, and all those stakeholders within the bank" (P7, Head of Business Development, MM).</i></p> <p><i>"Like I said you [MM] need to have a working knowledge of anybody you're working with" (P8, Operational Excellence Manager, MM).</i></p>
		Learning and keeping up-to-date with knowledge and information	Demonstrate ability to learn and acquire knowledge that benefits agile project delivery, and keep up-to-date with relevant knowledge, developments, and information	<p><i>"I've gone through a lot of learning academies which has given me some insight about how to manage agile, how to manage projects in an agile environment... Then also what I do is I do self-development. So, like areas where I know I need to improve on, maybe at the end of the week, on the weekend I might just look back at the week and just say, okay, I think there's some areas I need to improve on personally. So, that's self-development. So I do self-development as well... I do, then I also learn..., I also do a lot of like leadership, leadership training... courses, which assist me in terms of leadership as well, and how to, and how to ensure that yeah..., just self-learning" (P1, Head of Operations, MM).</i></p> <p><i>"But to be able to effectively work as a manager you need to make sure that in everything you do, you always have to make sure you have, like I said, make sure you have updated knowledge in anything. So, when even, when your team member begins to mention things you don't hear before, you should..., that lapse in knowledge should not go beyond that period. You must always make sure you cover for everything that you don't know. Where something new comes; a new problem arises, a new situation arises in any agile team, the manager [MM] is the first person everybody looks up to come up with a solution... the middle managers are the ones because if, for example, now if any issue comes up the CEO is looking at me to fix it, and my team members are looking at me to fix it; everybody looks at the middle manager. So, you [MM] always have to make sure you stay ahead of everybody in terms of information and knowledge. So, that's the easiest way to demonstrate your competence" (P6, Head of Technology and Scrum Master, MM).</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
	Delivery	Successfully completing agile project and its associated activities and tasks with an effective team	Demonstrate ability to: (a) focus and complete a given agile project, build an effective team, and deliver expected good-quality project results, and (b) carry out project activities and deliver on tasks that MMgmt is required to ensure are completed	<p><i>“The only way they [MMs] can demonstrate is by carrying out the project. That’s the only way because these are their operational activities that they do on a day-to-day basis. So the only way they can demonstrate is while working with their team or external parties in the delivery of a specific project. Because there are different activities involved. There are stakeholder review..., stakeholder sessions that hold, during..., before the project commencement and during the project commencement. There are regular project meetings that happens. There are negotiation meetings with vendors as it relates to the delivery of the projects. There are cost review sessions with management, research R&D during the project that requires some brainstorming sessions or problem-solving tasks to be done. So while they are doing that, all those traits that we mentioned earlier will be adopted to be able to carry out effective delivery” (P4, Group CIO, senior management).</i></p> <p><i>“Demonstrate competence..., so I think..., first, the most obvious way from a holistic perspective would be the quality of the team and the quality of work, because if you are an agile, if you are following that and you’re an agile middle level manager and you’re adhering to those principles, then the first evidence of that would be in your team and the quality of work that they deliver and the way work is done” (P7, Head of Business Development, MM).</i></p>
		Planning, coordinating, and facilitating team interactions and efforts for self-organisation	Demonstrate ability to plan, coordinate, and facilitate team interactions and efforts in the agile project team (project delivery efforts, decision-making, prioritising, etc.) so as to nurture and promote a collaborative, self-organised, autonomous, and empowering agile project environment	<p><i>“At least for my role, planning and coordination, you really need that, that’s very key, you [MM] need to know how to plan and coordinate properly... Initially, when we are having weekly Scrum, the guys..., the team members they don’t contribute. Everybody just keeps quiet, and it’s just myself and the Head of Technology that end up looking at all the stories and start breaking the stories into tasks and so on. But, every time, but subsequently, what I did was that I would engage them; I will say, ‘so, how do we achieve this?’ First off, the person will say I don’t know. I’ll now be like ‘but what if we do it this way, what if we do it that way?’ The person will be like yeah, but, the person now..., after the person says ‘but we should but..., what if this thing doesn’t work’. So, that way, I started engaging them and they started giving me a response. Then gradually, gradually what now happens is at every Sprint which we do weekly now once we see a story we already know you are supposed to work under the task under this story, then automatically what happens is the team members are even the ones that engage and say ‘oh...,’ because [name]</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<p><i>is the name of the Head of Technology, my name is [name], they'll now say is 'oh [name], what about this thing? Can we do it this way or should we do it that way or which way do you think is the best way to do it?' So, right now, what we have found out is that they are the ones actually engaging in these conversations. So, basically, what I even do now is I just bring up the stories. We prioritise the backlog, but when breaking the tasks, they are the ones that do more of the talking than me these days... I facilitate every agile meeting, and why I am facilitating it so that we can get the desired outcome. So that the guys don't just enter a meeting deviate because you know there are sometimes when you are brainstorming, you can actually brainstorm in the wrong direction. So, you need somebody that always bring everybody back in check, ensure that the time, so it's not like the budget say want to do something for two hours. Well, because there's no coordination, you guys spend three hours, at the end of three hours, you be like what have we achieved, just arguments. So, I facilitate this conversation ensuring that the expected outcome is achieved for this conversation" (P1, Head of Operations, MM).</i></p> <p>Observation from Sprint Planning Meeting: <i>"Head of Operations coordinates the meeting. Head of Operations interacts with the team members to update their Jira software tasks. Head of Operations runs through the Jira tasks, checking status of current sprint (i.e., determining the tasks that have been completed and those tasks that are still pending)".</i></p>
		Managing and resolving project challenges	Demonstrate ability to manage project escalations and challenges by taking action to find precise solutions to the challenges either independently without escalating to higher level of authority (where possible), or in collaboration with other stakeholders	<p><i>"if I'm having any challenge with a tool or document, I raise it up with the necessary person, especially if it's something that is affecting my work with my developers or something that is slowing our work or something that is not allowing our work to..., I instantly raise it up and, even though it doesn't become a company-wide process at least it would be a modified process for us at the [TECHCOY] division. So, when I encounter such issues, I speak with the person in charge to ensure..., and that's the Operational and Excellence team; OpEx, they are the ones that actually create these documentations, these procedures and guidelines for the company. So, if I see a procedural guideline doesn't fall into what my team needs, or it doesn't tally with how our team is supposed to operate then I raise it with them then we can do a modification based on our own situation... So, if, during the course of the week, the Project Manager [P5, Project Manager and Business Analyst, LOW] doesn't still have any luck</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<i>at getting these things [issues] resolved they escalate to me, and when they escalate to me I go in there to have like a senior conversation with senior personnel [senior management on client side] and ensure that this thing happens” (P1, Head of Operations, MM).</i>
		Maximising resources	Demonstrate ability to maximise available resources (e.g., human resources) and adapt so as to nurture and promote cross-functionality in the agile team, minimise resource wastage, and meet project timelines	<p><i>“we want to make sure the team is working at their highest capacity and we are maximising the resource we have to the fullest. We still have a lot of missing roles, a lot of roles yet to be occupied... sometimes you need to carry on the roles of people that are missing. So, the target of all these things is to maximise the resource we have... let me give you an example, like today I’m sending in two people into the banks... now I mean, two roles missing which we also need their functions... Because we don’t have people that can replace them when they are away at the moment... So, for the day, I’m going to have to take up some tasks that they should have worked on and I have to share some of their tasks for others to do” (P6, Head of Technology and Scrum Master, MM).</i></p> <p><i>“Ability to maximise available resources. You [MM] must learn how to do that. Like, for example, when I told you when our tester left impromptu, the way we had to manage to ensure that we are still delivering quality. So, ability to maximise our available resource, yeah, that is very key; very key” (P1, Head of Operations, MM).</i></p>
		Leading and owning project implementation	Demonstrate ability to: (a) lead in an agile project environment (e.g., providing agile leadership and technical leadership) and delegate, (b) own project implementation and perform project duties with confidence (e.g., stakeholder engagements, issue resolutions, process improvements), and (c) operate with a shared project ownership mindset to promote team autonomy and accountability	<p><i>“They [MMs] should take ownership. They should lead really right, its..., they should lead really they should lead. So, I’ll give an example. They don’t have to wait on the senior management person to set up a meeting with the external stakeholder right, the stakeholder on the customer side. They should go ahead and setup that meeting. They should go ahead and reach out. They should just..., Really, one clear sign of competence right is being able to hold your own right, be able to lead, engagement... And hold your own during the engagement. I don’t see..., yeah I don’t see any other..., I don’t see a much more effective way you know, a much more clear way of showing that. I think that’s really the best way you can show competence” (P9, CEO of TECHCOY division, senior management).</i></p> <p><i>“so in determining who does what, they [MMs] tend to..., so over time working with the tech guys, they [MMs] tend to have understood that, ‘oh when we need to do something like this, this guy always gets it done faster than this other person’. So, they tend to know how to delegate those tasks to them [team members]. Yeah, they have an understanding of who gets it</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<p><i>done faster and better, so it allows them to like, okay, decide ‘oh, you do this, you do this’” (P2, App Support Developer, LOW).</i></p> <p><i>“the only way an agile project can succeed is if your team members actually own this project and own each task... one quality that an agile leader must have is emotional intelligence because there are a lot of things that can be happening to developers maybe it may not even be a work related issue, it might be personal issue which is making the developer have some down time or not being able to perform properly. So, once you notice things like that, as an agile leader what I do is I come to, I speak with the person, where is the problem coming from?... so the thing is most of these tools, when, because of the role I’m in, if I’m having any challenge with a tool or document I raise it up with the necessary person, especially if it’s something that is affecting my work with my developers or something that is slowing our work or something that is not allowing our work to..., I instantly raise it up... So, my Scrum master, which is Head of Technology, he’s always there, always present and always giving that support ensuring that whatever..., whatever facilitation or whatever meeting we’re having, even though his team members are discussing, he [Head of Technology and Scrum Master] is always there to chip in; to assist them [developers] because in terms of knowledge, he’s always assisting them” (P1, Head of Operations, MM).</i></p>
		Implementing agile project delivery approach	Demonstrate ability to implement and follow agile project delivery approach	<p><i>“so for in terms of project monitoring, you [MM] can also demonstrate that project monitoring in terms of daily Scrum or weekly periodic Scrum, having stakeholder reviews, especially with project..., where you have project implementation with both your internal and external stakeholders, that too is evident... The whole essence of adhering to agile is to have a realistic project plan okay, and so you don’t..., you don’t..., you’re not always..., yes, there’s a tendency to always adjust and readjust and reforecast because of certain dependencies that may not come from you totally, but then again, because of..., I think that’s where experience may now come in... Yes. In terms of communication of timelines to your external stakeholders and when review of those project milestones and timelines start, I think a very good way of demonstrating agile” (P7, Head of Business Development, MM).</i></p> <p><i>“we’re working in an agile methodology. We drop solutions per..., we drop releases per iteration. So, we always prioritise with the stakeholders, whether it’s the MoSCoW model; the must have, should have, so that by</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<i>that we will know in terms of priority releases, which one should come first, which one should come next... I facilitate every..., whether it's the weekly Scrum, whether it's the daily Scrum or whether it's the retrospective that is at the end of each iteration, that's when you have the retrospective, I'm the one that always facilitates this communication" (P1, Head of Operations, MM).</i>
		Meeting deadlines	Demonstrate ability to ensure completion of project tasks in line with agreed timelines and deliver expected results by agreed deadlines	<i>"So, basically, for me, the thing is, I work with a timeline, both from external stakeholders and also from the management which we have here; I work with a strict timeline. So, my own job is to ensure we get results at the shortest time possible. Now, to achieve that, I have to always think of different ways, I have to always think of different ways to either ensure we achieve faster timelines to these goals" (P1, Head of Operations, MM).</i>
		Teaching and coaching others	Demonstrate the ability to teach and transfer knowledge to other team members in order to prevent knowledge gap and key-person risk in the agile project environment	<i>"In my team I do make sure that we have a knowledge exchange hour... we just call it knowledge exchange hour but in reality it do last sometimes about five/six hours... so I've only had to take charge of it once just to show them how it is done but I do make sure, everybody, you've worked for one week, Monday to Thursday, today is Friday, explain to others what you've been doing. Let them understand so that if next week you could not make it to office, someone else can pick up your task and continue working on it. So, we do share those knowledge. Have you learnt anything new? Any new technology? Okay like personally I have a couple of programming languages I'm working on so, I do share that with them too, to let them have a better understanding of the programming terminologies" (P6, Head of Technology and Scrum Master, MM). "if there is a new software that is introduced to the team, they [MMs] are the ones that make sure that each of the team members understand how the software works... when I joined the team... the Jira app I talked about, yeah he [Head of Operations] was the one that put us through the app... put us through on how it's being used, what each of the functionalities are and what they mean" (P3, Product enhancement developer, LOW).</i>

Appendix R: BANKCOY - Input Competencies in Input Competence Category

Table R1: Input competencies of middle managers in agile project governance from BANKCOY

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
Input Competence	Delivery	Teaching and coaching skill	Ability to educate other team members and facilitate their learning, transmit knowledge that will enable and empower teammates so that they know what to do or how to act in particular situations during project delivery	<i>“Okay what I mean by technical alignment is that we are having two technical teams, the external party [external vendor team] had their own technical specification; we had our own. So, I was able to be the one in the meeting to make sure that both teams..., to explain every detail of the technical design to their own so that they can understand our technical specification. And it was my responsibility to interpret their own technical requirements and understand it 100%, and to be able to relate that to every stakeholder internally” (P13, DevOps Lead, MM).</i>
		Adaptability skill	Ability to change and adapt to changes so as to achieve project goals	<i>“So, when we hit brick wall..., specific example was when we are supposed to provide a separate database server in that project, and it was valued at about ninety million and the bank is not ready to take that huge cost at that time. So, we had to improvise. So, the manager in charge that [inaudible] and said, ‘Okay, we have a database server that we can also use” (P12, E-channels Manager, MM). “You [MM] will have the ability to adapt to changes – adaptability, that’s very important. There are times when we are on a particular task in a project and of course you don’t always rely on your own knowledge you understand. At times, we go back to the drawing board to say, ‘Okay, this is what I think we should do’ and then someone else from the team decides or gives an opinion on having to do it the other way round and in the end we still achieve the same result. But of course, if you are not open to change, open to opinion, you are not flexible, it becomes difficult because people just hold back information and you are not able to progress because you only rely on what you think you know” (P17, Senior E-channels Officer, LOW). “And usually in agile project you therefore allow also to change requirement or to increase requirement and stuff like that. That’s what the product owner [E-channels Manager, MM] is also there for-they say, ‘okay we have done this one fast, so let’s do this’, ‘Ah no, this one has changed because now let’s adjust this design and blah blah’. That’s..., he can make..., he [E-channels Manager, MM] can take the decisions quickly based on the mandate also given to him. For some decisions he has to come back to the Change advisory board, but sometimes there are</i>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<i>certain things that he can actually adjust at this level because it's not really like critical" (P21, Chief Information Officer, senior management).</i>
		Coordination skill	Ability to interface with different project stakeholders and coordinate and facilitate different aspects of project work and engagements in an organised and harmonious manner to accomplish the project	<i>"I'm the coordinator when it comes to sprints and agile and also our monthly iteration. So, I coordinate between DevOps, the QA, the user or the requester, then also align all this coordination with my line manager, which is the CIO... Then, the middle manager must have the ability to coordinate and work within a team" (P11, Project and Change Coordinator, MM).</i>
		Decision-making skill	Ability to make decisions and engage in collaborative decision-making on project matters	<i>"For instance, we hit a brick wall at a certain period of time and the provider they [the external vendor team] could not support certain technology that we are using. Then, they are proposing that we use another technology. Then Security [the Information Security sub-unit] is saying this technology is having certain issue-it's giving us XYZ, which is why we cannot use that technology. And the software team [DevOps sub-unit] is saying, 'Okay we can also find a way around it. We can use that technology you are proposing. This is our only..., this is the only way we can align with the provider, but we can add one other thing to make it safer'. And that was discussed. Eventually, we took it [the proposed solution] to the CIO, and CIO approved and that was what was implemented" (P12, E-channels Manager, MM). "to conform to the technology being used by the provider [external vendor team], I had to decide on what we had to use internally. So, I did research to pick the best tools for us to use, and also to learn about the technology that we were integrating with, which was outside the scope of what we were doing but for that project we had to do that" (P13, DevOps Lead, MM).</i>
		Leadership and people management skill	Ability to lead and manage different people, carry team members along during project delivery, delegate tasks as needed, motivate team members, and exercise emotional intelligence	<i>"a middle manager should have skill of motivating or influencing other staffs. Most times it is very important to have that skill because sometimes projects might tend to go the other way around, but when you have the right manager who can motivate and you find out that the staff were able to pass that level because they have a manager who is understanding, who can motivate people and it goes a long way in ensuring that project is well delivered" (P15, Enterprise Solution and Service Desk Lead, LOW).</i>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<p>“He [MM] must be able to manage people, because you are going to be dealing with different people in different teams” (P13, DevOps Lead, MM).</p> <p>“of course leadership on the part of our own team: so, being able to carry guys along, being able to delegate tasks as required majorly” (P14, IT Operations Manager, MM).</p>
		Prioritisation skill	Ability to prioritise by collaborating with other project stakeholders to determine tasks and activities that need to be performed in a prioritised order based on importance	<p>“They [MMs] will now come and say, ‘Hey guys, this is what we propose. We’re going to structure it [BANKCOY ASD project] like this, and then it will be like this. After one month we receive this, six weeks later we see this, [inaudible] like this’, okay. Maybe we wanted six services and then they [MMs] come back and say, ‘No. After analysis actually the two services; key services this one will deliver this one first and then this one comes next’. This is the ‘how’ part basically, that’s their responsibility to structure that to inform us [senior management]” (P21, CIO, senior management).</p>
		Issue resolution skill	Ability to identify and apply feasible problem-solving approaches and alternatives to resolve project issues amicably so as to achieve project goals	<p>“He [MM] must be able to resolve conflict amicably” (P11, Project and Change Coordinator, MM).</p> <p>“And then where they [desired result] cannot be achieved, you [MM] must come to the table with proposed solution; not come back with the problem. So, those are the ways we believe you [MM] can demonstrate that okay you are worth the onions of being in that position [MMgmt]” (P12, E-channels Manager, MM).</p>
		Supervisory skill	Ability to oversee and follow up with team members and their assigned tasks so as to stay up to date with work they perform and ensure work completion	<p>“they [MMs] are the first point of contact for each unit whereby they lead... So, they [MMs] ensure the resource reporting to them actually delivered on what is expected” (P11, Project and Change Coordinator, MM).</p>
		Time management skill	Ability to effectively manage allocated time for project work and activities, and adhere to timelines	<p>“They [MMs] also need to be very versatile with time management... So, their [MMs] competences will come to play when a certain work has been apportioned by the project manager and the timeline has been given, and you want to work to deliver within that timeline. So, the skill that come into play will be your technical skill, your time management” (P12, E-channels Manager, MM).</p>
		Escalation skill	Ability to escalate and share encountered project issues with other stakeholders on time so that	<p>“then you [MM] also need to appreciate escalation: you don’t bottle issues. When there are issues you escalate on time so that we can seek help on how to solve them, because I think agile method is more in tune</p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
			escalated issues can be dealt with promptly in order to achieve project deliverables accordingly	<i>with timebound; you have to ensure..., because those phases are actually timebound and you need to ensure those deliverables are done within the set timeline” (P12, E-channels Manager, MM).</i>
	Socio-Relational	Emotional intelligence skill	Ability to understand what other team members are experiencing or feeling (i.e., their emotions), showing concern towards their well-being, and engaging and interacting with them appropriately with empathy and self-control during emotionally sensitive situations (e.g., conflict situations)	<p><i>“So, most times the state of your mind also helps when you are facing difficulties in delivering a particular project. It’s always good okay you take the walk away from the project to relax your mind then comeback. That time is not time where you need to be putting pressure on as a middle manager if you are a middle manager. Now, you have an expert who is working on that project and these things are happening, they are not able to go through on the project. I think for a middle manager, it’s the time to call..., to calm down the personnel working on that project and allow him to take a break, you understand, and revisit..., later revisit the project. But in a situation whereby you have somebody who is mounting, instead of encouraging, he’s mounting pressure on you that, ‘You have to deliver this’. From my experience it doesn’t work out that way you understand. So, it..., as a middle manager, you should be able to understand..., to be able to manage the personal, understand the situation of things and be able to give that encouraging in terms of motivation that will allow the person to move forward” (P15, Enterprise Solution and Service Desk Lead, LOW).</i></p> <p><i>“Must be calm because there will always be conflicts, because he [MM] is the person everybody is seeing leading the project. He [MM] must be calm. He must be calm and [inaudible]. He must actually be calm” (P11, Project and Change Coordinator, MM).</i></p> <p><i>“you [MMs] need to exercise empathy... You need to be able to empathise with people. It is not every time your guys will always get it. But if you are able to put yourself in their shoes you’ll better manage them rather than coming hard. You will agree with me that middle managers will still be hit whenever things go wrong, and when it goes right you tend to also receive the handshake. But most times when it goes wrong you receive the heat, but because you receive the heat you should be able to manage it in such a way that you don’t transfer the heat to the team otherwise you will have problems with that” (P17, Senior E-channels Officer, LOW).</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
		Interpersonal communication skill	Ability to listen and interact well with project stakeholders, communicate information by reporting and presenting it effectively to project stakeholders in a way that is clear and understandable	<p><i>“communication skill is very important as well, which I see, because sometimes we may have..., we could have some salient points but the way we communicate it to the other guys, I mean the other stakeholders, if it’s not well communicated there could be a kind of a gap... I would say that he [MM] should be a good listener” (P16, Information Security and Assurance Lead, MM).</i></p> <p><i>“you [MM] must have a basic reporting skill” (P12, E-channels Manager, MM).</i></p>
		Interpersonal relationship skill	Ability to relate, engage, and collaborate effectively with different stakeholders in a project (e.g., senior managers, team members), thereby maintaining healthy interpersonal working relationships with others so as to produce expected results	<p><i>“And also having what some people don’t really look out for is having interpersonal relationship with your colleagues; it’s very important when handling projects. You [MM] need to be able to know how to relate with your colleagues and..., either senior or junior colleagues” (P18, Head of Service Delivery, MM).</i></p> <p><i>“I would look at in terms of relationship management right because we have different stakeholders and there should be a kind of good collaboration right which is more..., if relationship is not normal, not matter how technical know-how the whole thing..., I mean we are, and there’s no a kind of collaboration, we may not be able to get..., and even get it [succeed] in an agile way” (P16, Information Security and Assurance Lead, MM).</i></p>
		Tact and diplomacy skill	Ability to handle sensitive people, navigate sensitive matters, situations, and conversations, and negotiate with persuasion and dialogue in order to reach an agreement	<p><i>“For example, when we first needed to establish connectivity, there was first the issue of how do we establish with them – are we doing via a direct VPN link? Are we doing it over the internet? How will the link go? Which provider? And so on and so forth. So, we need to do a bit of back and forth first; its more like a negotiation, “Okay, what do you want? How do you want it?”, and then we find a middle ground” (P14, IT Operations Manager, MM).</i></p> <p><i>“For instance, we had established our network integration with [the external vendor], and the following day, we resumed at work and discovered that we can no longer reach them. Then, there is this push around between the DevOps and the network team [part of the IT Operations sub-unit]. The network team saying their network delivery is okay; we should check the application. The DevOps is saying, no, the application is fine; we should check the network. So, what I agree as the project coordinator will be we test the two; let’s ensure we are not having issues anywhere. So, let’s start with network, which is the most</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<i>important... So, application [the DevOps sub-unit] later discovered that it wasn't what they developed but the application..., the app it [the bank's application] is talking to from their [the external vendor] own end had issues. So eventually we were able to isolate it. It took about two or three days. We were able to isolate it. Eventually, we moved our seats to [the external vendor]—we had to seat down with their DevOps [the external vendor] and all of that. Within few hours we were able to resolve it” (P12, E-channels Manager, MM).</i>
		Understanding of tacit relationship structures and social dynamics	Understanding of the tacit (unspoken) relationship structures and social dynamics in the project environment (e.g., within the customer organisation) in order to facilitate project communications and issue escalations and resolutions	<i>“And other challenge that we can say we had during the [BANKCOY project name] were having the cooperation of the [the external vendor] because they are external they are not..., they are not part of our organisation here so and you know the Nigerian factor: you really need to relate with them at least in a personal level before they can help you get one or two information or help you execute one or two scripts that you need to be done from their own end... but by having one of them as a what we call paddy [meaning friend in Nigerian lingo]... Because if not, if we say we should go through the official route with them we won't accomplish a task on time” (P18, Head of Service Delivery, MM).</i>
	Business	Domain knowledge and expertise	Knowledge and understanding of different aspects of an agile project to ensure successful project delivery (e.g., agile software development, project management, information security, knowledge of organisation(s) and stakeholders involved in the project, project documentation, organisation/industry processes and policies and regulations, use of project software tools that are utilised in the industry)	<i>“I'm the coordinator when it comes to sprints and agile and also our monthly iteration” (P11, Project and Change Coordinator, MM). “I'm the Lead, Information Security and Assurance. I work within the IT department right, majorly is just to ensure you know in terms of information security and governance in the bank, in terms of implementation of information security standards alright, and also working with the IT operations to ensure that..., so we have different controls in place right, and to ensure the controls are actually in place right, being IT standards that we have [inaudible] like for instance I am the ISO [Information Security Officer]” (P16, Information Security and Assurance Lead, MM). “I'm familiar with the team and I know who does what. And where I'm not sure then I go to the team..., the middle manager in charge to find out who should do what” (P12, E-channels Manager, MM). “I actually met with their own technical team [external vendor team] to even sort some things out. So, I was like the point contact person technically, seeing to the design of technical documentation design, architectural design. The development activity I was 90% involved,</i>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<p><i>integration and then deployment, actively involved too... An example is the regulations that says KYC: Know Your Customer level 1, 2, 3 and then if you're on a particular KYC, you must be able to do electronic transfer more than so so amount. So, either during the project or not, you must be able to ensure that such is even tested and vetted that a customer with a particular KYC should not be able to do a transaction more than this level. Another that I can give is more of like with respect to the process, there are policies. That's why I talk about they [MMs] must be versatile with the policy. There are policy regarding monitoring and control. CBN [Central Bank of Nigeria] says an account of so so category that receives an amount from this, must not be credited, must be reported. So, he [MM] must demonstrate your versatility by ensuring that during the project such cases are tested and then you don't violate because there could be a regulation penalty based on the transaction that happens through the channel and it's not appropriately reported. There are regulations around..., more regulation in the project regarding settlement. E.g., you do a transfer, you were debited but it did not get to the destination. There are timeline through..., by which the reversal must take place otherwise you will be penalised. So, as the middle line manager, you must ensure that such cases are taken care of in the project, that if a transaction occurred it was not completed, the reversal whatever has to be done; it must be done within the time limits”</i></p> <p>(P13, DevOps Lead, MM).</p> <p><i>“Middle managers have to be the vast knowledge of..., what number one they..., he has to be vast in knowledge of your organisation, number one... Yes. And number two, you [MM] also have to be vast in knowledge with..., I'm talking in an IT perspective now..., in knowledge of applications that are or programs that are being used in the industry”</i></p> <p>(P18, Head of Service Delivery, MM).</p> <p><i>“So, in terms those skills, I think before getting to that middle manager, you need to have those principles: philosophy of project management basically, that's why, cost benefit analysis, you do a change, you create values, okay, in a business case, and you can technically apply it on any micro..., micro task, basically. It's just a process of thinking. It has nothing to see with the administrative part. Now when you now become middle manager, you just deal with more bigger tasks basically. It's no</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<i>longer a task of one day, but it could be a task of months or weeks or years sometimes” (P21, CIO, senior management).</i>
		Team competence knowledge	Knowledge of the capabilities, competences, and skill sets of team members	<i>“So, middle managers have the fair knowledge of the ability and capability of each of the resource reporting to them. So, as far as the requirements and the deliverables of project is concerned, they know the specific resource to assign the roles based on the capability and ability of the resource under their unit” (P11, Project and Change Coordinator, MM).</i>

Appendix S: BANKCOY - Personal Competencies in Personal Competence Category

Table S1: Personal competencies of middle managers in agile project governance from BANKCOY

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
Personal Competence	Results-Oriented	Adaptable	Personality that is flexible and open to change, and can adapt to changes so as to achieve project goals	<p><i>“for example, the technology used was somehow, I don’t want to use old version, but an earlier technology that even myself and some members of the team had to learn. So, also with respect to that, to implement..., to conform to the technology being used by the provider [external vendor team], I had to decide on what we had to use internally. So, I did research to pick the best tools for us to use, and also to learn about the technology that we were integrating with, which was outside the scope of what we were doing but for that project we had to do that” (P13, DevOps Lead, MM).</i></p> <p><i>“And usually in agile project you therefore allow also to change requirement or to increase requirement and stuff like that. That’s what the product owner [E-channels Manager, MM] is also there for-they say, ‘okay we have done this one fast, so let’s do this’, ‘Ah no, this one has changed because now let’s adjust this design and blah blah’. That’s..., he can make..., he [E-channels Manager, MM] can take the decisions quickly based on the mandate also given to him. For some decisions he has to come back to the Change advisory board, but sometimes there are certain things that he can actually adjust at this level because it’s not really like critical” (P21, Chief Information Officer, senior management).</i></p>
		Focused and consistent	Resolute and focused on achieving project goals and expected deliverables without losing sight of them (i.e., a goal-getter)	<p><i>“Being able to collaborate and being able to see the project goal that’s the most important [competence], despite the individual goal of each of the stakeholders as they relate to the project... That’s the major..., the utmost goal is that of the project goal—the deliverable of the project... Because that’s actually key because nothing stops and ends in each unit. So, you [MM] must be able to collaborate with other team units, not losing site of the project goal” (P11, Project and Change Coordinator, MM).</i></p> <p><i>“he [MM] should be a goal-getter because you’ll meet a lot of people, and they might want to draw you down [inaudible] but then you know what you’re doing. I mean you need to be like be a goal-getter” (P16, Information Security and Assurance Lead, MM).</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
		Willingness to learn and stay up-to-date	Personality that is willing to learn for continuous self-development that benefits agile project delivery, acquisitive for knowledge, cognisant and informed on relevant developments (e.g., current technology tools), and keen to stay up-to-date	<p><i>“for example, the technology used was somehow, I don’t want to use old version, but an earlier technology that even myself and some members of the team had to learn. So, also with respect to that, to implement..., to conform to the technology being used by the provider [external vendor team], I had to decide on what we had to use internally. So, I did research to pick the best tools for us to use, and also to learn about the technology that we were integrating with, which was outside the scope of what we were doing but for that project we had to do that” (P13, DevOps Lead, MM).</i></p> <p><i>“we introduced a new one called Postman... For testing APIs, yeah. It’s a free application that we got online so there wasn’t need to purchase any..., but there was need for knowledge of the application, so I had to start doing a crash course on how to use Postman... The way it works is when we go for standup meetings, we try to look at how we can..., how we can test application; automate testing, and how we can test using a faster method instead of doing it manually. So, when we go for such meetings, we table...; ‘These are the softwares that we browsed or checked online, and this is what we are going to use’. So, in the standup meeting we already know as a team that we’ll be using this software. So, the next thing is let’s do a research on how to use it” (P18, Head of Service Delivery, MM).</i></p>
		Autonomous and decisive	Personality to make decisions on project matters and act by one's own reasoning, volition and sense of judgment regarding project matters (e.g., resolving project issues)	<p><i>“to conform to the technology being used by the provider [external vendor team], I had to decide on what we had to use internally. So, I did research to pick the best tools for us to use, and also to learn about the technology that we were integrating with, which was outside the scope of what we were doing but for that project we had to do that” (P13, DevOps Lead, MM).</i></p>
		Confident and courageous	Confident and courageous personality with the self-assurance, willingness, and optimism to engage project stakeholders, handle project matters, and deal with project challenges when they arise	<p><i>“And some vendors, because they are more of a...will I say regulatory body but close to that, they are about the central switch, so they tend to say, “This is how we want it done.” They tend to put down their foot down and say this is how they want it. But somehow, we too need to push back because our own environment is different. So, there will be those challenges... We had a bit of emails back and forth flying initially, then at some point in time we had to do verbal communication like we had to sit down and talk I think via Skype. I think there was also a site visit at some point we had to go down to their office” (P14, IT Operations Manager, MM).</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
		Disciplined with time and resources	Personality that is: (a) disciplined and strict with time with regard to meetings and adherence to project timelines, and (b) economical and not wasteful; able to maximise project resources (e.g., human and material resources)	<i>“Yeah, when I say time and resources, discipline with time when there are meetings that needs to be held both internally and externally. He [MM] must be somebody that adheres to the timeline of the project. Then in terms of resources, he must not be wasteful in resources, that is resources allocated must be properly managed. In terms of human resources and others like..., you know every project involves financial budgets and all things like that” (P13, DevOps Lead, MM).</i>
		Resourceful	Personality that can identify feasible problem-solving approaches and alternatives to resolve and overcome project issues in order to accomplish set project goals	<i>“So, when we hit brick wall..., specific example was when we are supposed to provide a separate database server in that project, and it was valued at about ninety million and the bank is not ready to take that huge cost at that time. So, we had to improvise. So, the manager [MM] in charge that [inaudible] and said, ‘Okay, we have a database server that we can also use’... For instance, we had established our network integration with [the external vendor], and the following day, we resumed at work and discovered that we can no longer reach them. Then, there is this push around between the DevOps and the network team [part of the IT Operations sub-unit]. The network team saying their network delivery is okay; we should check the application. The DevOps is saying, no, the application is fine; we should check the network. So, what I agree as the project coordinator will be we test the two; let’s ensure we are not having issues anywhere. So, let’s start with network, which is the most important... So, application [the DevOps sub-unit] later discovered that it wasn’t what they developed but the application..., the app it [the bank’s application] is talking to from their [the external vendor] own end had issues. So eventually we were able to isolate it. It took about two or three days. We were able to isolate it. Eventually, we moved our seats to [the external vendor]—we had to seat down with their DevOps [the external vendor] and all of that. Within few hours we were able to resolve it” (P12, E-channels Manager, MM).</i>
		Analytical and innovative	Personality to analyse a situation and engage in out-of-the-box thinking to support project delivery (e.g., devising workarounds and solutions to problems)	<i>“being analytical because some of these things will require..., especially because of the way our local environment is, some of these solutions require a bit of workaround or some outside-of-the-box thinking too” (P14, IT Operations Manager, MM).</i>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
	People-Oriented	Impartial	Impartial and neutral without taking sides during project conflicts so as to resolve conflicts amicably	<i>“He [MM] must be able to receive feedback and not take sides because there will always be conflict between each resource. So, he must be able to not take sides. He must be able to resolve conflict amicably” (P11, Project and Change Coordinator, MM).</i>
		Communicative	Willingness to teach and transfer knowledge to other team members and project stakeholders in order to prevent knowledge gap, knowledge hoarding, and key-person risk in the agile project environment	<i>“fortifying all stakeholders with details of the project is also a way of building the capability to ensure that everybody is abreast of detailed information of what the project is about, and so that you can have the holistic view and also know which area you come into play and how you will play your part. If you have the bigger picture then you can have understanding of what you need to deliver. So, in terms of that, each time we have our standup, I do..., I relate..., I take it from the start to say, ‘Okay, this is what we are expected to do. This is what we have done. This is what is pending’” (P12, E-channels Manager, MM).</i> <i>“Okay what I mean by technical alignment is that we are having two technical teams, the external party [external vendor team] had their own technical specification; we had our own. So, I was able to be the one in the meeting to make sure that both teams..., to explain every detail of the technical design to their own [team] so that they can understand our technical specification. And it was my responsibility to interpret their own technical requirements and understand it 100%, and to be able to relate that to every stakeholder internally... they [MMs] must be able to communicate what they know” (P13, DevOps Lead, MM).</i>
		Integrity and openness	Personality that is honest, straightforward, truthful, and direct without mincing words, open and transparent when dealing with team members in order to maintain trust in the agile project environment	<i>“He [MM] must be able to receive feedback and not take sides because there will always be conflict between each resource. So, he must be able to not take sides” (P11, Project and Change Coordinator, MM).</i> <i>“I mean one might to look at something from a purely technical or purely analytical or whatever direction. And then somebody that knows, or somebody that is not really thinking from that direction, maybe a non-technical person or maybe a non-IT person or whatever says, “Oh, why don’t you try it this way?”. So, I think open-mindedness. Openness in general. Somebody might throw an idea that this sounds farfetched but take a second look at it. It might work” (P14, IT Operations Manager, MM).</i>
		Tactful and diplomatic	Personality that can handle sensitive people, navigate sensitive matters, situations, and	<i>“For example, when we first needed to establish connectivity, there was first the issue of how do we establish with them [external vendor team] – are we doing via a direct VPN link? Are we doing it over the internet?”</i>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
			conversations, and negotiate with persuasion and dialogue in order to reach an agreement	<p><i>How will the link go? Which provider? And so on and so forth. So, we need to do a bit of back and forth first; its more like a negotiation, “Okay, what do you want? How do you want it?”, and then we find a middle ground” (P14, IT Operations Manager, MM).</i></p> <p><i>“For instance, we had established our network integration with [the external vendor], and the following day, we resumed at work and discovered that we can no longer reach them. Then, there is this push around between the DevOps and the network team [part of the IT Operations sub-unit]. The network team saying their network delivery is okay; we should check the application. The DevOps is saying, no, the application is fine; we should check the network. So, what I agree as the project coordinator will be we test the two; let’s ensure we are not having issues anywhere. So, let’s start with network, which is the most important... So, application [the DevOps sub-unit] later discovered that it wasn’t what they developed but the application..., the app it [the bank’s application] is talking to from their [the external vendor] own end had issues. So eventually we were able to isolate it. It took about two or three days. We were able to isolate it. Eventually, we moved our seats to [the external vendor]—we had to seat down with their DevOps [the external vendor] and all of that. Within few hours we were able to resolve it” (P12, E-channels Manager, MM).</i></p>
		Calm and emotionally intelligent	Personality that is calm under pressure, understands and appreciates what other people are experiencing or feeling (i.e., their emotions), shows concern towards their well-being, engages and interacts with them appropriately with empathy and self-control during emotionally sensitive situations (e.g., conflict situations)	<p><i>“Must be calm because there will always be conflicts, because he [MM] is the person everybody is seeing leading the project. He [MM] must be calm. He must be calm and [inaudible]. He must actually be calm” (P11, Project and Change Coordinator, MM).</i></p> <p><i>“So, most times the state of your mind also helps when you are facing difficulties in delivering a particular project. It’s always good okay you take the walk away from the project to relax your mind then comeback. That time is not time where you need to be putting pressure on as a middle manager if you are a middle manager. Now, you have an expert who is working on that project and these things are happening, they are not able to go through on the project. I think for a middle manager, it’s the time to call..., to calm down the personnel working on that project and allow him to take a break, you understand, and revisit..., later revisit the project. But in a situation whereby you have somebody who is mounting, instead of encouraging, he’s mounting pressure on you that, ‘You have to deliver this’. From my experience it doesn’t work out that way you understand.</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<i>So, it..., as a middle manager, you should be able to understand..., to be able to manage the personal, understand the situation of things and be able to give that encouraging in terms of motivation that will allow the person to move forward” (P15, Enterprise Solution and Service Desk Lead, LOW).</i>
		Effective in communication	Personality that can listen and interact well with project stakeholders, communicate information by reporting and presenting it effectively to project stakeholders in a way that is clear and understandable	<i>“communication skill is very important as well, which I see, because sometimes we may have..., we could have some salient points but the way we communicate it to the other guys, I mean the other stakeholders, if it’s not well communicated there could be a kind of a gap... I would say that he [MM] should be a good listener” (P16, Information Security and Assurance Lead, MM).</i> <i>“Communications skills also is key. Must be able to communicate with the end-user of the process or the approach to be taken in delivering request of business needs” (P11, Project and Change Coordinator, MM).</i> <i>“you [MM] must have a basic reporting skill” (P12, E-channels Manager, MM).</i>
		Liberality–rigidity balance	Personality that is not overly liberal and not overly rigid (strict) but can balance the two extremes when dealing with different project stakeholders in different project situations	<i>“I also want to say that maybe from the management perspective right you [MM] should not be too liberal, and you should not be too rigid right in terms of applying maybe the model of rigidity and liberality... it depends on I mean different people calls for different action right” (P16, Information Security and Assurance Lead, MM).</i>
		Team spirit	Approachable, self-sacrificing, and democratic personality that can collaborate and relate well with different people and provide (or receive) necessary support as a team player for effective teamwork and achievement of shared goals	<i>“the only area we could have tension will be in the area of timeline; timeline in like okay we need to have this at X period of time and from the look of things this will not be delivered at that time. Then, I as the coordinator will want to ensure..., want to prevail on the manager that, ‘We need to have this, you have to deliver it’. So, in a case where we have other resource they [MMs] can support to ensure that timeline is met, we just rally around to see, ‘Okay how can we be of help while you are doing your [inaudible], can somebody else be doing the server provisioning? So, what can you be supported with?’, and all of that. So..., so bringing in some team spirit into the game also help a lot to avoid friction” (P12, E-channels Manager, MM).</i>
		Broad-minded and open-minded	Personality that accepts feedback, tolerates different viewpoints and opinions of other team	<i>“He [MM] must be able to receive feedback” (P11, Project and Change Coordinator, MM).</i>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
			members (i.e., broad-minded), and open to new ideas and knowledge (i.e., open-minded)	<p><i>“I mean one might to look at something from a purely technical or purely analytical or whatever direction. And then somebody that knows, or somebody that is not really thinking from that direction, maybe a non-technical person or maybe a non-IT person or whatever says, “Oh, why don’t you try it this way?”. So, I think open-mindedness. Openness in general. Somebody might throw an idea that this sounds farfetched but take a second look at it. It might work” (P14, IT Operations Manager, MM).</i></p> <p><i>“There are times when we are on a particular task in a project and of course you [MM] don’t always rely on your own knowledge you understand. At times, we go back to the drawing board to say, ‘Okay, this is what I think we should do’ and then someone else from the team decides or gives an opinion on having to do it the other way round and in the end we still achieve the same result. But of course, if you [MM] are not open to change, open to opinion, you are not flexible, it becomes difficult because people just hold back information and you are not able to progress because you [MM] only rely on what you think you know. And in the end if you don’t juggle you knowledge with people’s opinions and knowledge, it becomes a problem” (P17, Senior E-channels Officer, LOW).</i></p>

Appendix T: BANKCOY - Output Competencies in Output Competence Category

Table T1: Output competencies of middle managers in agile project governance from BANKCOY

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
Output Competence	Socio-Relational	Building rapport and maintaining productive working relationships	Demonstrate the ability to build rapport and maintain productive interpersonal working relationships with other project stakeholders (e.g., teammates and external project stakeholders) during project implementation	<i>“And other challenge that we can say we had during the [BANKCOY project name] were having the cooperation of the [the external vendor] because they are external they are not..., they are not part of our organisation here so and you know the Nigerian factor: you really need to relate with them at least in a personal level before they can help you get one or two information or help you execute one or two scripts that you need to be done from their own end... but by having one of them as a what we call paddy [meaning friend in Nigerian lingo]... Because if not, if we say we should go through the official route with them we won't accomplish a task on time... No, I did not encounter that [issues and tensions with other MMs in BANKCOY], because yeah I have been in the organisation for a while now, so I think I've had rapport with all of them. So, it wasn't hard for me to get what I want” (P18, Head of Service Delivery, MM).</i>
		Communicating effectively and keeping stakeholders informed	Demonstrate ability to: (a) listen and interact well with project stakeholders, receive complex information, break it down into its basic components and interpret it, report and present it effectively to project stakeholders in a way that is clear and understandable, and (b) keep stakeholders informed about project happenings, progress, updates, and carry everyone along (e.g., communicating project challenges and technical details)	<i>“a listening manager [MM] is very good... as a middle manager in terms of this [BANKCOY project name], of course during the meeting I come back home to tell my guys in the office, ‘This is what happened. Of course, this is the new thing coming on board yeah and these are the things we discussed. These are risks that we identified’” (P16, Information Security and Assurance Lead, MM).</i> <i>“Okay what I mean by technical alignment is that we are having two technical teams, the external party [external vendor team] had their own technical specification; we had our own. So, I was able to be the one in the meeting to make sure that both teams..., to explain every detail of the technical design to their own so that they can understand our technical specification. And it was my responsibility to interpret their own technical requirements and understand it 100%, and to be able to relate that to every stakeholder internally” (P13, DevOps Lead, MM).</i> <i>“fortifying all stakeholders with details of the project is also a way of building the capability to ensure that everybody is abreast of detailed information of what the project is about, and so that you can have the holistic view and also know which area you come into play and how you will play your part. If you have the bigger picture then you can have understanding of what you need to deliver. So, in terms of that, each time</i>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<p><i>we have our standup, I do..., I relate..., I take it from the start to say, 'Okay, this is what we are expected to do. This is what we have done. This is what is pending' (P12, E-channels Manager, MM).</i></p> <p><i>"And in the event where you [MM] are having challenges, because challenges will come up, being able to communicate with all the stakeholders and parties. I think that's also a way to communicate that competency. Yes, you [MM] might not have all the solutions but being able to carry everybody along that's one of the things one needs to know how to do" (P14, IT Operations Manager, MM).</i></p>
		<p>Expressing emotional intelligence and persuasiveness in challenging project situations</p>	<p>Demonstrating emotional intelligence (i.e., expressive empathy, calmness, temperament control) towards team members during challenging project situations to encourage and motivate them, and at the same time being persuasive without applying excessive pressure on team members so as to ensure assigned project tasks and set goals are accomplished in such situations</p>	<p><i>"we had established our network integration with [the external vendor], and the following day, we resumed at work and discovered that we can no longer reach them. Then, there is this push around between the DevOps and the network team [part of the IT Operations sub-unit]. The network team saying their network delivery is okay; we should check the application. The DevOps is saying, no, the application is fine; we should check the network. So, what I agree as the project coordinator will be we test the two; let's ensure we are not having issues anywhere. So, let's start with network, which is the most important... So, we checked the application side too. So, application [the DevOps sub-unit] later discovered that it wasn't what they developed but the application..., the app it [the bank's application] is talking to from their [the external vendor] own end had issues. So eventually we were able to isolate it. It took about two or three days. We were able to isolate it. Eventually, we moved our seats to [the external vendor]-we had to seat down with their DevOps [the external vendor] and all of that. Within few hours we were able to resolve it" (P12, E-channels Manager, MM).</i></p> <p><i>"most times the state of your mind also helps when you are facing difficulties in delivering a particular project. It's always good okay you take the walk away from the project to relax your mind then comeback. That time is not time where you need to be putting pressure on as a middle manager if you are a middle manager. Now, you have an expert who is working on that project and these things are happening, they are not able to go through on the project. I think for a middle manager, it's the time to call..., to calm down the personnel working on that project and allow him to take a break, you understand, and revisit..., later revisit the project. But in a situation whereby you have somebody who is mounting, instead of encouraging, he's mounting pressure on you that, 'You have to deliver</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<i>this'. From my experience it doesn't work out that way you understand. So, it..., as a middle manager, you should be able to understand..., to be able to manage the personal, understand the situation of things and be able to give that encouraging in terms of motivation that will allow the person to move forward" (P15, Enterprise Solution and Service Desk Lead, LOW).</i>
	Business	Demonstrating domain knowledge and expertise	Demonstrate knowledge and understanding of different aspects of an agile project to ensure successful project delivery (e.g., agile software development, project management, information security, knowledge of organisation(s) and stakeholders involved in the project, project documentation, organisation/industry processes and policies and regulations, use of project software tools that are utilised in the industry)	<i>"I'm the coordinator when it comes to sprints and agile and also our monthly iteration. So, I coordinate between DevOps, the QA, the user or the requester, then also align all this coordination with my line manager, which is the CIO" (P11, Project and Change Coordinator, MM). "I'm the Lead, Information Security and Assurance. I work within the IT department right, majorly is just to ensure you know in terms of information security and governance in the bank, in terms of implementation of information security standards alright, and also working with the IT operations to ensure that..., so we have different controls in place right, and to ensure the controls are actually in place right, being IT standards that we have [inaudible] like for instance I am the ISO [Information Security Officer]... Then we also ensure that we do an assurance testing for our applications. For instance, when we are deploying our applications we have to be there as well as the Information Security Officer in the team, probably during projects to ensure that our you know application system being deployed is tested and we also give assurance to the management... information security [sub-unit] will just go and test and come; 'Oh, this is security flaw. We need to fix it alright'. Now, how do we now ensure all of us come to board, one, getting things done, and then by not compromising our policy alright? The only thing we have to do now is to, one, to communicate this in terms of risk..., from the risk perspective what we are seeing for them [other agile project team members] to understand. That is from the communication part. The second part of it now is that, in collaborating with them [other agile project team members] how can we now collaborate with them? We don't just pick issue and dump it, of course we can also use our expertise to say, okay we can recommend – to say this is how you can also achieve this thing... We just play advisory role in terms of security alright, and assurance to the management that one, this application has been tested and it is okay" (P16, Information Security and Assurance Lead, MM).</i>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<p><i>“I’m familiar with the team and I know who does what. And where I’m not sure then I go to the team..., the middle manager in charge to find out who should do what” (P12, E-channels Manager, MM).</i></p> <p><i>“I led the integration, yes. And then when it was needed for us to meet with the technical team of the provider [external vendor team], I was the interface between our team..., I actually met with their own technical team [external vendor team] to even sort some things out. So, I was like the point contact person technically, seeing to the design of technical documentation design, architectural design. The development activity I was 90% involved, integration and then deployment, actively involved too... An example is the regulations that says KYC: Know Your Customer level 1, 2, 3 and then if you’re on a particular KYC, you must be able to do electronic transfer more than so so amount. So, either during the project or not, you must be able to ensure that such is even tested and vetted that a customer with a particular KYC should not be able to do a transaction more than this level. Another that I can give is more of like with respect to the process, there are policies. That’s why I talk about they [MMs] must be versatile with the policy. There are policy regarding monitoring and control. CBN [Central Bank of Nigeria] says an account of so so category that receives an amount from this, must not be credited, must be reported. So, he [MM] must demonstrate your versatility by ensuring that during the project such cases are tested and then you don’t violate because there could be a regulation penalty based on the transaction that happens through the channel and it’s not appropriately reported. There are regulations around..., more regulation in the project regarding settlement. E.g., you do a transfer, you were debited but it did not get to the destination. There are timeline through..., by which the reversal must take place otherwise you will be penalised. So, as the middle line manager, you must ensure that such cases are taken care of in the project, that if a transaction occurred it was not completed, the reversal whatever has to be done; it must be done within the time limits” (P13, DevOps Lead, MM).</i></p> <p><i>“we introduced a new one called Postman... For testing APIs, yeah. It’s a free application that we got online so there wasn’t need to purchase any..., but there was need for knowledge of the application, so I had to start doing a crash course on how to use Postman... The way it works is when we go for standup meetings, we try to look at how we can..., how we can test</i></p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<p>application; automate testing, and how we can test using a faster method instead of doing it manually. So, when we go for such meetings, we table...; 'These are the softwares that we browsed or checked online, and this is what we are going to use'. So, in the standup meeting we already know as a team that we'll be using this software. So, the next thing is let's do a research on how to use it" (P18, Head of Service Delivery, MM).</p> <p>"They [MMs] will now come and say, 'Hey guys, this is what we propose. We're going to structure it [agile project] like this, and then it will be like this. After one month we receive this, six weeks later we see this, [inaudible] like this', okay. Maybe we wanted six services and then they [MMs] come back and say, 'No. After analysis actually the two services; key services this one will deliver this one first and then this one comes next'. This is the 'how' part basically, that's their responsibility to structure that to inform us [senior management]" (P21, CIO, senior management).</p>
		Learning and keeping up-to-date with knowledge and information	Demonstrate ability to learn and acquire knowledge that benefits agile project delivery, and keep up-to-date with relevant knowledge, developments, and information	<p>"for example, the technology used was somehow, I don't want to use old version, but an earlier technology that even myself and some members of the team had to learn. So, also with respect to that, to implement..., to conform to the technology being used by the provider [external vendor team], I had to decide on what we had to use internally. So, I did research to pick the best tools for us to use, and also to learn about the technology that we were integrating with, which was outside the scope of what we were doing but for that project we had to do that" (P13, DevOps Lead, MM).</p> <p>"we introduced a new one called Postman... For testing APIs, yeah. It's a free application that we got online so there wasn't need to purchase any..., but there was need for knowledge of the application, so I had to start doing a crash course on how to use Postman... The way it works is when we go for standup meetings, we try to look at how we can..., how we can test application; automate testing, and how we can test using a faster method instead of doing it manually. So, when we go for such meetings, we table...; 'These are the softwares that we browsed or checked online, and this is what we are going to use'. So, in the standup meeting we already know as a team that we'll be using this software. So, the next thing is let's do a research on how to use it" (P18, Head of Service Delivery, MM).</p>

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	Delivery	Successfully completing agile project and its associated activities and tasks with an effective team	Demonstrate ability to: (a) focus and complete a given agile project, and deliver expected good-quality project results, and (b) carry out project activities and deliver on tasks that MMgmt is required to ensure are completed	<p>“the way to demonstrate that, they [MMs] should have a success project, meaning that they should deliver whatever was defined basically” (P21, CIO, senior management).</p> <p>“I think one of the ways would be in actually bringing about the results that are needed. For example, there will be tasks delegated to our own end or there will be outcomes expected from our own end to transfer to the required stakeholder. So, you [MMs] agree that this needs to be done by so and so time, and then you’re able to deliver. So, delivery is key. It’s one of the ways that you [MMgmt] can easily demonstrate that we know what we are doing here” (P14, IT Operations Manager, MM).</p>
		Planning, coordinating, and facilitating team interactions and efforts for self-organisation	Demonstrate ability to plan, coordinate, and facilitate team interactions and efforts in the agile project team (project delivery efforts, decision-making, prioritising, etc.) so as to nurture and promote a collaborative, self-organised, autonomous, and empowering agile project environment	<p>“So, in terms of the governance, when we do the project management plan, so you do it in such a way that, okay, this project can be delivered in iteration such that..., okay so..., just like I mentioned that’s the beautiful part that I actually appreciate in that method [agile method]. So, we designed it to..., to have it delivered in piecemeal, ‘Okay in Phase 1 or let’s say Iteration 1, this is what we are going to be having... in Iteration 2, this is what we are going to be having, and maybe in the final phase this is what we are going to be having... For instance, we had established our network integration with [the external vendor], and the following day, we resumed at work and discovered that we can no longer reach them. Then, there is this push around between the DevOps and the network team [part of the IT Operations sub-unit]. The network team saying their network delivery is okay; we should check the application. The DevOps is saying, no, the application is fine; we should check the network. So, what I agree as the project coordinator will be we test the two; let’s ensure we are not having issues anywhere. So, let’s start with network, which is the most important... So, application [the DevOps sub-unit] later discovered that it wasn’t what they developed but the application..., the app it [the bank’s application] is talking to from their [the external vendor] own end had issues. So eventually we were able to isolate it. It took about two or three days. We were able to isolate it. Eventually, we moved our seats to [the external vendor]—we had to seat down with their DevOps [the external vendor] and all of that. Within few hours we were able to resolve it” (P12, E-channels Manager, MM).</p> <p>“they are middle managers, so they have the authority to take some certain decisions, like as..., take a certain decision. Let’s say for instance, when we are estimating on the timeline for each project or each deliverables,</p>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<p>they have the authority to say, ‘Oh, this timeline allocated is not..., we can’t realise it’, or ‘It’s not realisable. So, we need to adjust it’” (P11, Project and Change Coordinator, MM).</p> <p>“I led the integration, yes. And then when it was needed for us to meet with the technical team of the provider [external vendor team], I was the interface between our team..., I actually met with their own technical team [external vendor team] to even sort some things out. So, I was like the point contact person technically” (P13, DevOps Lead, MM).</p>
		Managing and resolving project challenges	Demonstrate ability to manage project escalations and challenges by taking action to find precise solutions to the challenges either independently without escalating to higher level of authority (where possible), or in collaboration with other stakeholders	<p>“So, how can you demonstrate? You can demonstrate by ensuring that okay, you respect the time given by you, the expected..., the desired result from your side is also achieved. And then where they [desired results] cannot be achieved, you [MM] must come to the table with proposed solution; not come back with the problem. So, those are the ways we believe you [MM] can demonstrate that okay you are worth the onions of being in that position [MMgmt]... For instance, we hit a brick wall at a certain period of time and the provider they [the external vendor team] could not support certain technology that we are using. Then, they are proposing that we use another technology. Then Security [the Information Security sub-unit] is saying this technology is having certain issue-it’s giving us XYZ, which is why we cannot use that technology. And the software team [DevOps sub-unit] is saying, ‘Okay we can also find a way around it. We can use that technology you are proposing. This is our only..., this is the only way we can align with the provider, but we can add one other thing to make it safer’. And that was discussed. Eventually, we took it [the proposed solution] to the CIO, and CIO approved and that was what was implemented” (P12, E-channels Manager, MM).</p> <p>“the only way you can demonstrate as the middle manager is to manage conflicts” (P11, Project and Change Coordinator, MM).</p>
		Maximising resources	Demonstrate ability to maximise available resources (e.g., human and material resources) and adapt so as to nurture and promote cross-functionality in the agile team, minimise resource wastage, and meet project timelines	<p>“So, when we hit brick wall..., specific example was when we are supposed to provide a separate database server in that project, and it was valued at about ninety million and the bank is not ready to take that huge cost at that time. So, we had to improvise. So, the manager in charge that [inaudible] and said, ‘Okay, we have a database server that we can also use’... That instead of having to acquire new license for a new database server, why not create an instance on this existing server that we have not used up space on, and that was what we did, and we were able to move</p>

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				<i>faster. We were able to cut costs... the only area we could have tension will be in the area of timeline; timeline in like okay we need to have this at X period of time and from the look of things this will not be delivered at that time. Then, I as the coordinator will want to ensure..., want to prevail on the manager that, 'We need to have this, you have to deliver it'. So, in a case where we have other resource they can support to ensure that timeline is met, we just rally around to see, 'Okay how can we be of help while you are doing your [inaudible], can somebody else be doing the server provisioning? So, what can you be supported with?', and all of that. So..., so bringing in some team spirit into the game also help a lot to avoid friction" (P12, E-channels Manager, MM).</i>
		Leading and owning project implementation	Demonstrate ability to: (a) lead in an agile project environment (e.g., providing technical leadership and inclusive leadership) and lead by example, as well as (b) own project implementation and perform project duties with confidence (e.g., stakeholder engagements, issue resolutions, process improvements)	<i>"I led the integration, yes. And then when it was needed for us to meet with the technical team of the provider [external vendor team], I was the interface between our team..., I actually met with their own technical team [external vendor team] to even sort some things out. So, I was like the point contact person technically, seeing to the design of technical documentation design, architectural design. The development activity I was 90% involved, integration and then deployment, actively involved too... I would say leadership is by example. So, they [MMs] must demonstrate their competence by ensuring that showing their own role..., they perform their own role without..., not just by delegating, just by doing their own bit" (P13, DevOps Lead, MM).</i> <i>"Demonstration of competence..., of competence here I think..., I see it in terms of leadership styles... Alright, and then it means that..., I will say application of..., or deployment of inclusive or collaborating style..., leadership style" (P16, Information Security and Assurance Lead, MM).</i> <i>"For our procedures, if we are executing a project and maybe we notice one or two things that needs to be done in our procedures, we meet with the senior management or [name of CIO] in this case" (P18, Head of Service Delivery, MM).</i>
		Implementing agile project delivery approach	Demonstrate ability to implement and follow agile project delivery approach	<i>"So, we followed the SDLC, but let me just run through the SDLC... A request comes. The request is reviewed, approved. Once they approved it, it comes into the technical team to review and build their Functional Specification document and more of like an architectural design, which goes for approval too before development starts and when development</i>

Competence Category	Competence Subcategory	Middle Manager Competency	Competency Description	Excerpt of Original Data (Representative Quote)
				<p><i>starts so it's done in iterations... So, from the point of the development it is usually broken into iterations. So, the iterations are agreed: iteration 1, this is the scope; iteration 2, the scope; iteration 3. For each of the iterations is being released for other team-the QA to proceed and all those stuff, then we proceed to next iteration and so. So, we have that internal process, which was followed. And then there's corresponding..., for each internal iteration, there's corresponding phase with the external provider" (P13, DevOps Lead, MM).</i></p> <p><i>"I'm the coordinator when it comes to sprints and agile and also our monthly iteration" (P11, Project and Change Coordinator, MM).</i></p>
		Meeting deadlines	Demonstrate ability to ensure completion of project tasks in line with agreed timelines and deliver expected results by agreed deadlines	<p><i>"So, how can you demonstrate? You can demonstrate by ensuring that okay, you respect the time given by you, the expected..., the desired result from your side is also achieved. And then where they cannot be achieved, you must come to the table with proposed solution; not come back with the problem. So, those are the ways we believe you [MM] can demonstrate that okay you are worth the onions of being in that position [MMgmt]" (P12, E-channels Manager, MM).</i></p> <p><i>"For example, there will be tasks delegated to our own end or there will be outcomes expected from our own end to transfer to the required stakeholder. So, you [MM] agree that this needs to be done by so and so time, and then you're able to deliver. So, delivery is key. It's one of the ways that you [MMs] can easily demonstrate that we know what we are doing here" (P14, IT Operations Manager, MM).</i></p>
		Teaching and coaching others	Demonstrate the ability to teach and transfer knowledge to other project stakeholders in order to prevent knowledge gap and key-person risk in the agile project environment	<p><i>"Okay what I mean by technical alignment is that we are having two technical teams, the external party [external vendor team] had their own technical specification; we had our own. So, I was able to be the one in the meeting to make sure that both teams..., to explain every detail of the technical design to their own [team] so that they can understand our technical specification. And it was my responsibility to interpret their own technical requirements and understand it 100%, and to be able to relate that to every stakeholder internally... they [MMs] must be able to communicate what they know" (P13, DevOps Lead, MM).</i></p>

Appendix U: Validation Study Ethics Application Approval



University of Central Lancashire
Preston PR1 2HE
01772 201201
uclan.ac.uk

19th April 2022

Peggy Gregory / Maduka Uwadi
School of Psychology and Computer Science
University of Central Lancashire

Dear Peggy

Re: Science Ethics Review Panel Application
Unique Reference Number: SCIENCE 0019 Stage 2

The Science Ethics Review Panel has granted approval of your proposal application 'Validation study for PhD research project: Project Governance in Agile Software Development Projects: An Activity-Oriented Analysis of Middle Management Roles, Competences, Challenges and Interventions'. Approval is granted up to the end of project date*.

It is your responsibility to ensure that

- the project is carried out in line with the information provided in the forms you have submitted
- you regularly re-consider the ethical issues that may be raised in generating and analysing your data
- any proposed amendments/changes to the project are raised with, and approved, by the Ethics Review Panel
- you notify EthicsInfo@uclan.ac.uk if the end date changes or the project does not start
- serious adverse events that occur from the project are reported to the Ethics Review Panel
- a closure report is submitted to complete the ethics governance procedures (Existing paperwork can be used for this purpose e.g. funder's end of grant report; abstract for student award or NRES final report. If none of these are available use e-Ethics Closure Report Pro forma).

Yours sincerely

Tony Lee Graham
Deputy Vice-Chair
Science Ethics Review Panel

* for research degree students this will be the final lapse date

NB - Ethical approval is contingent on any health and safety checklists having been completed, and necessary approvals gained.

Appendix V: Validation Study Participant Information Sheet



Participant Information Sheet

1. Title of Study

Project Governance in Agile Software Development Projects: An Activity-Oriented Analysis of Middle Management Roles, Competences, Challenges and Interventions

2. Version Number and Date

Version 1, 7th March 2022

3. Invitation Paragraph

You are being invited to participate in a research study. Before you decide whether to participate, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and feel free to ask us if you would like more information or if there is anything that you do not understand. We would like to stress that you do not have to accept this invitation and should only agree to take part if you want to. Thank you for reading this.

4. What is the purpose of the study?

The purpose of this study is to validate findings of a wider PhD study that is being undertaken.

As part of the PhD study, the researchers are seeking to identify:

1. the roles of middle managers in project governance activities that take place within agile software development projects,
2. competences that middle managers need to have in order to function effectively when working with agile software teams in agile software development projects, and
3. challenges and issues that impact middle managers, and their corresponding remedies that maybe useful in practice

To date, two case studies have been conducted: one in a Nigerian fintech company and the other in a Nigerian microfinance bank. Each company has used agile methods to govern and implement software development projects for several years. Each case study involved investigating the project governance activity in an agile software development project within each company. From these case studies, the following discoveries were made:

1. There were multiple roles that middle managers performed in the process of governing and implementing the respective agile software development projects that were investigated. The identified roles of middle managers in agile project governance have been developed into a model.
2. There are multiple competences that middle managers are required to have in order to function effectively when working with agile software teams in agile software development projects. The identified competences of middle managers have also been developed into a model.

The PhD study is now seeking individuals to participate in a study to validate the identified middle management roles and competences. The aim of this validation study is to obtain critical feedback and ascertain the usefulness of the two developed models and their descriptions, as well as extent to which the findings of the case studies agree with the experiences of agile practitioners and agile software teams in other companies.

5. Why have I been invited to take part?

You have been approached because you have been identified as an agile practitioner, or a stakeholder or project team member for agile software projects that are being undertaken by your organisation. We refer to an agile practitioner as a person with experience (a) using agile methods for software development and project delivery, (b) managing or working with agile software development teams, or (c) making decisions that promotes the use of agile methods in an organisation.

6. Do I have to take part?

Participation is entirely voluntary. If you are happy to take part, we will ask you to sign the attached Interview consent form and give it to us at an interview. Even if you agree to participate you are still free to withdraw at any time without giving a reason by contacting Maduka Uwadi by email: mcuwadi@uclan.ac.uk. If you choose to withdraw, you will be asked to provide your issued identification number. Once you have withdrawn from the study, data you provided will be deleted and destroyed. However, your data can only be withdrawn prior to anonymisation; afterwards it will not be possible to tell which results belong to which person. If you wish to withdraw please note that data already collected can only be withdrawn up to 5 days after the interview. After this point, the researcher will have combined the data and your information will have been anonymised ready for analysing and it won't

be possible to identify who you are at this stage. A decision to withdraw, or a decision not to take part, will not be recorded or reported within the final report or to your employer.

7. What will happen if I take part?

This research is being undertaken and funded by the Agile Research Network (ARN), a research collaboration between the University of Central Lancashire (UCLan) and the Open University, both located in the UK. ARN is funded by the Agile Business Consortium and the two Universities.

If you are happy to take part in the validation study, we will ask you to sign the attached Interview consent form and give it to us at an interview. Data will be collected from you by one of the researchers using interviews. You will be asked a series of questions that will be useful in validating the Model of middle managers' roles in agile project governance and the Model of middle managers' competences, and you will be expected to respond to the questions with the best of your ability. Interviews will be conducted using online communication tools, such as Skype, Zoom, or Microsoft Teams. Interviews will last about 20-30 minutes. They will be conversational in style but guided by the set of interview questions.

With your consent, researchers will take notes during interview. Interviews will be audio-recorded and/or visual-recorded so that we have a record of what was discussed. All notes will be anonymised so that the role of the participant is noted (e.g., Senior Project Manager, Head of Agile, Chief Executive Officer, Chief Information Officer, etc.), but no names will be stored with the data. Also data such as age, date of birth and address will not be collected.

8. Covid-19

The validation study will not involve face-to-face participant interactions. The study will involve only online interviews, which will be conducted using online communication tools, such as Skype, Zoom, or Microsoft Teams. Consequently, Covid-19 measures regarding face-to-face participant interactions will not apply.

9. How will my data be used?

The University processes personal data as part of its research and teaching activities in accordance with the lawful basis of 'public task', and in accordance with the University's purpose of "advancing education, learning and research for the public benefit".

Under UK data protection legislation, the University acts as the Data Controller for personal data collected as part of the University's research. The University privacy notice for research

participants can be found on the attached link
https://www.uclan.ac.uk/data_protection/privacy-notice-research-participants.php

Further information on how your data will be used can be found in the table below.

<p>How will my data be collected?</p>	<p>Data will be collected using online interviews, which will be conducted using online communication tools, such as Skype, Zoom, or Microsoft Teams. The interviews will be visual-recorded and/or audio-recorded. In addition, written notes may be taken so that the interviewer can properly capture all information that participants will provide during interviews.</p> <p>Consent forms will be used to obtain research participants' signed consent.</p>
<p>How will my data be stored?</p>	<p>Hard copies of research materials obtained such as anonymised interview notes will be confidential and stored in a secure way locked in filing cabinets on UCLan premises.</p> <p>Electronic copies of research materials obtained such as consent forms, audio-visual interview recordings, and interview transcripts will be confidential and stored in a secure way under password protection on UCLan secure servers.</p> <p>Obtained data will be stored in accordance with the UCLan regulations for data protection and within the statutory requirements of the Data Protection Act 2018. Data will be collected, stored and distributed in accordance with the 'Eight principles of Data Protection'.</p>
<p>How long will my data be stored for?</p>	<p>All data will be kept for a maximum of 7 years in line with the University's ethical guidelines and will then be destroyed.</p>
<p>What measures are in place to protect the security and confidentiality of my data?</p>	<p>If hard copies of research materials are taken out of locked filing cabinets for any reason such as face-to-face meetings between the researchers of this study, the materials will be confidential and transported in a bag with secure lock feature (e.g. padlock) to ensure data is not exposed on transit. The bag will always be in the researchers' possession.</p> <p>Electronic copies of research materials obtained will be stored under password protection on UCLan secure servers. Access to research data on UCLan secure servers will be over secured password protected</p>

	internet connection. Remote working will be done using secured UCLan services (e.g. UCLan's OneDrive for Business).
Will my data be anonymised?	<p>Data collected from interviews such as comments by participants or their professional opinion will be anonymised. Interview notes will be anonymised. Interview data will be transcribed in a way that anonymises the data. Participants that opt-in for the research study will be given a participant identification number (e.g., VS-P1, VS-P2) and their information will be aligned with this identification number, rather than their name. All demographic information will be anonymised. Demographic information include information such as current job role of participants, position in organisational structure, number of years in organisation, as well as previous experience in IT, agile methodologies, and agile software development.</p> <p>Data collected from the research will be confidential to the researchers involved in the research study and they alone will have access to the original data.</p>
How will my data be used?	<p>Factual personal data such as name, address, date of birth will not be collected during the research study except for consent forms which will have only the signature of participants as evidence of their consent. Personal data will not be processed. It is only used for consent purposes and to create anonymised transcripts of research data. Identifying information will not be published.</p> <p>Other data that will be collected include demographic information (e.g., current job role of participants, position in organisational structure, number of years in organisation, previous experience in IT, agile methods, and agile software development), as well as participants' information relevant to the research study and obtained through the interviews (e.g., opinions, perceptions, experiences).</p> <p>Research data (e.g. anonymised demographic information, interview data) mentioned above is necessary for data analysis in order to produce findings that will contribute to knowledge and practice regarding project governance and middle management in agile software development projects. The data is necessary to ensure high reliability and validity of the PhD research. They can also</p>

	<p>provide important evidence relating to research phenomena being investigated. Consequently they may be published in PhD thesis, reports, presentations, whitepapers, articles, and other publications. The names of participants and organisations that have taken part in the research study will not be identified in these publications.</p>
<p>Who will have access to my data?</p>	<p>Data collected from the research will be confidential to the research team involved in the research study and they alone will have access to the original data. The researchers include the following:</p> <ul style="list-style-type: none"> • Dr Peggy Gregory, Principal Investigator and Senior Lecturer, +44(0)1772893284, ajgregory@uclan.ac.uk • Maduka Uwadi, Co-investigator and PhD Student, +44(0)7570700824, mcuwadi@uclan.ac.uk • Professor Ian Allison, Co-investigator, +44(0)1772892505, iallison@uclan.ac.uk • Professor Helen Sharp, Co-investigator, +44(0)1908653638, helen.sharp@open.ac.uk • Dr Leonor Barroca, Senior Lecturer and Co-investigator, +44(0)1908654864, leonor.barroca@open.ac.uk • Dr Shaima Salem Moh'd, Research Associate and Co-investigator, ssmoh-d@uclan.ac.uk <p>Hard copies of research materials obtained such as anonymised interview notes will be confidential and stored in a secure way locked in filing cabinets on UCLan premises. Electronic copies of research materials obtained will be stored under password protection on UCLan secure servers. Access to research data on UCLan secure servers will be over secured password protected internet connection.</p> <p>Research data may be published in PhD thesis, reports, presentations, whitepapers, articles, and other publications. Identifying information relating to participants and organisations that have taken part in the research study will not be included in these publications.</p> <p>Updates will be provided to the Agile Research Network and Agile Business Consortium on research study progress. In</p>

	addition, the final PhD thesis will be shared with them for wider dissemination and learning. It is anticipated there will be collateral benefit to these organisations in the form of completed PhD study, industry-based research in agile practice, and empirical research outputs that aid agile practitioners across the globe.
Will my data be archived for use in other research projects in the future?	No
How will my data be destroyed?	Research data will be appropriately and securely destroyed after a period of seven years of retention, or earlier if a participant withdraws from the research study. This will be done in accordance with all legal, ethical, research funder requirements, and with particular consideration for confidentiality and security. Data deletion or destruction will be done in line with UCLan guidelines and procedures to ensure affected data is no longer accessible or recoverable.

Transferring data outside the EU

Personal data will not be transferred outside the European Union.

10. Are there any risks in taking part?

There are no risks associated with taking part in the validation study.

11. Are there any benefits from taking part?

By participating in the validation study, participants will be contributing to industry-based research that contributes to knowledge and practice in project management, project governance, and agile software development fields. The findings will help to improve project governance and middle management practices in agile software development projects by helping to identify and understand (a) the role of middle managers in agile project governance, and (b) the competences necessary for middle managers to function effectively in agile software projects and teams. The research has the potential to facilitate project success in agile software development project settings and create high-performing agile project teams.

12. Expenses and / or payments

Participation is entirely voluntary. There are no payments or incentives for participating in the study.

13. What will happen to the results of the study?

The results of the study will be used to further understand and improve project governance and middle management practice in agile software development projects within organisations. Research results may also be published as PhD thesis, reports, presentations,

whitepapers, articles, and other publications. The names of the organisations and participants who have taken part in the research will not be identified in these publications.

14. What will happen if I want to stop taking part?

Participants are free to withdraw from the study at any time without giving a reason by contacting Maduka Uwadi (co-investigator and PhD student) by email: mcuwadi@uclan.ac.uk. If you choose to withdraw, you will be asked to provide your issued identification number. Once you have withdrawn from the study, data you provided will be deleted and destroyed. However, your data can only be withdrawn prior to anonymisation; afterwards it will not be possible to tell which results belong to which person. If you wish to withdraw please note that data already collected can only be withdrawn up to 5 days after the interview. After this point, the researcher will have combined the data and your information will have been anonymised ready for analysing and it won't be possible to identify who you are at this stage. A decision to withdraw, or a decision not to take part, will not be recorded or reported within the final report or to your employer.

15. What if I am unhappy or if there is a problem?

If you are unhappy, or if there is a problem, please feel free to let us know by contacting Dr Peggy Gregory (principal investigator) on +44(0)1772893284 or email: ajgregory@uclan.ac.uk, and we will try to help. If you remain unhappy or have a complaint which you feel you cannot come to us with, then please contact the Ethics, Integrity and Governance Unit at OfficerForEthics@uclan.ac.uk.

The University strives to maintain the highest standards of rigour in the processing of your data. However, if you have any concerns about the way in which the University processes your personal data, it is important that you are aware of your right to lodge a complaint with the Information Commissioner's Office by calling +44(0)303 123 1113.

16. Who can I contact if I have further questions?

If you have any questions please contact Dr Peggy Gregory (principal investigator) on +44(0)1772893284 or email: ajgregory@uclan.ac.uk.

Contact details of investigatory team

- Dr Peggy Gregory, Principal Investigator and Senior Lecturer, +44(0)1772893284, ajgregory@uclan.ac.uk
- Maduka Uwadi, Co-investigator and PhD Student, +44(0)7570700824, mcuwadi@uclan.ac.uk
- Professor Ian Allison, Co-investigator, +44(0)1772892505, iallison@uclan.ac.uk
- Professor Helen Sharp, Co-investigator, +44(0)1908653638, helen.sharp@open.ac.uk
- Dr Leonor Barroca, Senior Lecturer and Co-investigator, +44(0)1908654864, leonor.barroca@open.ac.uk
- Dr Shaima Salem Moh'd, Research Associate and Co-investigator, ssmoh-d@uclan.ac.uk

Appendix W: Validation Study Interview Consent Form



Project Governance in Agile Software Development Projects: An Activity-Oriented Analysis of Middle Management Roles, Competences, Challenges and Interventions

INTERVIEW CONSENT FORM

Please tick the boxes provided to indicate 'YES' to the following statements:

I understand that participation is entirely voluntary and that I won't be paid for my participation. I may withdraw and discontinue participation at any time in this study.	<input type="checkbox"/>
I have read and understood the information sheet and I have had the opportunity to ask questions.	<input type="checkbox"/>
I agree to interviews being audio-recorded, visual-recorded, and/or written notes being taken so that the interviewer can properly capture all information that I will provide during interviews.	<input type="checkbox"/>
I agree to the use of my opinions, perceptions, information and experiences in the study.	<input type="checkbox"/>
I understand that my participation will be anonymous and any details that might identify me or my employer in a clear and detailed manner will not be included in reports or other publications produced from the study.	<input type="checkbox"/>

Signature:	Date:
Name of researcher taking consent:	
Signature:	Date:

Appendix X: Validation Study Interview Protocol



Project Title: Project Governance in Agile Software Development Projects: An Activity-Oriented Analysis of Middle Management Roles, Competences, Challenges and Interventions

Interview Protocol to Validate Model of Middle Managers Competences in Agile Software Projects and Model of Middle Managers Roles in Agile Project Governance

Semi-structured interview questions for individual interviews to address the validation topics are indicated below. Interview questions will be in stages:

Participant ID: Date: Start Time: End Time:

STAGE 1: Some information about the participant

1. Introduction to the study. Check they have read the Participant Information Sheet, signed the Consent Form and their participation is voluntary. Invite questions for clarification.
2. Obtain demographic information from participant:
Please can you tell me your current job role in your company?
Further probe – What industry sector does your company operate in?
- Where is your position in the organisational structure of your company?
- Are you a member of top/senior management or middle management?

Is interviewee a middle manager? Yes No

3. Record current and previous experience in IT, agile methods, agile software development, and agile project management:
Please can you tell me your professional background?
Further probe - How many years of IT experience do you have?
- How many years of IT experience do you have using agile methods?
- Do you have any current or previous agile certifications or qualifications?

STAGE 2: Model of middle managers competences in agile software projects

2.1 Questions on using the Model of middle managers competences as a job description and person specification resource tool for middle management recruitment:

1. Have you been in a position where you needed to help recruit new team members? Can you refer to the Competences' Model and tell me if it is useful to produce job descriptions and person specifications when recruiting? For example, when recruiting a product manager or software engineer into middle management positions in your agile software team?
Further probe – If yes or no, can you give reason(s) briefly?
2. Assuming you are recruiting middle managers into your agile software teams, do you feel the Competences' Model will be useful for specifying competences that candidates for the middle management job positions will need to possess?
Further probe – If yes or no, can you give reason(s) briefly?
3. Are the competences' descriptions and details in the Competences' Model clear to you and easy to understand?
Further probe – Are there any words that seem unclear and difficult to interpret?

4. Considering your current company, how relevant and important will this Competences' Model be to you if you are recruiting middle managers into your in agile software teams?
5. In your opinion, how relevant and important do you feel this Competences' Model will be to Human resources personnel in your current company when recruiting middle managers into your in agile software teams?

2.2 Questions on using the Model of middle management competences as an education and training tool:

6. Do you feel the Competences' Model will be useful to you as an education and training tool for your continuing professional development (CPD) and self-development?
Further probe – If yes or no, can you give reason(s) briefly?
7. Do you feel the Competences' Model can help you learn about important competences that middle managers need to have when working in agile software projects?
Further probe – If yes or no, can you give reason(s) briefly?
8. **For middle manager. Skip this question if interviewee is a senior manager based on question 2 above:**
As a middle manager, do you feel the Competences' Model can help you identify competences you may be lacking so you can develop such competences in order to remain effective and efficient in agile software teams and projects?
Further probe – If yes or no, can you give reason(s) briefly?
9. **For senior manager. Skip this question if interviewee is a middle manager based on question 2 above:**
Do you feel the Competences' Model can help middle managers identify competences they may be lacking so that they can develop such competences in order to remain effective and efficient in agile software teams and projects?
Further probe – If yes or no, can you give reason(s) briefly?
10. Do you feel the Competences' Model can help aspiring middle managers identify competences they may be lacking so that they can develop such competences in order to function in middle management job roles in agile software teams and projects?
Further probe – If yes or no, can you give reason(s) briefly?
11. Do you feel the Competences' Model can be useful to your company for developing training and development programs for staff so that current middle managers and aspiring middle managers can develop competences that will help them function well in agile software teams and projects?
Further probe – If yes or no, can you give reason(s) briefly?

2.3 Questions on using the Model of middle management competences as a job performance framework:

12. Do you feel the Competences' Model can be used in your company as a performance framework to help create and define specific criteria and indicators for middle managers' job performance?
Further probe – If yes or no, can you give reason(s) briefly?

2.4 Other questions:

13. Are the competences' descriptions and details in the Competences' Model arranged and presented in an organised and acceptable manner?
14. Is the Competences' Model comprehensive and detailed enough in terms of the competences' descriptions and details?
Further probe – Does the Competences' Model contain necessary information that will help users like you to use it effectively?
15. Is there any additional comment you wish to make as your feedback regarding this Competences' Model?

STAGE 3: Model of middle managers roles in agile project governance

3.1 Questions on using the Model of middle managers roles in agile project governance as a job description and person specification resource tool for middle management recruitment:

1. Have you been in a position where you needed to help recruit new team members? Can you refer to the Model of Middle Managers' Roles and tell me if it is useful to produce job descriptions and person specifications when recruiting? For example, when recruiting a product manager or software engineer into middle management positions in your agile software team?
Further probe – If yes or no, can you give reason(s) briefly?
2. Assuming you are recruiting middle managers into your agile software teams (e.g., software engineer, agile delivery manager), do you feel the Model of Middle Managers' Roles will be useful for specifying the responsibilities that people in those job positions will need to perform in software projects?
Further probe – If yes or no, can you give reason(s) briefly?
3. Are the roles' descriptions and details in the Model of Middle Managers' Roles clear to you and easy to understand?
4. Considering your current company, how relevant and important will this Model of Middle Managers' Roles be to you if you are recruiting middle managers into your in agile software teams?
5. In your opinion, how relevant and important do you feel this Model of Middle Managers' Roles will be to the Human resources personnel in your current company when recruiting middle managers into your in agile software teams?

3.2 Questions on using the Model of middle managers roles in agile project governance as an education and training tool:

6. Do you feel the Model of Middle Managers' Roles will be useful to you as an education and training tool for your continuing professional development (CPD) and self-development?
Further probe – If yes or no, can you give reason(s) briefly?
7. Do you feel the Model of Middle Managers' Roles can help you know important roles and project governance responsibilities that middle managers need to perform when working in agile software projects?
Further probe – If yes or no, can you give reason(s) briefly?
8. **For middle manager. Skip this question if interviewee is a senior manager based on question 2 above:**
As a middle manager, do you feel the Model of Middle Managers' Roles can help you identify any competences you may be lacking so that you can develop such competences in order to be effective in your roles and responsibilities in agile software teams and projects?
Further probe – If yes or no, can you give reason(s) briefly?
9. **For senior manager. Skip this question if interviewee is a middle manager based on question 2 above:**
Do you feel the Model of Middle Managers' Roles can help middle managers identify competences they may be lacking so that they can develop such competences in order to be effective in their roles and responsibilities in agile software teams and projects?
Further probe – If yes or no, can you give reason(s) briefly?
10. Do you feel the Model of Middle Managers' Roles can help aspiring middle managers identify competences they may be lacking so that they can develop such competences in order to function in middle management job roles in agile software teams and projects?
Further probe – If yes or no, can you give reason(s) briefly?
11. Do you feel the Model of Middle Managers' Roles can be useful to your company for developing training and development programs for staff so that current middle managers and aspiring middle managers can develop competences and function well in agile software teams and projects?
Further probe – If yes or no, can you give reason(s) briefly?

3.3 Questions on using the Model of middle managers roles in agile project governance as a job performance framework:

12. Do you feel the Model of Middle Managers' Roles can be used in your company as a performance framework to help create and define specific criteria and indicators for middle managers' job performance?

Further probe – If yes or no, can you give reason(s) briefly?

3.4 Other questions:

13. Are the roles' descriptions and details in the Model of Middle Managers' Roles arranged and presented in an organised and acceptable manner?
14. Is the Model of Middle Managers' Roles comprehensive and detailed enough in terms of the roles' descriptions and details?
Further probe – Does the Model of Middle Managers' Roles contain necessary information that will help users like you to use it effectively?
15. Is there any additional comment you wish to make as your feedback regarding this Model of Middle Managers' Roles?

Appendix Y: Excerpts of Validation Study Data Analysis for the Two Models

Table Y1: Excerpts of validation findings and data for Model of Middle Management Roles in Agile Project Governance (M1)

Validation Criteria	Relevance and Importance Use Case	Validation Question Topic Area	Validation Findings	Excerpt of Original Data (Representative Quote)
Relevance and Importance	1. Useful to produce job descriptions and person specifications when recruiting people into middle management positions in agile software teams	Part of Use Case 1: Useful to produce job descriptions and person specifications when recruiting people into middle management positions in agile software teams	<p>Summary: Findings suggest five validators (V1, V2, V3, V4, V5) agreed that M1 will be useful to produce job descriptions and person specifications when recruiting people into middle management positions in agile software teams. V6 was skeptical about MMs actually fulfilling some of the described roles in reality.</p> <p><u>Specific views on the Model:</u> V1 (senior management): V1 agreed the Model (M1) can be used to specify the kind of people organisations are looking for, i.e., MMs that are suitable to fill the different PG roles for particular projects. This will vary from organisation to organisation considering that PG governance structures, practices, and requirements in organisations are highly contextual. In essence, its usage will depend on how various organisations choose to adapt it to suite their own environment and meet their unique needs. V1 agreed M1 can be used to define PG roles and responsibilities that MMs should perform in particular projects in organisations. However, this could change from project to project because MMs could perform different PG roles across different projects. He opined that M1 can be used to create tags of skills and PG roles that MMs can perform. It can be used to create project team member profiles for the sort of individuals that are suitable for certain agile software projects based on their capabilities and roles they have performed in previous projects. This is useful when forming project teams to help select the right people for the right projects.</p>	<p><i>“Yeah, you could..., you could use..., I can see how you can use this to define the purpose of the role [MM role]. For example, you can help to define what the role should be doing in that particular project, or the person should be performing that activity in that particular project because that could change from project to project. So yes, yes you could use it... Highly contextual for the organisation, I guess so, but they can pick and choose from the menu almost on what kind of person they are looking for who fits in these different roles for that project... But it appeared to me that I could use this model [M1] also to create like a..., in my team I can create like a tag of skills and roles that people can perform. So, next time when I'm looking to form a project team and I need certain skill sets or certain roles that people have some experience or strength in performing, I could pick and choose based on what their strengths are. So, I could see this..., both these models, the one previous [M2] and this one [M1] can also be used to create a profile of an individual, he or she or they can be suitable for certain projects or not, based on their competence and based on the roles they have done in the past and they're capable of performing. So, you pick the right people for the right project”</i></p> <p>(V1, senior management).</p> <p><i>“Yeah. I see..., I do see..., because even within our construct today, we do have, if I think about the monitoring role, we do have middle-level managers who play more of the pastoral care provider kind of role; we call them staff development managers for example. And when I look at the description, I do see how we can enable even organisations like mine</i></p>

Validation Criteria	Relevance and Importance Use Case	Validation Question Topic Area	Validation Findings	Excerpt of Original Data (Representative Quote)
			<p>V2 (MM): According to V2, there are MMs in his organisation who play the <i>Pastoral Care Provider</i> role and they are called staff development managers. V2 affirmed that in his organisation and probably in similar organisations, M1 can help better clarify the services that are expected of MMs who would perform the various PG roles.</p> <p>V3 (MM): V3 affirmed that M1 is useful for producing job descriptions and person specifications for middle management recruitment into agile software teams.</p> <p>V4 (senior management): V4 opined that M1 is useful because it sets the expectations of any potential middle management candidates taking up the PG roles, thereby helping them to understand the expectations of those roles.</p> <p>V5 (LOW): V5 affirmed that M1 was concise. It potentially allows hiring managers to select MMs that have the abilities they are looking for when recruiting. M1 brings clarity to a job description, and it helps candidates to evaluate the kind of role they are moving into with full awareness of role expectations to avoid employee attrition. Also, M1 helps recruiters to get a better idea of what the MMs will be doing in their job.</p> <p>V6 (MM): V6 stated that a role like <i>Coach</i> is expected in agile project delivery. He acknowledges that MMs may perform <i>Capability Building Advocate</i> role. However, some roles and the language/terms used to label them in the Model seem foreign to agile project delivery with respect to roles that MMs can perform. V6 opined that middle management would not perform <i>Pastoral Care Provider</i> role in an official sense, nor would they perform <i>Auditor</i> role. Also,</p>	<p><i>better clarify what is expected of people who play in that role” (V2, MM).</i></p> <p><i>“Yeah, yeah, absolutely. I would say yes right away.” (V3, MM).</i></p> <p><i>“yes, I think it is useful... yes. I think it's a good idea to have those. It sets the expectations of any candidates or potential people moving in those roles, to understand the expectations of those roles.” (V4, senior management).</i></p> <p><i>“Yeah, yeah, I believe it's..., it's useful in producing JDs when recruiting middle managers... it's concise and it allows a hiring manager to like select for the specific..., should I say skills that they're looking for? I think it's brings clarity to a job description and also, you know, helps candidates evaluate what kind of role they're getting themselves into, and you getting a better idea of what they will be doing. Because it's important to have a clear idea of what you'll be doing in a role otherwise that might lead to, you know, attrition, which is not good for either the candidates or the company because everybody just wastes their time. So, it's nice to have this kind of model and let it influence your job description” (V5, LOW).</i></p> <p><i>“It would be. So, first, personally some of the language is not..., some of the language; the words used to describe some of the skill sets..., it doesn't..., it sounds a bit foreign to the industry, because if you're talking agile and agile project delivery and Pastoral Care is not one I would expect from a middle manager, not in an official sense. And Rule-maker is another I question; they may not be hired at that level to make rules. They would be hired to follow rules. Coach is good. Capability building advocates..., capability building advocate I don't know about that. Capability building well it depends; at middle management level, if you're a line</i></p>

Validation Criteria	Relevance and Importance Use Case	Validation Question Topic Area	Validation Findings	Excerpt of Original Data (Representative Quote)
			MMs would not perform <i>Rule-maker</i> role because they would be hired to follow rules and not make them.	<i>manager probably... Compared to the previous model, the previous model seemed more in tune with what I would expect as the skill sets that a middle manager can be judged against..., hired to..., against even reviewed against, right. The language as well is in tune with the language you would expect of an agile delivery environment; it's not foreign to that. In comparison to this model, some of it is a bit foreign, so I wouldn't expect a middle manager, except if you're hiring..., auditor is not the word that would come in for a middle manager being hired into program management in an agile delivery environment. Not really. Rule-maker, not really"</i> (V6, MM).
		<p>Part of Use Case 1: Useful for specifying the responsibilities that people who are being recruited in middle management job positions will need to perform in agile software projects</p>	<p>Summary: Findings suggest five validators (V1, V2, V3, V4, V5) agree that M1 will be useful for specifying the responsibilities that people who are being recruited in middle management job positions will need to perform in agile software projects. V6 was ambivalent about using the Model in such manner. V4 expressed reservations about the term used to label the <i>Gatekeeper</i> role.</p> <p>Specific views on the Model: V1 (senior management): V1 affirmed that M1 could help to define and clarify the boundaries of roles during agile projects as to the project-specific roles people are performing: what they should or should not do. This is helpful because occasionally it can be difficult for people to effortlessly alternate between project-specific roles when working on multiple projects. V1 opined that the Model could be helpful as a resource when creating a RACI matrix for an agile software project—who is responsible, who is accountable, who needs to be consulted, and who needs to be informed.</p>	<p><i>"Yeah, you could. It could help us to define the boundaries of the role. You know, when they're in a particular project, what is the role they're performing and what are the boundaries, what they should do, what they should not do, because sometimes it can be hard. If I'm a person..., like I gave you an example. In one project I could be a product owner, in another project I could be, I don't know, sponsor, it's hard for me to cognitively shift my boundaries if I'm..., if I'm not being careful about this project that role, that project that role. So, I should not mix because there is somebody else doing that role that I'm not doing. So, this could help to for example, when you're creating, you know, like a RACI thing; responsibilities and accountabilities for a project, it could help to clarify boundaries, yeah, for sure"</i> (V1, senior management).</p> <p><i>"Yes, I do. And I will go even beyond that to say it will provide clarity that we oftentimes face in agile teams where the lines of, you know, where the boundaries of one person's roles and responsibilities is not clear to the other the person. So, using this model would help provide that clarity</i></p>

Validation Criteria	Relevance and Importance Use Case	Validation Question Topic Area	Validation Findings	Excerpt of Original Data (Representative Quote)
			<p>V2 (MM): V2 opined that M1 will provide clarity to address role ambiguity which is often experienced in agile teams whereby the boundaries of an individual’s roles and responsibilities are not clear to other team members. The Model would help ensure that when hiring, for instance, for big software development project teams, the roles for middle management are very clear so that everyone understands where the boundaries of their responsibilities ends.</p> <p>V3 (MM): V3 opined that M1 can be used to help people (e.g., MMs) understand their job requirements and expectations as they manage and work alongside stakeholders during agile project delivery.</p> <p>V4 (senior management): V4 agreed M1 is potentially useful. V4 agreed that terms used to label some roles in M1 were very clear without reading the role descriptions—<i>Goal and Task Inspector, Pastoral Care Provider, Capability Building Advocate</i>, for example. However, some terms may require interpretation. For example, <i>Gatekeeper</i> is not very clear unless one reads the supplied role description to understand what the role is about. V4 emphasised the need to ensure the roles are clear so that job seekers (e.g., MMs) can have a clear understanding of the roles and their descriptions when published in job advertisements. V4 recommended adding more details to some of the roles for clarity.</p> <p>V5 (LOW): V5 agreed M1 is useful.</p> <p>V6 (MM): V6 felt that M1 was potentially useful to a certain degree. V6 agreed that middle management would be expected to perform various roles in agile project delivery as defined in M1, which include <i>Innovator, Agile Leader, Technical Leader</i>, and</p>	<p><i>and making sure that when hiring, you know, for big software development project teams, that the expected roles for middle-line management are very clear and everybody understands where the boundaries of their responsibilities stops” (V2, MM).</i></p> <p><i>“I would say yes. These roles can be used to help people understand what the requirement is on the job, and what their expectation is as they continue to go through the agile process and in managing whoever they're managing, whoever their stakeholders are” (V3, MM).</i></p> <p><i>“Yes, potentially. I mean some of the words might not be ideal. So, gatekeeper for instance, you know, what does that mean in this context? Goal and Task Inspector is very clear. Pastoral Care, very clear. Capability Building, again very clear. I think it's just maybe a review of..., does that make sense to people who would be picking up this job advertisement on the market? Do they understand what that would mean in their role? You may need to add a little bit more about some of the terms used, just so it's pretty clear... if we're looking at just that middle manager role column then you would then need to have a look at the role description to understand that” (V4, senior management).</i></p> <p><i>“Yes, yes, I think so” (V5, LOW).</i></p> <p><i>“I think there might be a cultural thing to this. If like you say I think you mentioned the studies were conducted in Nigeria, I can understand that in the Nigerian context, but in a British/UK even American context, it will be alien, because the middle manager (even a senior manager) wouldn't be expected to provide pastoral care. That's not part of their job role so I wouldn't expect them to fill that kind of role. Rule-maker as well, I wouldn't expect..., a middle manager cannot be hired to fill the role of a rule-</i></p>

Validation Criteria	Relevance and Importance Use Case	Validation Question Topic Area	Validation Findings	Excerpt of Original Data (Representative Quote)
			<p><i>Gatekeeper</i> roles. However, V6 opined that organisational culture and regional contexts may influence or limit the existence and practice of the various middle management PG roles in organisations. For instance, V6 acknowledged that while MMs in Nigerian ASD project contexts may perform the <i>Pastoral Care Provider</i>, <i>Rule-maker</i>, or <i>Auditor</i> roles, this may not be the case in UK or American ASD projects because such PG roles would be alien to those contexts. According to V6, MMs (and senior management) in UK or American contexts would not be expected to provide pastoral care in ASD projects. Also, MMs in the latter contexts would not be hired to make rules, rather they implement rules made by senior management (the actual rule-makers). According to V6, a MM may take up a PG role that reviews agile project work against set policy or standards (similar to <i>Auditor</i>), however in his experience such role will not be termed <i>Auditor</i>.</p>	<p><i>maker; that's the role of the board, right, senior management board. They make the rules. The middle managers are there to implement them. So, again, I wouldn't expect them to fill that role. An auditor sounds..., depends on what you..., it could be a job title, it could be a job role if you're talking in accountancy, if you are talking in a banking environment... I think it's the word auditor that just within that space..., I don't know if it's a term, a terminology you will find used in an agile delivery environment. So, again, like I mentioned, it's not that the underlying..., so that would be a review, ok, they would usually have someone [MM in an agile software project] who's reviewing work done against set standards or against policy standards. But, you know, just in my experience that wouldn't be the type of terminology that I will find. So, anyway, those are some of the questions I have about the model. Innovator? Yeah. [inaudible] innovation. Again, is that a role that he [MM] could fill? Possibly, possibly. Agile leader? Yes. Technical lead? Yeah. Gatekeeper? Yes." (V6, MM).</i></p>

Table Y2: Excerpts of validation findings and data for Model of Middle Management Competencies in Agile Project Governance (M2)

Validation Criteria	Relevance and Importance Use Case	Validation Question Topic Area	Validation Findings	Excerpt of Original Data (Representative Quote)
	<p>2. Useful as an education and training tool for continuing professional development and self-development</p>	<p>Part of Use Case 2: Useful to validator as an education and training tool for his/her continuing professional development and self-development</p>	<p>Summary: Findings suggest that five validators (V1, V2, V3, V5, V6) agreed that the M2 will be useful as an education and training tool for their continuing professional development and self-development with respect to learning about the competencies of MMs in agile PG. V4 opined that M2 will not be useful for her continuing professional development and self-development, which may be because she is conversant with the competencies of MMs in agile PG. However, she felt the Model will be useful to other members of her team, which may include people that are less conversant with the competencies of MMs in ASD projects.</p> <p><u>Specific views on the Model:</u> V1 (senior management): V1 opined that M2 can be used to create learning and development plans for employee learning in the workplace. He opined that the Model can be useful for periodic learning and development needs analysis—current strengths and areas for further development—to help employees identify, understand, and evaluate their training needs for continuing professional development and self-development.</p> <p>V2 (MM): V2 opined that M2 can be used as a checklist for performing periodic learning and development needs analysis to identify areas for further development with respect to his job-related competencies. This will be useful for continuing professional development (CPD).</p>	<p><i>“Yeah, you can use it as a as a tool to understand learning and development needs analysis, i.e., where you are currently as a person to where..., what areas you need to develop, where you are strong versus where there are opportunities for further work. So yes, it can be used. I can see that, and I can also see how a training or a learning and development plan can also be created based on that kind of needs analysis using this competency model” (V1, senior management).</i></p> <p><i>“I do. I do think so. So, the perspective that I thought of was..., like I mentioned earlier as a checklist that might be revisited from time to time, and probably one can articulate on which of these competencies are my falling short and then use that for their CPD, and looking forward to improve” (V2, MM).</i></p> <p><i>“Absolutely, absolutely, because you know it's one thing to understand agile, but it's also one thing to understand the SWOTs for the people you are recruiting, the SWOT analysis for the role that you're recruiting for, and this also helps to understand what to look out for in doing that SWOT analysis” (V3, MM).</i></p> <p><i>“Not for my personal self-development, but potentially for some of my team” (V4, senior management).</i></p> <p><i>“I think so. I think this can be the starting point of a training material on something like what companies do... And this material can be like the foundation for such a training programme, of course, it will need to be like heavily expanded, you know, all these different skills, adding case studies and scenarios and things like that. But yeah, this can serve as a foundation for a training material” (V5, LOW).</i></p> <p><i>“I think it will be a useful guide for..., I think it will be useful for checking yourself against the relevant skill set to continue to be effective in what you do. So, in that sense, yes, I think it'll be useful” (V6, MM).</i></p>

Validation Criteria	Relevance and Importance Use Case	Validation Question Topic Area	Validation Findings	Excerpt of Original Data (Representative Quote)
			<p>V3 (MM): V3 opined that M2 can help to determine and understand the strengths, weaknesses, opportunities, and threats (SWOT) relating to the people being recruited as MMs and their MMgmt roles by performing SWOT analysis.</p> <p>V4 (senior management): V4 opined that M2 will not be useful for her continuing professional development and self-development, which may be because she is conversant with the competencies of MMs in agile PG. However, she felt the Model will be useful to other members of her team, which may include people that are less conversant with the competencies of MMs in ASD projects.</p> <p>V5 (LOW): V5 opined that the Model can be used as a base resource to create training materials for training programmes. For training purposes, the Model will need to be expanded to include other necessary contents—scenarios and case studies, for example.</p> <p>V6 (MM): V6 opined that M2 can serve as useful guide to help MMs evaluate themselves against competencies that are relevant for the job that they perform so as to remain effective in the job.</p> <p><u>Recommendation and areas for improvement:</u></p> <ul style="list-style-type: none"> • V5: In order to use the Model as a training material for training programmes, it will be necessary to expand it by including other necessary contents—scenarios and case studies, for example. This customisation can be organisation-specific. 	

Validation Criteria	Relevance and Importance Use Case	Validation Question Topic Area	Validation Findings	Excerpt of Original Data (Representative Quote)
		<p>Part of Use Case 2: Helpful to validator in learning about important competences that MMs need to have when working in agile software projects</p>	<p>Summary: Findings suggest that five validators (V1, V2, V3, V5, V6) agreed that the Model will be helpful in learning about important competencies that MMs need to have when working in agile software projects. V4 on the other hand noted that the Model only reinforces what she already knows regarding competencies that MMs in agile environments need to have.</p> <p><u>Specific views on the Model:</u> V1 (senior management): V1 affirmed that M2 will be helpful in learning about important competences that MMs need to have in ASD project settings. However, the Model does not clearly indicate or distinguish the competencies that MMs in ASD projects exclusively need to have, which represent the competencies that MMs who are not involved in ASD projects are not expected to have (e.g., MM in finance department).</p> <p>V2 (MM): According to V2, in order to effectively utilise the Model, organisations may need to adapt it to meet their specific needs, taking into account their specific teams and specific environment. Adaptation of the Model may include addition of relative weights to individual competencies in the model so as to indicate and prioritise the most important competencies that MMs need to learn or cultivate for particular roles, based on each organisation's requirements and preferences.</p> <p>V3 (MM): V3 affirmed that the Model will be helpful in learning about important competences that MMs need to have when working in agile software projects.</p>	<p><i>“Yes, but I think what's missing for me..., As I said to you, what is specific about agile that differentiates somebody..., a middle manager who's just a middle manager in operations or finance or any other function compared to a middle manager who's in agile software development. So, for me that is not clear. So, I see the..., I see the model and I see yeah perfect really good, but what is different about agile software project? So, therefore what I should be looking for in the middle manager whilst recruiting or training which is domain specific that a finance middle manager doesn't need to know, or an operations middle manager doesn't need to know. So, that that for me is not clear” (V1, senior management).</i></p> <p><i>“I think it can. However, I do feel like every organisation that will use it have to adapt it to their specific teams and specific environment. Like I mentioned earlier, maybe having some weights to it that helps the individual and probably the organisation prioritise what matters most, because we do have a lot of competencies listed out here. So, maybe that way your model..., that an organisation, for example, if I was to use it, I might use some sort of weight attributes to it to help me understand what are the most critical competencies for the particular role” (V2, MM).</i></p> <p><i>“Yes, I would say yes, absolutely” (V3, MM).</i></p> <p><i>“Again, I think it doesn't teach me anything, but it reinforces what I already know” (V4, senior management).</i></p> <p><i>“Yes, yes” (V5, LOW).</i></p> <p><i>“Yeah, it looks good to me, yes... senior managers will benefit from this [model] as well” (V6, MM).</i></p>

Validation Criteria	Relevance and Importance Use Case	Validation Question Topic Area	Validation Findings	Excerpt of Original Data (Representative Quote)
			<p>V4 (senior management): V4 opined that the Model does not teach her anything new. However, it reinforces what she already knows about the competencies that MMs in agile environments need to have.</p> <p>V5 (LOW): V5 affirmed that the Model will be helpful in learning about important competences that MMs need to have when working in agile software projects.</p> <p>V6 (MM): V6 affirmed that the Model will be helpful in learning about important competences that MMs need to have when working in agile software projects. The Model will also benefit senior management.</p> <p><u>Recommendation/area for improvement:</u></p> <ul style="list-style-type: none"> • V1: Indicate the competencies in the Model that are exclusive to MMs in ASD projects and those that are applicable to other MMs. • V2: Include relative weights to various competencies in the Model to help intended users (individuals and organisations) identify, understand, and prioritise the most critical or ‘must-have’ competencies that MMs need to learn or cultivate for particular middle management roles in ASD projects within organisations. 	

Appendix Z: Detailed Descriptions of Validation Study Findings

Z.1: Model of Middle Management Roles in Agile Project Governance (M1)

1. Relevance and Importance

- *Use the model (M1) for producing job descriptions and person specifications for MMgmt recruitment*

Several validators felt that M1 will be useful to produce job descriptions and person specifications when recruiting MMs for agile software teams and projects. It will be useful to Human resources (HR) personnel and/or hiring managers. According to V3 (MM) adoption of the model should help by enabling recruiters to put together job details that are tailor-made for recruiting MMs into agile teams, thereby facilitating targeted and productive recruitment conversations with job candidates.

“I think it's super important for anybody in HR to use this to guide themselves with looking for talent out there. Because for HR what I find is a HR person looks at a job description or a job title with a few descriptions that were copied and pasted and all they are doing when they're having that conversation is checking-off a list” (V3, MM).

V5 (LOW) felt that the model can serve as a reference for comparing MMgmt candidates. He also noted that it can be used by HR personnel for initial screening of MMgmt candidates after which hiring managers may take charge and utilise the model for in-depth recruitment conversations in order to select suitable candidates for vacant MMgmt positions. The model can be used to specify the kind of MMs that can fill the various PG roles for specific projects, albeit highly contextual.

“you can help to define what the role should be doing in that particular project, or the person should be performing that activity in that particular project because that could change from project to project. So yes, yes you could use it... Highly contextual for the organisation, I guess so, but they can pick and choose from the menu almost on what kind of person they are looking for who fits in these different roles for that project” (V1, senior management).

In essence, usage of the model will depend on how various organisations choose to adapt it to suit their own environment and meet their unique needs. Not all PG roles in the model may be useful or applicable in companies due to contextual factors, which according to V5 (LOW) include company culture, direction, and size. V5 opined that mature companies are likely to adopt and practice far more roles in the model compared to smaller agile companies.

Validators felt that the model can help better clarify the services expected of MMs who would perform the various PG roles because it sets the expectations of potential MMgmt candidates taking up the roles, thereby helping them to understand the expectations of those roles.

“yes, I think it is useful... yes. I think it's a good idea to have those. It sets the expectations of any candidates or potential people moving in those roles, to understand the expectations of those roles” (V4, senior management).

Some of the PG roles might be performed by more specialist roles. For example, V2 (MM) opined that there are MMs in his organisation who play the *Pastoral Care Provider* role and they are called staff development managers. V6 (MM) stated that MMgmt roles like *Coach, Capability Building Advocate, Innovator, Agile Leader, Technical Leader, and Gatekeeper* roles are expected in agile project delivery. However, some roles and the language/terms used to label them in the model seem foreign to agile project delivery with respect to roles that MMs can perform. He was skeptical about other roles, and thought that organisational and regional context matters:

“it sounds a bit foreign to the industry, because if you're talking agile and agile project delivery and Pastoral Care is not one I would expect from a middle manager, not in an official sense. And Rule-maker is another I question; they may not be hired at that level to make rules. They would be hired to follow rules. Coach is good... Auditor is not the word that would come in for a middle manager being hired into program management in an agile delivery environment... I think there might be a cultural thing to this. If like you say I think you mentioned the studies were conducted in Nigeria, I can understand that in the Nigerian context, but in a British/UK even American context, it will be alien, because the middle manager (even a senior manager) wouldn't be expected to provide pastoral care” (V6, MM).

Also, V6 felt the model was comprised of roles that were specific to agile project environments (agile roles), as well as generic roles (which are applicable in agile and traditional settings) and traditional/non-agile roles (which cannot be found in agile settings). V1 (senior management) partially shared this view, stating that 50 to 70% of the PG roles in the model are roles that he would expect any MM to fill with respect to MMgmt recruitment because they seem generic. However, he affirmed that some of the roles are specific to agile project delivery.

V4 (senior management) agreed that terms used to label some roles in the model are very clear without reading the role descriptions—*Goal and Task Inspector, Pastoral Care Provider,*

Capability Building Advocate, for example. However, she noted that some terms may require interpretation unless one reads the role descriptions to understand what the role is about—*Gatekeeper*, for example. Therefore, it is important to ensure the roles are described in detail when published in job advertisements so that job seekers (e.g., MMs) can have a clear understanding of what they entail.

- *Use the model (M1) as an education and training tool for continuing professional development and self-development*

Several validators agreed that M1 will be useful as an education and training tool for their continuing professional development and self-development with respect to learning about the roles of MMs in agile PG. V2 (MM) stated:

“it might just help more or less in helping me articulate what is expected of me in a role that I'm playing and maybe to have that conversation with my manager to align on what is expected of me” (V2, MM).

V4 (senior management), however, felt other members of her team—who may be less conversant with PG roles of MMs in ASD projects than she is—will benefit more from the model than herself. Nonetheless, she stated that the model could be very useful for providing clarity in the PG structures of agile projects with respect to PG roles and responsibilities:

“Yes. Often the governance side of things is not as adhered to as some of the actual practices of agile, of Scrum. And especially if there's no project manager around some of those governance layers, then it [the model] could be very useful to add clarity. Things like managing risk, et cetera, which are outside of the pure Scrum process” (V4).

V6 (MM) felt the model will be partially useful to him for his learning and development. According to him, roles in the model that will be useful for his learning are those that are transferable to and applicable in agile project environments. However, the roles he deemed non-agile, which he felt cannot be found in agile settings (e.g., *Pastoral Care Provider, Rule-Maker*), will not be relevant. Besides several roles in the model that he expects to find in agile projects (e.g., *Technical Leader, Coordinator, Project Manager, Product Owner*), he also expects to find other MMgmt roles which are not in the model—Scrum master, for example. Other validators felt differently, affirming the model will be useful in their organisations for developing training and development programmes.

Some validators (V1 and V2) opined that the two models (M1 and M2) could be used either separately, or together as complementary learning resources for understanding the multiple roles and competencies of MMs in agile project environments. Still, V1 (senior management) noted that the roles performed by MMgmt in ASD projects varies from organisation to organisation:

“the role that middle managers perform generally in organisations varies from organisation to organisation. And this will be inhibited by how senior leaders in their organisation view the role of middle manager in agile projects... for example Strategist, I see this middle manager role very hard to be done in organisations because it's very..., rarely people allow for middle managers to be Strategists, they just want them to execute... I'm not saying this doesn't happen by the way, I'm sure some organisations are really different and they work..., but typically in the legacy traditional organisations, I see it very hard for senior managers to allow the middle managers to be Strategists” (V1, senior management).

Relating to this, V3 (MM) commented that adoption of the model will help one to learn more about the PG structure in an ASD project, as well as the workplace culture and behaviors of the agile software team and the organisation as a whole.

Several validators felt that the model will be helpful to MMs and prospective MMs in identifying competencies they may be lacking so that they can develop such competencies and become more effective. V6 (MM), however, noted that descriptions of some roles in the model do not sufficiently capture all possible competencies that are required to fulfil those roles. Nonetheless, it was affirmed that the model could be used by HR personnel, MMs, or prospective MMs:

“they could use it as a training needs analysis. It can be used by HR as well as by the middle managers themselves. They could look at it as a self-assessment; ‘How well I'm doing this role, where is the gap? Do I need to improve certain areas? Do I need to go on a training, or do I just need to..., I don't know..., read a book, learn something new’. So, yes, absolutely” (V1, senior management).

“Yeah, 100 percent. I see..., I see it being more used for people in that particular position [prospective MMs] where you took a look at the roles, you understand what is required from there, and then you use it as a, you know, as a..., fit it into your development plans to help you prepare for those roles” (V2, MM).

V2 (MM) opined that the model will be helpful in bringing clarity when MMs like himself cannot perform certain roles described in the model considering the tendency that a MM may try to perform all the roles. Therefore, V2 affirmed that having the model as a resource will help him to articulate and understand his strengths and weaknesses with respect to the roles he can or cannot perform. Such self-assessment will enable him to engage his manager or HR personnel to identify MMs that can fill the roles he cannot perform—assuming those roles are required in his agile team. Also, V5 (LOW) felt the model can be used to define archetypes for MMgmt positions—managers and senior staff engineers, for example. Such archetypes will allow prospective MMs to determine where to focus their self-development efforts, as well as help them plan their career development strategies in order develop themselves and achieve career goals. For agile-practicing organisations that may choose to use the model as a standard, V5 affirms it will help promote transparency and minimise bias with respect to career growth requirements and opportunities in the workplace. This is because the model will help offer prospective MMs a sense of equality of opportunities and fairness so that they can strive for higher responsibilities in their organisations on equal terms. Ultimately, according to V3 (MM), M1 will be valuable to people that are interested in learning about the agile way of working and the roles of MMgmt in agile settings. It will also be valuable to organisations and individuals that provide training courses.

- *Use the model (M1) as a performance framework resource to help create and define specific criteria and indicators for MMs' job performance*

Several validators agreed that M1 will be useful in their organisations as a performance framework resource to help create and define specific criteria and indicators for MMs' job performance. V6 (MM) agreed that the model will be useful for the aforesaid purpose to a limited extent. V1 (senior management) suggested that the manner in which the model may be used as a performance framework resource in organisations will need to be clearly defined as to the scope and specific performance assessment objectives. This is due to perceived difference between job performance (associated with one's job role/title) and role performance (associated with a specific role taken up in a project):

“Job performance versus role performance in a project differentiation. What I mean by that is, certain roles are specific or could only be specific to a project rather than the role that I perform in my job like I gave you the examples. So, when you develop performance criteria,

performance objectives, it'll have to be project-specific rather than a generic... I'm not product owner as my primary job function; I'm doing that role because it's needed for that particular project... for me, I see this [model] going hand in hand with the competency framework you showed. I don't think we can isolate these two together like they're not mutually exclusive frameworks” (V1, senior management).

V4 (senior management) opined that the model is a good starting point for MMgmt performance assessment in ASD projects in her organisation. However, it will have to be customised to include preferred performance-level criteria/scales to suit the organisation’s specific needs and environment:

“we would have to apply the criteria on what classes or what qualifies as a performance level, but it's a good start” (V4, senior management).

According to V5 (LOW), the model has the potential to lay the groundwork for assessing the performance of MMs in ASD projects in his organisation. However, he notes that assessing MMs’ performance based on the PG roles may be more challenging than assessing their performance based on the Competencies Model. Regarding this, V5 explains that a MM may take up a PG role that is not within his/her area of expertise or an area of strength. Hence, in such a situation, the MM may be at risk of underperforming in the role. V3 (MM) felt the model will be useful for assessing the performance of agile MMs in his organisation, as well as in previous organisations he has worked for. V3 commented:

“I would say yes, and when I think about this [model], I think about not just my current company, but other companies I've worked for as well and I think this is a valuable tool for them as well” (V3, MM).

- *Additional use cases of the model*

- a) *Use the model (M1) for creating project team member profiles*

V1 (senior management) opined that M1 (together with M2) can be used to create tags of skills and PG roles that MMs can perform:

“I could use this model [M1] also to create like a..., in my team I can create like a tag of skills and roles that people can perform. So, next time when I'm looking to form a project team and I need certain skill sets or certain roles that people have some experience or strength in performing, I could pick and choose based on what their strengths are. So, I could see this...,

both these models, the one previous [M2] and this one [M1] can also be used to create a profile of an individual, he or she or they can be suitable for certain projects or not, based on their competence and based on the roles they have done in the past and they're capable of performing. So, you pick the right people for the right project” (V1).

b) *Use the model (M1) for creating responsibility assignment matrices*

V1 (senior management) felt that the Model could be helpful as a resource when creating a RACI matrix for an agile software project—who is responsible, who is accountable, who needs to be consulted, and who needs to be informed:

“It could help us to define the boundaries of the role. You know, when they're in a particular project, what is the role they're performing and what are the boundaries, what they should do, what they should not do, because sometimes it can be hard... this could help to for example, when you're creating, you know, like a RACI thing; responsibilities and accountabilities for a project, it could help to clarify boundaries” (V1, senior management).

c) *Use the model (M1) for creating job interview questionnaires*

According to V1 (senior management), the model can be used to create interview questionnaires to guide job interviews when recruiting MMs in agile software teams:

“I could see this model being used to inform recruitment, especially how I can create the kind of questions I can ask when I'm interviewing people. This [model] will help me to create certain questions that are..., ‘Ok, if you were performing this role, give me an example of how you did this kind of thing’. So, I can create role-based and skill-based questions and try and understand specifically when they were performing this kind of role in the previous projects” (V1, senior management).

d) *Use the model (M1) as an auditing tool*

According to V2 (MM), there can be detrimental effects on ASD projects if some of the PG roles described in M1 are not available in agile project teams. Therefore, V2 opines that the model can be used for auditing purposes:

“I think it's [the model] also good for..., for lack of better word, for auditing purposes; for organisations and teams to reflect and ask, ‘do we have anybody filling this role today? Do

we need someone to fill this role?... Because oftentimes lack of some of the roles that I saw in this model can be detrimental to the project, so looking through it and using it, you know, even before the project start, having that clarity on the roles that, you know, they need people to play in the project” (V2, MM).

2. Understandability

Several validators felt that descriptions and details in M1 were clear and easy to understand, albeit organisations will need to adapt it accordingly. For example, V4 (senior management) and V1 (senior management) commented:

“it's clear for me as an experienced recruiter and practitioner of agile software development what those roles are.” (V4).

“I think they need to be customised to the organisation..., the organisation has to look at that and adapt..., adapt it for them [for themselves]... But as a general framework, yeah, I mean it's pretty detailed and the description is quite good” (V1).

Conversely, one validator (V6, MM) opined that some descriptions and details were not clear. This is because in his opinion some roles and the language/terms used to label them seem foreign to agile project delivery with respect to roles that MMs can perform.

3. Organisation

Validators felt the descriptions and details in M1 were arranged and presented in an organised, acceptable, and relatable manner. For example, V6 (MM) and V3 (MM) commented:

“Yeah, it's presented in an organised and acceptable manner” (V6, MM).

“Oh yeah, oh yeah. It was one of the things..., it was one of the first things that caught my eye in this exercise and like I said it's very relatable. It's easy to understand and that's one of the things that excited me when I kept reading this document” (V3, MM).

Conversely, V1 (senior management) expressed reservations regarding the organisation of the model. According to him, the role categories in the model (e.g., monitoring, capability building, planning and coordination for project alignment and execution) are interlinked and not mutually exclusive, which in his view seems to be duplication in the Model. He opined that it would be better to have only the PG roles and their descriptions in the model without the role categories so as to eliminate the perceived duplication.

“I just spot a few duplication, but that's minor, but more again how a particular organisation needs to adapt it for their need, that's where it will be key... So, when I say duplication, I'm meaning because you're starting from role category and then you're saying what's the middle manager role and then the role description. Would it not be better if you just have the role and the role description? Because like monitoring role, capability building role, planning and coordination for project alignment, but they are kind of interlinked right. Some of them are not mutually exclusive.”

V1 further opines that in smaller organisations, a MM may perform many roles in the model, whereas in larger organisations a MM may perform a single role or fewer roles. Hence, customisation and adaptation of the model by organisations may require further synthesis and simplification depending on organisational and project needs. Alternatively, V1 recommended further research work aimed at combining M1 and M2 into a meta-model, thereby providing a single resource that describes the roles and competencies of MMs in agile PG. This alternative may be easier and simpler for organisations to adapt the two models.

“what is coming to my mind is can you combine these two [models] together somehow to create a meta model so it's easier and simpler for organisations to adapt it?... Integrate and synthesise this in such a way that you have one framework that combines roles and competencies because they're not really separate. For you to be effective in your role, you need to be competent at the same time” (V1).

4. Comprehensiveness

Several validators agreed that M1 was comprehensive and sufficiently detailed in terms of roles' descriptions and details. For example, V2 (MM) commented:

“I think the descriptions have..., are a detailed enough. Again, you don't want to have too many things to be able to, you know, to overwhelm people. So, I think it's detailed enough for organisations and individuals to be able to now use it to expand more on it if needed” (V2, MM).

However, some validators expressed reservations. V6 (MM) felt the descriptions of some roles in the model did not sufficiently capture all possible competencies that are required to fulfil those roles. Also, he felt the model did not capture all possible PG roles that MMs perform in agile project environments. V4 (senior management) acknowledges that the model highlights what MMs

do. However, it does not adequately describe in detail how they accomplish what they do—this is especially important for training purposes:

“I think what you've said is ‘what’ they're doing, but it's the ‘how to’ that we would need to develop for the training programmes... how would you do that task that you’ve defined in that role description?... What are the techniques? What are the skills? What are the approaches that you would need to follow?” (V4).

Z.2: Model of Middle Management Competencies in Agile Project Governance (M2)

1. Relevance and Importance

- *Use the model (M2) for producing job descriptions and person specifications for MMgmt recruitment*

All validators agreed that M2 will be useful to produce job descriptions and person specifications when recruiting people into MMgmt positions in agile software teams. It was affirmed that the model covers a wide range of competence aspects and valuable details that senior management would focus on when recruiting MMs for agile software teams. It provides a competence-related language that can be used for MMgmt recruitment.

“in the model there's a lot of areas covered, which..., like people orientation or results orientation. So yeah, in nutshell, yes, absolutely, because it highlights really important points that I would look for when recruiting a middle manager... it provides a language that that you can use” (V1, senior management).

The model identifies various competencies in subcategories, which will be helpful to hiring managers in identifying various skills they might require for MM positions in agile software teams. For example, V2 commented:

“So, if I think about teaching and coaching skill, that was one of this one I think in the input competence. So, for example, if I was to hire senior developer for example for my team, it will be a skill that we will require... I see it more as a checklist and also toolbox that I can look through and be able to pick aspects that are more..., maybe another approach might be you know using the weighted approach towards it, selecting the top competencies that will be needed for that role” (V2, MM).

V2 further noted that some organisations (including his organisation) lack competency models that can help hiring managers to think more holistically about core competencies they need from their MMs:

“often times for recruitment, especially when you're recruiting middle management as well, there's a..., you don't have..., most organisations, at least in my organisation, we don't have a document like this or a competency model like this that enables hiring managers to be able to say ‘Ok for this role, what are the core competencies that I need to hire for this role? So, this competency model brings that additional aspect of what are the core competencies and

skills that we should be looking at. Apart from the generic, you know, very technical skills that we often seem to focus on” (V2, MM).

V3 (MM) affirmed that the model will be very important to HR personnel as a resource to help guide MMgmt recruitment into agile software teams in his organisation. It will help all parties understand the competency expectations relating to job roles that need to be filled:

“what you find most of the time in recruitment is this ‘copy and paste’ mentality with..., from the HR folks. And most of the time it doesn't really give you details into what the expectation is on that role. So, with this [model] it helps anybody really even guys in the HR space to understand where these different competencies lie and what their expectation might be from anybody they're willing to recruit in this space... it [the model] is very explanatory and it helps to identify and make that conversation easier for anybody to hire somebody in that role... I think this is super important to Human Resources because from a hiring perspective, they are the first line of defence... So, this helps them [HR personnel] to even understand what those roles entail... this [the model] helps everybody understand, and it helps even the HR person have a more rounded conversation with the person they're recruiting” (V3, MM).

V4 (senior management) felt the model will be useful, but noted that besides aiming to recruit MMs that satisfy a specified set of competencies, it is important to look out for candidates that have the ability to learn or acquire those competencies on the job.

According to V6 (MM), the process of producing job descriptions and person specifications can be challenging. This is because oftentimes it is difficult to remember all desired competencies or qualities pertaining to a job role (which are used for job interviews) without referring to a framework or model. Hence, he affirmed that M2 will be helpful as a guidance model for identifying various skill sets and traits that are desired from candidates for MMgmt roles in agile software teams.

“The challenge we have when writing job specifications is adopting a standard that articulates all of the competencies you want to interview against... There are several other qualities that you would want in a candidate that often when you sit down to write a job spec without a framework, you will easily miss out in documenting or capturing some of those expected traits without a guidance model. This seems like a useful model for purposes of describing or writing

down a job description. You may not need to tick everything here for every single job... this model seems useful to me for helping identify many, if not most, of the skill sets that you would want in a candidate for middle management role” (V6, MM).

Based on V6’s comment above, not all competencies described in the model will need to be specified for every MMgmt job—different sub-sets of competencies may be required for different MMgmt job roles. V5 (LOW) concurred, noting:

“And this would definitely depend on each job role. And also on the company, what the company itself like prioritises according to their culture” (V5, LOW).

According to V1 (senior management), several competencies in the model are applicable to MMs in general and not particularly to agile MMs (MMs in ASD projects) alone:

“what I’m trying to also see here is that a lot of the competencies that you have highlighted are not different from any middle manager one would recruit, so the language would be very familiar to HR because if they’re recruiting middle managers they would use it anyways. So not only agile, but generally when you look for middle managers... So what I think it will need more is how agile [MM] is different from any middle manager you’re recruiting, let’s say in operations or in other areas or functions” (V1).

V5 (LOW) noted that the model will be useful to HR personnel for initial screening of MMgmt candidates at initial stages of the recruitment process. Following this, hiring managers (who know the sort of people they need) will likely need to take charge and utilise the model for in-depth conversations with candidates to determine their suitability for vacant positions. According to V5, the model serves as a resource that can be used to objectively compare MMgmt candidates so as to avoid bias in the candidate selection process. However, V5 expressed concern about focusing too much on personality:

“my challenge with..., like I mentioned is the personality side of things, which might..., If too heavy a focus is placed on it, it might lead to like a selection bias where companies, you know, hire only specific kinds of people, which might reduce diversity and things like that. But otherwise, I think it’s a good model” (V5, LOW).

Ultimately, the model will be relevant and important to hiring managers and/or HR personnel for MMgmt recruitment in agile project environments. However, this may not apply to HR functions

that do not handle recruitment as in V4's organisation, where the HR function deals with HR policy and Delivery function deals with personnel recruitment.

- *Use the model (M2) as an education and training tool for continuing professional development and self-development*

Several validators felt that M2 will be useful as an education and training tool for their continuing professional development and self-development with respect to learning about the competencies of MMs in agile PG. V1 commented:

“Yeah, you can use it as a as a tool to understand learning and development needs analysis i.e., where you are currently as a person to where..., what areas you need to develop, where you are strong versus where there are opportunities for further work... I can also see how a training or a learning and development plan can also be created based on that kind of needs analysis using this competency model” (V1, senior management).

The model can be used as a base resource to create training materials as V5 (LOW) commented:

“I think this can be the starting point of a training material on something like what companies do... And this material can be like the foundation for such a training programme, of course, it will need to be like heavily expanded, you know, all these different skills, adding case studies and scenarios and things like that. But yeah, this can serve as a foundation for a training material” (V5, LOW).

According to V3 (MM), the model will be helpful to anyone that is interested in learning about the agile domain and competencies that MMs need to have in order to be successful in the agile teams. It will also be of benefit to organisations and individuals that provide training courses. The model can serve as useful resource for self-evaluation, and it will benefit senior management as well as V6 commented:

“I think it will be a useful guide for..., I think it will be useful for checking yourself against the relevant skill set to continue to be effective in what you do... Yeah, it looks good to me, yes... senior managers will benefit from this [model] as well” (V6, MM).

It was also affirmed that the model will help MMs and prospective MMs to identify and understand competencies they may be lacking in order to develop such competencies and function in MMgmt job roles within agile software teams and projects. However, according to V2 (MM), in order to

effectively utilise the model, organisations may need to adapt it to meet their specific needs, and prioritise important competencies:

“I do feel like every organisation that will use it have to adapt it to their specific teams and specific environment... maybe having some weights to it that helps the individual and probably the organisation prioritise what matters most, because we do have a lot of competencies listed out here... for example, if I was to use it, I might use some sort of weight attributes to it to help me understand what are the most critical competencies for the particular role” (V2, MM).

V1 (senior management) acknowledged that the model highlights competencies that are exclusive to agile MMs, such as *Implementing agile project delivery approach*, however, the descriptions are not sufficiently detailed; it would be valuable to expand such competencies to include details of specific practices, techniques, and methods:

“I think what's missing for me..., As I said to you, what is specific about agile that differentiates somebody..., a middle manager who's just a middle manager in operations or finance or any other function compared to a middle manager who's in Agile software development. So, for me that is not clear... therefore what I should be looking for in the middle manager whilst recruiting or training which is domain specific that a finance middle manager doesn't need to know, or an operations middle manager doesn't need to know... yes, I can see how this language and this framework can help middle managers to improve their management style and capability” (V1).

V6 (MM) noted that in course of performing day-to-day agile project delivery, MMs may overlook certain competencies. The model can serve as a reminder:

“And sometimes you need a little bit of a reminder in order not to drop certain skills. I think a chart like this..., a model like this could be useful for checking yourself against to ensure that you are continually balancing out your various skills and not diminishing in any particular area” (V6, MM).

According to V2 (MM), the model will be helpful to traditional/non-agile MMs that are transitioning to the agile way of working:

“And even looking back to my career, thinking about people who move from say project management waterfall processes towards the agile side of things, I see how this competency

model could be like an assessment..., it can be used for self-assessment for people to understand and know where they need to improve” (V2, MM).

V3 (MM) affirmed that the model will be helpful to agile MMs that aspire to progress into senior management positions for their career development planning and capability building:

“As you continue to apply your trade and continue to look into your career, especially for me going forward into senior management, this helps to identify those competencies, those skills that make it to the top. So, it’s easy to see what I’m lacking and what my strengths are and begin to work on some of the things I may identify as weaknesses” (V3, MM).

The model can help maintain skilled workforce in agile-practicing organisations. According to V4 (senior management), the model can help agile project teams assess themselves by performing competency gap analysis to identify current strong points, desired competencies, and competency gaps in order to inform team development and learning and development initiatives, such as training programmes:

“Not for my personal self-development, but potentially for some of my team... it reinforces what I already know... Yes, I think potentially it would help identify some skills gaps, which would then be able to drive the development and the training programmes for our teams... I think it's probably not as detailed to be able to develop a training..., actual training materials or programmes, but it does give that higher level view of the sort of skills that we need to look for within a training and development programme... it would need to be a little bit more lower level to be able to develop those techniques and training that would give them [team members] the relevant knowledge to perform” (V4).

V2 (MM) affirmed that the model will be helpful to prospective agile MMs that aspire to progress into MM positions for their career development planning and capability building. This is because it captures several competencies that prospective MMs may fail to consider as pertinent competencies:

“often times people who want to become middle management, we as individual contributors, you don't think about that people orientation. You don't think about things like, you know, diplomacy... You don't think about, you know, shared ownership mindset or being open or

how to be able to balance liberality and rigidity. So, I do see this as also being helpful for aspiring middle managers... I also see this competency model as something that, especially the segmentations or the categories, are some things that you know middle management themselves can use to help their direct reports or other people under them; be it for mentoring, or even for career guidance and career planning” (V2, MM).

According to V3 (MM), M2 will be useful for educators in teaching ASD, agile project management, product management, and traditional project management courses. Below is an exchange during V3’s interview.

V3: *“I conduct a fair bit of coaching where I teach product management and agile project management and software development once in a while. And I think this is gonna be very valuable to helping people, not just learn about the space but also learn what the expectation is from them from a competency level—what they need to equip themselves with... So, this would also help with anybody who’s involved in coaching, who’s involved in even traditional teachings of project management, agile software development. This helps a great deal.”*

Researcher: *“So, both models help for teaching generally and coaching?”*

V3: *“Yes.”*

- *Use the model (M2) as a performance framework resource to help create and define specific criteria and indicators for MMs’ job performance*

All validators agreed that the model will be useful in their organisations as a performance framework resource to help create and define specific criteria and indicators for MMs’ job performance. However, the model would need to be customised:

“it’s a great starting point... when you talk about performance objectives then they are, you know, specific to the role and the person... like objective always is SMART, measurable, realistic, that kind of thing. So, great framework but it needs to be further..., made slightly more objective for people, so that they are..., they understand how they demonstrate that behavior on a day-to-day basis... A slight customisation [is needed], not a lot of customisation, but slight to make it more relevant to that organisation and the job role that person is performing” (V1, senior management).

According to V4 (senior management), the customisation should include performance-level criteria/scales, which are important to determine whether or not MMs are achieving performance expectations, and identify areas MMs need to develop in order to improve their performance.

V2 (MM) affirmed that the model can be used as a tailored performance assessment resource:

“the company being able to translate what are those competencies that are most valuable for them and be able to attach certain weights to them and use that to be able to evaluate their people on a yearly basis as opposed to some of the very generic what’s it called performance assessments that we do—by the way my company does that—which is not very focused as this competency model” (V2, MM).

According to V3 (MM), the model can facilitate performance assessment conversations involving MMs because it can be used to highlight areas for improvement and inform steps they can take to improve their performance for career growth based on the described competencies.

“you could use it for that in the sense that it's easy for people to understand why they're being scaled, or why they are being graded at different..., on different points of the scale... So, this makes that conversation easy again, and it's easy to help them understand what they need to work on and what they need to do to develop to the next level in their career” (V3, MM).

Although V5 (LOW) felt that the model can be used to inform performance assessments for agile MMs, he expressed concern regarding the personal competencies:

“It can, although, there's a challenge with the part of personal characteristics if weights are assigned to those kind of things, then it might create some..., some kind of bias if it's not implemented properly. So, like you can start incentivising certain kinds of people, you know, just based on who they are personally and not, you know, really only about say input and output characteristics. That's the only challenge I would have with it. But otherwise, yeah, it can. It can be used as a basis of evaluation” (V5, LOW).

According to V6 (MM), the model can serve as a company-wide standard for assessing the performance of MMs in agile software teams and projects based on various competencies described therein. It can help to establish uniformity in an organisation with respect to the way their agile MMs are assessed irrespective of the assessors.

“Because otherwise if you don't have a standard or a framework various managers would evaluate their middle managers using various..., various standards or against various

standards. But this [the model] can provide the standard against all managers to use to evaluate their middle managers that are reporting to them” (V6, MM).

- *Additional use case of the model*

- a) *Use the model (M2) for creating project team member profiles*

When responding to questions on M1 (model of MM roles), V1 (senior management) opined that M2 can be used in conjunction with M1 to create tags of skills and PG roles that MMs can perform:

“both these models, the one previous [M2] and this one [M1] can also be used to create a profile of an individual, he or she or they can be suitable for certain projects or not, based on their competence and based on the roles they have done in the past and they’re capable of performing. So, you pick the right people for the right project” (V1).

2. Understandability

All validators agreed that descriptions and details in M2 were clear and easy to understand. For example, V1 and V3 noted:

“Yeah, they're fairly clear and written in what I call simple English, so it's not confusing. So any..., let's say a HR person can pick this up and create a competency profile.” (V1).

“That's an easy yes, because I really like the way like I said, the way you identified all the business segments, business, social-relational, delivery, people orientation and all the different competencies that are very relevant to those spaces” (V3, MM).

3. Organisation

Several validators felt that descriptions and details in M2 were arranged and presented in an organised and acceptable manner. However, others expressed reservations. For example, on the positive aspect, V5 (LOW) commented:

“Yes, yes, it's well laid out” (V5, LOW).

V3 (MM) said the descriptions and details were very organised, but, he felt the diagram was cramped and recommended an adjustment to it so that contents were more readable and spacious and less congested:

“Oh yeah, yeah, they are very organised. They are. Like I said, something that anybody I think who really understands what it takes to grow anybody would easily relate to this and would

really adopt it to foster their career... I know you tried to cram some of these things into this document, but it would help to have..., to have it a bit more readable as it is on this image, right?... it would be useful to have a way of highlighting it so that it pops up more at anybody who's looking at this" (V3, MM).

V1 (senior management), assessing the model based on the framework (or perspective) of knowledge, skills, and abilities (KSA), suggests overlap and duplication of competencies:

"I see a lot of overlaps and duplication in there. So, perhaps there is a way to condense it in such a way that..., Like adaptability and adaptable as one kind of area kind of features in 2 to 3 different things. So, maybe it's a way to..., if you can look at how do you compress it, synthesize it, and make it easier I guess, not losing the essence of the model or the competency but making it a lot easier... typically when you do competency models, you look at knowledge, skills, and attitude (KSA)... So, whether you call it input competence or an output competence, ultimately even in the input competence, you're still looking at what kind of knowledge you need... this is the framework [KSA] I have in mind. So, I'm kind of looking at..., at that perspective, and this is the language I think HR people will know from their HR backgrounds... But this is my experience. Of course, different organisations may do it differently" (V1).

V4 (senior management) also affirmed that descriptions and details were very clear but noted that the competency descriptions should be particularised to include more details:

"Yes, I think so. I would just say maybe on the competency description, just maybe some lower-level on some of the..., some of the points might be useful, but it is very clear." (V4).

4. Comprehensiveness

Several validators agreed that M2 was comprehensive and sufficiently detailed in terms of its content, descriptions, and details. V6 (MM) affirmed that the model's diagram was well-presented and appropriate because it presented the competence aspects, competencies, and their relationships in a single comprehensive view:

"I like the one-pager [model diagram]... In a busy work environment one-pagers are winners. I think this view [the model diagram] is very good... I think it is..., at this level, it is well-presented because you can see all of the skill sets on one page and you can see how they relate so what areas they relate to. So, input competences that's well named, because it's for the benefit of the individual, right. Output competences, again I think that's well named because

now you're beginning to produce value for the organisation. And then personal competences, I think my reading of that is qualities, right, expected qualities of the individual.” (V6, MM).

V4 (senior management) expressed reservations; she referred to her previous comment regarding particularisation of competency descriptions to include more details, such as specific techniques.

Appendix AA: Practical Implications of the Two Models

Table AA1: Practical implications of the M1 and M2 based on validation study findings

Implication area	Description
PG in ASD projects	<ul style="list-style-type: none"> • Adoption of the two models can impact the machinery of PG in ASD projects in organisations. • M1 can help in understanding the governance structure of ASD projects with respect to MMgmt and the PG roles they play, as well as workplace culture and behaviors of agile software teams and organisations. Notwithstanding, the PG roles performed by MMs will vary from organisation to organisation considering that PG governance structures, practices, and requirements in organisations are highly contextual. Company culture, direction, size, and geographical contexts may influence or limit the adoption and practice of some of these PG roles in companies. • The two models can be used to create project team member profiles comprised of tags of skills and PG roles that MMs can perform. This can help in identifying individuals that are suitable for certain ASD projects based on their capabilities and roles they have performed in previous projects. This will be useful when forming project teams to help ensure the right people are allocated to the right projects. • M1 can help to better clarify the MMgmt PG roles, and duties that are expected of people that perform those roles. • M1 can help to set the expectations of MMs taking up the PG roles, thereby helping them to understand the expectations of those roles. • M1 can be useful for creating RACI matrices for responsibility assignment in ASD projects. • M1 can be useful when defining and clarifying the boundaries of roles during agile projects with respect to project-specific roles that MMs perform. • M1 can be used for project auditing purposes in organisations and agile teams with respect to the PG structures of ASD projects prior to project commencement, as well as assessing the PG structures during project implementation. For this purpose, M1 can be used to (a) specify which MMgmt PG roles are needed in projects based on project needs (thereby ensuring requisite roles are included), and (b) verify that specified PG roles are being manned during projects. • M2 will be helpful in learning about important competencies that MMs need to have in ASD project settings in the interest of PG. However, the model will need to be customised by adding relative weights to individual competencies in the model so as to indicate and prioritise the key competencies that MMs need to learn or cultivate for particular PG roles they perform, based on each organisation's requirements and preferences. Generally, M2 can help agile project teams assess themselves in the interest of PG by enabling them to perform competency gap analysis to identify current strong points, desired competencies, and competency gaps in order to inform team development, which is vital for project success. The model will help maintain skilled agile project teams.
MMgmt recruitment for agile software teams and projects	<ul style="list-style-type: none"> • HR personnel and/or hiring managers can use the two models to produce job descriptions and person specifications when recruiting MMs into their agile software teams. • The two models can help hiring managers to select individuals that have the abilities they are looking for when recruiting for MMgmt positions. • Changes to the recruitment policies of organisations may result from adoption of the two models. For example, adoption of the two models can help minimise the recruitment practice of utilising generic 'cut and paste' information for job details by enabling recruiters to produce job descriptions and person specifications that are tailor-made for recruitment of MMs into agile software teams and projects, thereby facilitating thorough and better recruitment conversations with potential candidates so as to determine their suitability and make informed candidate selections.

	<ul style="list-style-type: none"> • The two models can serve as resources for screening and objectively comparing MMgmt candidates. However, care should be taken to avoid excessive focus on personal competencies described in M2 because that may undermine objectivity in the MMgmt recruitment process due to potential candidate selection bias. It may lead to preferential treatments (e.g., job offers) in favour of MMs that have certain personality characteristics, which may affect diversity in the workplace. • M1 can be useful for specifying the roles and responsibilities that individuals being recruited into MMgmt job positions will need to perform in agile software projects. However, these roles and responsibilities may vary across organisations due to varying organisational contexts, cultures, and preferences. • M1 can help potential MMgmt candidates to evaluate the kind of role(s) they will be taking up with full awareness of role expectations to avoid employee attrition. • M1 can be used by hiring managers to formulate role-based and skill-based questions and create interview questionnaires for MMgmt recruitment so as to understand how potential candidates perform particular PG roles in previous projects they have been part of. • M1 can be useful to organisations for creating archetypes of MMgmt positions for recruitments purposes—archetypes of managers and senior staff engineers, for example. • Organisations can benefit from M2 because it will help ensure that they recruit the right MMs with the right competencies at the right levels. • The process of producing job descriptions and person specifications can be challenging. This is because oftentimes it is difficult to remember all desired competencies or qualities pertaining to a job role (which are often used for job interviews) without referring to a framework or model. Some organisations lack competency models that can help hiring managers to identify and decide on specific competencies that are required in candidates for certain MMgmt job roles. M2 contributes in filling this gap. Therefore, M2 will be helpful as a guidance model for identifying various skill sets and traits that are desired from candidates for MMgmt roles in agile software teams. The model can be useful for specifying a wide range of competencies that candidates for MMgmt job positions will need to possess. However, this will vary from job role to job role. It will also depend on organisational culture and requirements. Different organisations may place greater importance on certain competencies above others due to their organisation-specific preferences, working environments, or needs. • M2 provides a broad perspective of competencies that MMs in agile project settings should have. Therefore, it will help hiring managers to think more holistically about core competencies they need from their MMs—from multiple aspects—rather than focusing solely on specific aspects, such as technical skills.
MMgmt recruitment for traditional software teams and projects	<ul style="list-style-type: none"> • Several roles and competencies in M1 and M2, respectively, may be applicable to MMs in general and not particularly to agile MMs only. Therefore, HR personnel and hiring managers may be able to use the models to recruit MMs that operate in traditional/non-agile project settings.
Learning and development of MMs, prospective MMs and senior managers, senior management, and project teams in agile-practicing organisations	<ul style="list-style-type: none"> • The two models can be used as education and training tools for employee learning and development. They can be used by MMs, prospective MMs, and HR personnel for periodic learning and development needs analysis to identify and evaluate individual training needs of MMs and prospective MMs for their continuing professional development and self-development. The models will be valuable for determining the current strengths and areas for further development in an organisation’s agile workforce. The two models will also benefit senior management with respect to learning about the various roles of MMs in agile PG and important competencies that MMs should have when working in agile software projects. For instance, senior managers can leverage insights from the models to help new MMs in their teams acclimatise to their MMgmt positions and responsibilities through mentoring and employee coaching. • The two models will be valuable to people that are interested in learning about the agile domain, as well as the roles of MMgmt in agile settings and competencies expected from agile MMs. • Organisations can benefit from using the two models as resources for developing tailored training and development programmes and materials for MMs and prospective MMs that operate in agile software teams and projects. However, organisations will need to enhance M1 to include

	<p>additional details regarding the ‘how-to’ associated with responsibilities under the various MMgmt PG roles, i.e., the skills, tools, methods, techniques, and approaches that MMs would need to apply when performing the roles. They will also need to include scenarios, case studies, and other additional details regarding the ‘how-to’ associated with competencies described in M2, i.e., the specific techniques, options, and approaches that MMs and prospective MMs would need to learn, as well as apply in different project situations as they exercise various competencies. Organisational business methods, techniques, and approaches for day-to-day operations differ from organisation to organisation—the agile methods and practices that are adopted in various organisations, for example. Such contextual elements will influence how organisations ultimately expand the contents of the models to design their training and development programmes and materials.</p> <ul style="list-style-type: none"> • The two models can be used as company-wide resources for career development planning, which will be particularly useful to MMs and prospective MMs. • MMs and prospective MMs can benefit from using the two models as resources to help them identify competencies they may be lacking so that they can develop such competencies in order to be effective in MMgmt roles and responsibilities in agile software teams and projects. Regarding M2, for instance, it captures several competencies that prospective MMs may fail to consider as pertinent competencies that are needed for MMs to function effectively in agile project environments—tact and diplomacy skill, shared project ownership mindset, openness, and liberality–rigidity balance, for example. Therefore, using the model, prospective MMs can assess themselves to determine their strong points and opportunities for improvement so that they can develop competencies in those self-improvement areas and facilitate their career progression in their teams and organisations. • Archetypes of MMgmt positions that are created using M1 can enable prospective MMs to determine where to focus their self-development efforts, as well as help them plan their career development strategies in order to develop themselves and achieve career goals. • For agile-practicing organisations that may choose to use M1 as a standard, it will help promote transparency and minimise bias with respect to career growth requirements and opportunities in the workplace. This is because the model can offer prospective MMs a sense of equality of opportunities and fairness so that they can strive for higher responsibilities in the organisation on equal terms. • M2 will be helpful to agile MMs that aspire to progress into senior management positions to drive their career development planning and capability building. Using the model, prospective senior managers can assess themselves to determine their strong points and opportunities for improvement so that they can develop competencies in those self-improvement areas and facilitate their career progression into the highest level of management. • M2 can help agile project teams assess themselves by enabling them to perform competency gap analysis to identify current strong points, desired competencies, and competency gaps in order to inform team development and learning and development initiatives, such as training programmes. • MMs can effectively draw on M2 to support the professional development and growth of their subordinates in agile teams through learning and development initiatives, such as mentoring and employee coaching, as well as provision of career guidance and career development planning support.
<p>Learning and development of practitioners in the traditional domain</p>	<ul style="list-style-type: none"> • The two models will be valuable—as teaching resources—to organisations and individuals (educators) that are involved in teaching traditional project management. • People tend to embark on learning about various agile-related topics (e.g., agile project management, agile product management) but fail to gather knowledge regarding the competency expectations that are important for them to succeed in practice. Consequently, they struggle in performing their agile-related jobs. M2 will be helpful to traditional/non-agile MMs that are transitioning to the agile way of working. It can aid traditional MMs in their self-assessment so as to identify and understand learning and development needs and areas for improvement to enable them improve their managerial approach and succeed in agile project environments. Using the model, traditional MMs can gain better understanding of competency expectations for MMgmt in agile project environments.

	<ul style="list-style-type: none"> • M2 can help maintain skilled workforce in traditional organisations.
Training providers	<ul style="list-style-type: none"> • The two models will be valuable to organisations and individuals that provide training courses on agile-related topics (e.g., ASD, agile project management, agile product management). They can be adapted as teaching resources aimed at MMs. Educators may be able to use the models to design and deliver tailored and personalised training materials and programmes in order to train skilled and productive professionals that can meet the demands of their jobs as MMs in the software teams.
MMgmt performance management in agile-practicing organisations	<ul style="list-style-type: none"> • Adoption of the two models may impact performance management policies of organisations with respect to assessment of their agile MMs. • Organisations can benefit from the two models by using them as performance framework resources to help create and define specific criteria and indicators for assessing the performance of MMs in their job roles and project-specific roles. For this purpose, organisations will need to customise the models and clearly define the performance assessment scope, specific performance assessment objectives, and preferred performance-level criteria/scales to suit their needs and environments. Regarding M2, organisations may choose to apply relative weights to the various competencies to indicate key competencies that are required in their environment for specific MMgmt job roles; these are the competencies that MMs will be assessed against periodically. However, care should be taken to avoid excessive focus on personal competencies because that may undermine objectivity in performance assessment processes due to potential bias. It may lead to preferential treatments (e.g., provision of workplace incentives) in favour of MMs that have certain personality characteristics. Notwithstanding, the models will not only enable organisations to determine whether or not MMs are achieving performance expectations, it will also help them identify specific areas MMs need to develop. This way, organisations can provide personalised support that will help MMs to unlock their potentials and improve their performance. • Some organisations may lack uniform standards for assessing their MMs. Performance management policies that allow various superiors to evaluate their MMs using different standards may contribute to poor, confusing, and unsystematic performance assessment processes. The two models can be used to develop company-wide standards for assessing the performance of MMs in agile software teams and projects. This can help to establish uniformity and transparency in organisations with respect to the way their MMs are assessed, regardless of who the assessors are.

Appendix AB: Recommendations from Validation Study

Table AB1: Recommendations based on validation study findings

Aspect	Model	Recommendation
Guidelines and modifications to facilitate model utilisation in practice	M1	1) General: The model should be modified to depict only the PG roles and their descriptions without having the role categories so as to eliminate the perceived duplication or overlaps.
		2) Middle management recruitment: The PG roles and associated responsibilities should be clearly specified and detailed by HR personnel and/or hiring managers when included in job advertisements so that job seekers (e.g., MMs) can have a clear understanding of what each role entails. This is subject to each organisation’s adaptation of the model.
		3) Middle management recruitment: Depending on how organisations operate, when the model is used by HR personnel, hiring managers may need to confirm that HR personnel are selecting and specifying the right roles and descriptions from the model in job advertisements so as to ensure alignment with the hiring requirements of hiring managers.
		4) Learning and development: The model should be enhanced to include further details regarding the ‘how-to’ associated with the responsibilities under the various MMgmt PG roles, i.e., the specific skills, tools, methods, techniques, and approaches that MMs would need to apply to perform the duties that are defined in each role description. This is especially important for training purposes.
		5) Middle management performance assessment: Depending on how organisations choose to adapt and utilise the model, it may be adapted to appraise a MM’s job performance that pertains to his/her official job role (job title) in an organisation for a given appraisal period. This may be achieved by evaluating the performance of MMs for each specific PG role in M1 they have performed (i.e., role performance) in ASD projects they have been involved in for a given appraisal period. In this context, performance of MMs in each PG role forms part of their overall job performance to meet employment expectations pertaining to their official job roles (job titles). Alternatively, appraisal using M1 may be project-based only, i.e., limited to a MM’s performance in specific PG roles that s/he performed (i.e., role performance) in ASD projects, without forming part of his/her job performance pertaining to his/her official job role (job title). Ultimately, customisation of the model and how it is applied for performance assessment should be organisation-specific in line with each organisation’s performance management policy.
		6) Middle management performance assessment: The model will have to be customised by organisations to include preferred performance-level criteria/scales to suit each organisation’s specific needs and environment. The performance-level criteria/scales are important to determine whether or not MMs are achieving performance expectations.
	M2	7) General: Further synthesis of the model is recommended in order to align with the knowledge, skills, and abilities (KSA) format, which HR personnel in some organisations may be more accustomed to. Some organisations may choose to synthesise the model in order to align with the KSA format. Guidelines should be provided to organisations with or without an existing MMgmt competency framework in order to facilitate their utilisation and adaptation of the model.
		8) General: The model diagram should be adjusted so that its contents are more readable and spacious and less congested. Organisations may choose to adjust the model diagram to meet their presentation preferences.

Aspect	Model	Recommendation
		<p>9) Middle management recruitment: The model may be used by HR personnel for initial screening of MMgmt candidates at initial stages of the recruitment process. Following this, hiring managers (who know the sort of people they need) may need to take charge and utilise the model for in-depth conversations with candidates to determine their suitability for vacant positions. The model can serve as a resource that can be used to objectively compare MMgmt candidates so as to avoid bias in the candidate selection process. Care should be taken to avoid excessive focus on personal competencies as it may undermine objectivity in the MMgmt recruitment process due to potential candidate selection bias. It may lead to preferential treatment (e.g., job offers) in favour of MMs that have certain personality characteristics, which may affect diversity in the workplace.</p> <p>10) Learning and development: In order to effectively use the model as a training material for training programmes, it should be enhanced to include further details regarding the ‘how-to’ associated with competencies that are described therein. This enhancement should include details of specific techniques, options, and approaches that current and prospective agile MMs would need to learn, as well as apply in different project situations as they exercise various competencies. On their part, organisations can expand and adapt the model as a training material by including relevant techniques, options, and approaches, scenarios, and case studies that are applicable to their unique organisational contexts.</p> <p>11) Learning and development: In order to use the model as a training material for training programmes, it will be necessary to expand it by including other necessary contents—scenarios and case studies, for example. This customisation can be organisation-specific.</p> <p>12) Learning and development: Organisations may choose to include relative weights to various competencies in the model to help employees identify, understand, and prioritise the most critical or ‘must-have’ competencies that MMs need to learn or cultivate for particular MMgmt roles in ASD projects within organisations.</p> <p>13) Middle management performance assessment: In order to effectively utilise the model for creating and defining specific criteria and indicators for job performance, the model will have to be customised. Organisations will have to define specific competence objectives that people need to demonstrate in their daily work regarding specific MMgmt job roles they occupy. The level of customisation will need to be organisation-specific to suit each organisation’s performance assessment needs.</p> <p>14) Middle management performance assessment: Some organisations may choose to adapt the model by applying relative weights to the various competencies to indicate key competencies that are required for specific MMgmt job roles; these are the competencies that MMs will be assessed against periodically. Care should be taken to avoid excessive focus on personal competencies because it may undermine objectivity in the performance assessment process due to potential bias. It may lead to preferential treatment (e.g., provision of workplace incentives) in favour of MMs that have certain personality characteristics.</p> <p>15) Middle management performance assessment: The model will have to be customised to include preferred performance-level criteria/scales to suit each organisation’s specific needs and environment. The performance-level criteria/scales are important to determine whether or not MMs are achieving performance expectations, and identify areas they need to develop in order to improve their performance.</p>
	M1 and M2	<p>16) Learning and development: The models can be used either separately, or together as complementary learning resources for understanding the multiple roles and competencies of</p>

Aspect	Model	Recommendation
		MMs in agile project environments to help MMs work effectively and facilitate the governance and delivery of ASD projects for project success.
		17) Middle management performance assessment: The models can be used either separately, or together as complementary resources for performance assessment of MMs.
Opportunities for future research	M1	18. Future research should build on the model by investigating MMgmt in ASD projects to identify additional PG roles that MMs perform in order to support agile teams and facilitate project success.
		19) Future research should build on the model by investigating MMgmt in ASD projects to identify specific competencies that MMs need to have to effectively perform each PG role and support their agile teams for project success. The research should identify the specific skills, tools, methods, techniques, and approaches that MMs would need to apply to perform the duties that are defined in each role description. This is especially important for training purposes.
	M2	20) For recruitment purposes, it would be useful to differentiate between the competencies that are applicable to agile MMs and those applicable to non-agile MMs. Therefore recommended future research work should focus on determining the competencies in the model that exclusively apply to MMs in ASD projects, and those that apply to any other MM. This will help establish the difference between agile MMs and non-agile MMs.
		21) Further research work should focus on determining the ‘how-to’ associated with MMgmt competencies that are described in the model. This should identify and include details of specific techniques, options, and approaches that current and prospective agile MMs would need to learn, as well as apply in different project situations as they exercise the various competencies. This is especially important for training purposes.
		22) Further research work should focus on expanding the competencies in the model that are exclusive to MMs in ASD projects— <i>Implementing agile project delivery approach</i> , for example. The expansion may include details of specific practices, techniques, and methods.
	M1 and M2	23) Further research should be aimed at synthesising M1 and M2 into a meta-model that subsumes the two models, thereby providing a single resource that describes the roles and competencies of MMs in agile PG. This alternative may be easier and simpler for organisations to adapt the two models.
24) Future research should be undertaken to determine the relative importance of the roles and competencies in M1 and M2, respectively.		

Appendix AC: Dependability and Confirmability Audit Feedback

Audit feedback template version 1.0

Maduka C. Uwadi

Dependability and Confirmability Audit Feedback

The aim of this audit is to provide a second opinion by examining the research steps employed in the given study in order to (a) ensure data stability and consistency in findings, (b) ascertain whether interpretations, findings, and recommendations are supported by data collected during the study, and (c) ascertain whether data collection, analysis and interpretations have been performed in accordance with standard academic procedures.

Date:	11/27/2022
Name of auditor (a researcher):	[REDACTED]
Organisation:	UCLAN

S/No.	Dependability and Confirmability Audit Dimension		Auditor Comments
1.	Data collection	Application of case study design for interpretive study: <ul style="list-style-type: none"> Refer to report provided (consider the researcher's use of case study protocol, pilot study, sampling, etc.) 	<ul style="list-style-type: none"> The use of the case study design is appropriate in this circumstance given the limited knowledge available of the specific topic as the target of this investigation. The structure of multi-case study design is also appropriate for this topic as it helped provide greater insights through reviewing multiple organizations. The sampling method and implementation appear appropriate in the case, which was somewhat dictated by BANKCOY organization and the TECHCOY team. There are no outstanding issues in this category from an audit perspective.
		Application of interviews: <ul style="list-style-type: none"> Refer to report and interview protocol provided 	<ul style="list-style-type: none"> The interview protocol was well developed and the questions graduated to gain deeper information through the duration of the interviews. Each stage in the interview protocol helped to build onto the stage prior which helped establish continuity in both the interview as well in the outcome narrative.

S/No.	Dependability and Confirmability Audit Dimension	Auditor Comments
		<ul style="list-style-type: none"> • “Further probe” questions seem tied well to the initial questions and will elucidate participant answers. • The last question in the interview protocol helped ensure the participants had an opportunity to provide any addition information they felt necessary to communicate which ensure closure on the topic. • There are no outstanding issues in this category from an audit perspective.
	<p>Application of observations:</p> <ul style="list-style-type: none"> • Refer to report and observation protocol provided 	<ul style="list-style-type: none"> • The observation protocol delivered on the research questions with alignment on the approach as described in the research methods. • Each item in the list of the observation protocol helped to draw out more knowledge from the semi-structured interviews. • In reviewing this list from an audit perspective, it would have been nice to see a direct tie between the stage in the interview protocol and the observation protocol, but this is not a deficiency of either protocol. • There are no outstanding issues in this category from an audit perspective.
	<p>Application of questionnaires:</p> <ul style="list-style-type: none"> • Refer to report and questionnaire provided 	<ul style="list-style-type: none"> • The questionnaire was well developed and aligned to the research study. • The questions focused on background information which provided a clear baseline for the type of organization in both structure and alignment to Agile. • There are no outstanding issues in this category from an audit perspective.
	<p>Application of document analysis:</p> <ul style="list-style-type: none"> • Refer to report and any documents provided 	<ul style="list-style-type: none"> • It is unclear from the documents provided if there were additional documents reviewed for this study.

S/No.	Dependability and Confirmability Audit Dimension		Auditor Comments
2.	Data analysis	Coding process and identification of themes: <ul style="list-style-type: none"> • Refer to report and copy of coding framework provided • Perform coding on the excerpts of data provided 	<ul style="list-style-type: none"> • The coding process seems to have been followed for the research study per the samples provided. • The transcript excerpts provided for the report were single topic and descriptive. • The framework provided clarity on the basic themes, twenty-four per the report, which appear to have been derived through the analysis process. • The framework also provided clarity on the organizing themes, six per the report, which appear to have been derived through the analysis process. • The descriptions for the organizing themes were well developed and clear and seemed aligned. • There are no outstanding issues in this category from an audit perspective.
3.	Findings	Data stability and consistency - agreement between identified themes, interpretations, and grounded in data: <ul style="list-style-type: none"> • Refer to report and excerpts of data provided 	<ul style="list-style-type: none"> • From the sample transcript elements provided, there is consistency between the organizing theme, basic theme, and data. • The descriptions for provided basic themes were consistent with the interpretations of the data and the organizing theme. • There are no outstanding issues in this category from an audit perspective.
<p>Overall:</p> <p>After a thorough review of the content provided as outlined in the above document, the research questions and research methodology are aligned, data collection was structured and delivered consistent output from participants at multiple organizations, and the analysis was well structured delivering basic with descriptions and organizing themes. Throughout this research audit, there are no outstanding issues or inconsistencies.</p> <p>- [REDACTED]</p>			