PLANNING IN CONSTRUCTION PROJECT MANAGEMENT: THE SPANISH PARADIGM

Rafael María Rodríguez Lorenzo

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This work is submitted to the University of Central Lancashire in partial fulfilment of the Degree of Masters in Project Management. I declare that the work presented here is my own work. The work cited from mass literature is duly referenced using Harvard Referencing System.

……..

Champika Liyanage

17th of Sept 2015

ACKNOWLEDGEMENT

Thanks to my parents Miguel and Fina, and my brothers Paco, Miguel, Luis and Mari Carmen for their endless support and love.

Gracias a mis padres Miguel y Fina, y a mis hermanos Paco, Miguel, Luis y Mari Carmen por su infinito apoyo y amor.

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Name: Rafael María Rodríguez Lorenzo

Current Address: Aveniu Doctor Oloriz, 8, 4E, ZP: 18012, GRANADA, SPAIN,

Email: famotril@hotmail.com

Phone:680 921 536

ABSTRACT

Given the adverse times facing the construction industry in Spain partly caused by the impact of the global crisis, which has bankrupted 90% of small and medium-sized companies that encompassed this sector, there have been developed this study in order to find out what were the main causes that have led to this collapse, for through analysis and appraisal, determine solutions to give back construction to the peak of profitable business, through the development of a construction project management best practice guide for construction organisations, based on good practices in planning management.

To achieve this aim it has been conducted a thorough literature study to analyse and understand the leading causes of this situation, and then an appraisal of this data using semi-structured questionnaires sent to professionals belonging to organisations in this sector, which information was contrasted with literary findings by descriptive and inferential statistical analysis.

Through this process, there have been reliably identified the major challenges facing the construction organisations, the obstacles for proper planning and possible solutions to be applied to each particular issue to resolve them.

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Abbreviations

MMR	Mixed-Method Research
SSQ	Semi-Structured Questionnaires
QUAN	Quantitative
QUAL	Qualitative
R & D	Research and Development
A	Company A
B	Company B
C	Company C
SME's	Small and medium-sized enterprises

CHAPTER 1 - INTRODUCTION

1.1 Background

Planning in Construction Project Management is a challenging determinant activity for the correct execution of construction projects. It encompasses: PM Book, (2015) "the choice of technology, the definition of work tasks, the estimation of the required resources and duration for individual tasks, and the identification of any interactions among the different work activities." To explain to someone without specific technical knowledge on the subject, what is the purpose and which is used in the construction management planning, it could be defined as (Harrison, 1981) the area that covers all the required undertakings to "launch" a project through the management of organisations resource, and the management of these resources for (Verheij, 2005) "the projection of the realization or achievement of a plan".

Optimal planning is the differentiating factor in which a construction project is supported to achieve the desired objective, without it in no case may take advantage of the performance of resources available that are all tools that the project manager has available. One of these tools is the time, CICE, (1983) "more than half the time wasted in construction is attributable to poor management practices", moreover Bureau of Labour Statist (Forbes & Ahmed, 2015) assures that "at least 30% of wasted resources are caused by entrenched attitudes in the management of projects." Often these poor efforts are imposed from the policy that puts pressure on managers to give start execution of the work, regardless of the long-term take longer to run if the schedule is not correct. "There is often pressure to skimp on the project initiation and planning phases and begin the implementation phase" (Lucas, 2006). Naoum et al. (2004) highlight the relevance of "project planning as one of the key tools that stakeholders use to ensure that construction projects are successful". The best way to solve a problem is

not to allow this does not even occur, and the best way to achieve this is through strict planning, as explained (Harllet, 2006) "substantial planning will Identify problems before it spots occurs". These standard errors are joined by only applying the concepts of the traditional planning, which is known as "strategic planning, where planning focused solely on all the aspects that were within the quantifiable, regardless there factors that directly affect the project and that cannot be measured", that is why that Mendenhall (2007) uses the term strategic thinking, it involves changes relating to politic, economic, legal, social, and his application is "the synthesis of one's experience, intuition, and creativity, in addition to analysis". Either are necessary for the correct planning of a project. Despite the considerable progress that has experienced the field of planning thanks to technological advances, one cannot overlook the human factor that is the tool that takes the decisive strategic decisions yet by computing convenience is not considered this factor as much as it should, Mintzberg, (1994) "only humans can perform the latter processes. We think in order to act, but we also act in order to think."

Teaching and application of planning in construction are changing, thus the summary experts Southern University of New Orleans, (2010): "Most colleges and universities currently are engaged in long-range planning, it is based in four key stages: monitoring, forecasting, goal setting and implementing." Mainly the purpose of following these four decisive steps is to deal with these questions: “(1) Where is the organisation now? (2) Where is it going? (3) Where does it want to go? (4) What does it have to do to change where it is going to get to where it wants to go? (Renfro, 1980 see Figure 1.1).” This cycle means that the current planning is not just a draft project step, but is a continuous process before the execution to completion and delivery. "It is best to think of planning as a cycle, not a straight-through process." (MindTools.com, 2002).

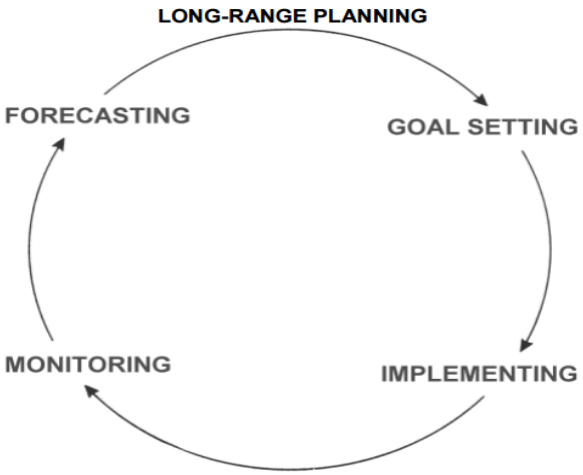

Figure 1.1. (Renfro 1980) Long Range Planning Cycle.

These features and errors in planning practices previously described will be some of the basis for this dissertation, using them as a model to correct and improve, to that end a perfected planning tool is obtained through trial and error technique.

1.2. Statement of problem

The construction industry is suffering a strong recession after the world ascension that experimented a few years ago when it was one of the principal economic growth drivers in many of the most influential financial markets internationally. The causes of this situation have been very diverse factors, some of them related to the internal management of every country and his circumstances, and other coming from the global economic destabilization that have suffered the majority of the economies worldwide in the last years.

Spain is still into this period of instability in the construction sector, to a great extent affected by the current uncertainty that experiments to political, social and economic level. Through this research study will be analysed these and other reasons responsible for this context, to determine what quantity are affecting to this business each of them

and to establish the directives that must be followed to re-arise the construction industry while the appropriate use of planning construction project management.

1.3. Aim and Objectives

Aim:

. Develop a construction project management best practice guide for construction organisations.

Objectives:

1. Synthetize core literature from experienced professionals, project management processes and construction technology.

2. Ascertain key priorities and challenges facing contractor organisational in Spain.

3. Develop a best practice guide for construction planning.

4. Test and validate the best practice guide with domain experts.

1.4. Scope and Limitations

The extent of this dissertation covers the planning phase of actual construction projects, more accurately those related to building and civil engineering. The reason that has defined the scope of planning is because it is at this stage where most value is added to the project, is the fuel that makes the machine start with the right energy required to move, and through the study of a broad range of construction projects literature findings, and the knowledge provided by experts in that area, will be conceptualized the different approaches that can be applied in planning to reach the ultimate goal.

1.5. Methodology

This dissertation is developed with mixed methodology. Mainly, because the aiming source that supply this guide to proper planning is literature findings, questionnaires with qualitative and quantitative analysis, statistical analysis, points of view and considerations of experienced professionals from selected construction companies, all these variety of sources of information was considered essential for the reliability of the final result. The primary data was collected using personal semi-structured questionnaires (SSQ) realised to project planning experts and data testing and validating with professionals belonging to this sector, to be able to quantify their knowledge.

The nature of this epistemological research implies the use of this methodology because the concept of right or bad planning is subjective, also, the burden of subjectivity as determined whether the planning has been successful or not, will be quantifiable with results such as the rigorous fulfilment of time and cost within the provisions regarding each project. Besides, it takes into account the views of stakeholders, because his vision and experience will be helpful to determine the critical factors of planning of these projects because a project is only successful if all stakeholders are satisfied with the final result.

The primary tool to identify, collect, study and synthesize the potential information of specialized sources to form part of this guide will be technical books, journals, articles, reports, specific researches on the subject worldwide available on the internet, about the most influent factors in the current construction situation. After this compilation was developed a professional analytical research, questioning the harmful practices and actual challenges that are experiencing contractors in Spain, determining the responsible factors causing this downgrade. Subsequently, primary data was captured through SSQ replied by workers related to Spanish construction organisations, through a statistical

and conceptual analysis was highlighted what are the critical factors that need the construction industry to ameliorate his situation, i.e., what has been the differentiating factor in their planning that has made it succeed or highlight about others. The distinguishing factor of the guide in this dissertation for successful planning construction projects in reward to others is mainly the sources of information for which the primary data is obtained. For this was realised 12 personal questionnaires with expertise professionals in 3 companies meeting the requirements of having experience in construction planning management, among them, was included contractors, architects engineers and project managers in strategy development and planning coordination. Finally, the knowledge collected was quantified and statistically analysed, getting to a conclusion through testing and validation with an organisation.

1.6. Structure of the dissertation

The main content of the dissertation consists of five chapters, which are divided as follows:

In the first chapter is outlined the purpose for which the dissertation is developed, and it is the aim, and the required objectives to achieve it.

The second chapter is a compendium of the most relevant literature concerning planning in construction project management as well as key challenges of the context and the current situation of Spanish contractors.

In Chapter 3 is detailed the methodology used to develop this study, and the justification for its use according to the characteristics of the result to obtain.

Chapter 4 presents the main findings of the literature and questionnaires that allow developing a guide for proper planning to construction organisations and validation of the guide for professionals.

The fifth and final chapter provides a brief summary of the dissertation and shows final conclusions and recommendations for future research and industry.

CHAPTER 2 - LITERATURE REVIEW

2.1. Introduction

Chapter 2 discusses the circumstances related to planning in construction project management in Spain, since the last decades until the present day. The chapter is divided into two main sections. The first part is a compendium of challenges in policy, economy, fragmentation, risk, innovation and competitiveness, faced by the current contractors of Spanish construction organisation. The second part is about the contractors experience to understand their real situation getting an understanding of their environment and needs, the situation in which are involved and their particular vision about the present scenario through a critical evaluation. Overall, Chapter 2 aims to achieve objectives 1 and 2 highlighted in Section 1.3.

2.2. Ascertain key priorities and challenges facing contractor organisational in Spain.

2.2.1. Political challenge.

Contractors are experiencing challenging times in construction, being one of the professions hardest attacked (the first one in Spain) with the arrival of the global crisis. In modern times, it is a daunting challenge to be a contractor in Spain, one of the main reasons is the lack of judicial support, as always contractors are responsible for most of the adverse events occurring in all stages of the works, regardless of whether are guilty or not, because in the eyes of the law hoard full responsibility as well stated in Article 7.3 of Royal Decree 1627/1997, adapted from the policy of European construction, which makes them all guilty grabbers on accidents, incidents and fatalities that occur in the construction process, regardless of whether the adverse event was caused by the negligence of a worker, mismanagement in planning phase, or data that has been overlooked in the planning stage. This leads to always live with a big weight on their

shoulders, because, beyond high pressure to meet the high demands of the construction projects, it is permanently present the social and legal responsibility of the personnel involved in their projects. The construction health and safety legislation in Spanish has not helped constructors to recover themselves and be active in the business.

To this high pressure must be added the unwillingness of Public Administrations of the government in facilitating the procurement of construction projects, in the last years each Autonomy designed individual plans as financial support to organisations that decide to conduct various kind of projects, delivering generous funding especially for companies that contribute to environmental projects, renewable energy or social causes, such as the construction of subsidized housing (SH), but due to the current political and economic context these subsidies are no longer available after the process of debt in which have been drowned Public Administrations of the 17 Autonomous Communities of Spain, and the only grants received by construction organisations are awarded by the European Union, such as financial support coming from EFRD (European Funds for Regional Development).

It is part of the political reality experienced by the country for some years, as published Gonzales, (1998) complex and restrictive laws do not facilitate the consecution of quality employment, along with the tax regulations have made companies opt for temporary contracts instead of permanent contracts, this creates a chain of insecurity and fear of consumerism that is reflected in the global economy, as the population living in precarious temporary situation fails to engage permanently in the labour market generating a global instability situation . As stated Baldwin and Arango (1999), the new labour reforms have produced a tremendous political and social change that has led to the massive influx of illegal immigrants, and the arrival of them triggered the restructuring of the industry, as governments have sought to regularize the situation

where many workers after getting foreign labour that many contractors have tried to exploit at their convenience offering illegal contracts, which in itself have created unfair competition with other workers by having lower wages than any other person who realised the same job. Such irregularities are guilty and responsible for policy on labour matters that have worsened so much in recent years.

Moreover, Spain is experiencing a stage called the second transition, in which regeneration is occurring primarily at the political level, this change primarily affects the industry, which is the central financial support to adapt to change for the state prosper. The path to follow for the industry will be marked by the influence of the emerging political parties and labour policies regeneration. With the recently held general elections of December 2015 will be show the proposed programs for this legislature and the strategy for growing sectors like construction, the percentage of gross domestic product that will be devoted to new construction projects, new subsidies and the financial support that will be available for the realisation of new projects, as well as tax benefits to autonomous workers (who currently pay one of the highest monthly rate in Europe) in general to make loose fear of undertaking to professions like contractors. Meanwhile, construction companies suffer waiting until it is finally invested a new political party after the electoral process, as politicians belonging to the urban area of the public administration state are not tendering projects until it is ensured their own continuity in the Halls, egoistically creating (Laborda & Fernández, 2015) an "increase in public works in the months leading up to the local and regional elections", and generating a professional stagnation post-election period, and as always those who are punished at this event are primary contractors.

2.2.2. Economic challenge

In recent years, the role played by construction in the Spanish market has been crucial to the economic health of the country, considering that it has been the main engine of growth. This has generated a high dependency between both, the state and a sector that has absorbed skills and labour from other areas in disproportionate numbers, bringing the economy to a dependent and equally unstable situation.

As explain Naredo, (2004) from the year 1996 Spain experienced an astonishing increase in their wealth thanks largely to the expansion of the building, leading Spain to be one of the countries with greater momentum in the economy of the construction worldwide for a decade. Aware of it, the state decided to turn this area into its primary source of income through massive investments that in the short term were translated into substantial profits.

Logically, this panorama has also produced that besides being the sector that has created more jobs during its expansion, it has been too the one who destroys more in its fall, but even the areas of manufacturing, trade and transportation together, reaching 55% of all job losses in the country, more accurately a total of 1.786 million unemployed, as can be graphically appreciated in the following Figure 2.1.

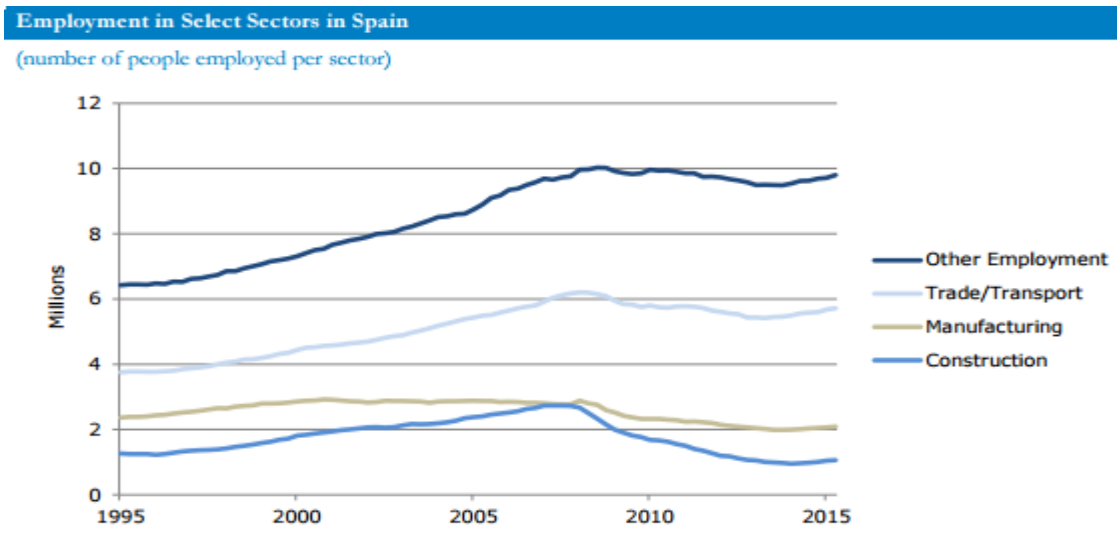

Figure 2.1. QECD (2015). Employment in select sectors in Spain.

Naturally, the balance of jobs and welfare is a proxy for productivity, INE, (2007) the direct contribution of construction to economic growth was above 20% of annual average, after that as shown Rosnick and Weisbrot (2015), the construction correctly represents the productivity growth since the crisis began, because before 2007 the overall productivity grew at a rate of 0.3%, and economic productivity outside the construction grew at a 0.9% annual figures, so that the construction represented only a third of the total productivity. Right, here it is where the conditioning inflection point is appreciated, since after 2007, productivity grew at a rate of 1.7 per year, but the percentage outside the building reached only 1.2 percent.

This powerful investment highlighted at international level, the choice of making of construction the mainstay of the economy meant that some of the Spanish companies were situated in the top world revenues, including 2 of them among the top 5 worldwide (FCC and Ferrovial) of businesses that obtained more profits between 1995 and 2007.

Group	Rank		Firm (2007)
	1995	2007	
Higher-Ranked Group	71	1	VINCI, Rueil-Malmaison Cedex, France
	64	17	FCC, FOMENTO DE CONSTR. Y CONTRATAS, Madrid, Spain
	68	25	TECHNIP, Paris La Defense Cedex, France
	77	27	LEIGHTON HOLDINGS LTD., St. Leonards, NSW, Australia
	76	29	FERROVIAL, Madrid, Spain
	56	36	KIEWIT CORP., Omaha, Neb., USA
	58	39	JACOBS, Pasadena, Calif., USA
	72	55	CLARK CONSTRUCTION GROUP, Bethesda, Md., U.S.A.
	80	65	GILBANE BUILDING CO., Providence, R.I., USA
Group Lower-Ranked Group	119	52	WHITING-TURNER CONTRACTING CO., Baltimore, Md., USA
	136	62	THE WALSH GROUP, Chicago, Ill, USA
	118	63	STRUCTURE TONE INC., New York, N.Y., USA
	125	66	BEIJING CONSTRUCTION ENG'G GROUP CO., Beijing, China
	124	90	TIC HOLDINGS INC., Steamboat Springs, Colo., USA
	121	99	TECHINT GROUP, Milan, Italy
	123	111	ASTALDI SPA, Rome, Italy
	134	114	AUSTIN INDUSTRIES, Dallas, Texas, USA
	137	117	TECNIMONT SPA, MILAN, Italy

Figure 2.2. Park et al., (2010). Changed Rank of Global Construction Firms according to revenue sizes.

According to the latest statistics, the future of construction in Spain will be safe by increasing the workload that will be producing moderately. The main advantage of this economic recovery and consequently the momentum of the construction is the active participation of the tourism sector, which according to the Spanish Ministry of Tourism has reached a record of tourists in 2015 in relative terms. This fact has a direct impact on the construction sector as shown Expansion (2015), explaining that since 2014 home sales in Spain have increased up to 21.6% reaching the amount of 365,594, mostly driven by foreign investment, which contributed to 19% of this digit with 72,000 homes, and the Spanish real estate sector has assured that the demand for second homes will remain in the immediate present and the future, as postulated BBVA (2011) stating that the potential demand for housing would place above the 300,000 homes between 2011 and 2016. This potential demand (Doménech, 2011) is a significant recovery element for the residential segment of the construction sector to remain relevant in the national economy and the medium-term investment in housing converge will raise the historical average, 5.5% of GDP, reaching the degree of stabilization. In response to the realised investment, the estimated indicators show an increase in household consumption up to 0.7% QoQ and 1% in the second trimester of 2015 (see Figure 2.3), keeping the upward growth line appeared in the trimester previous.

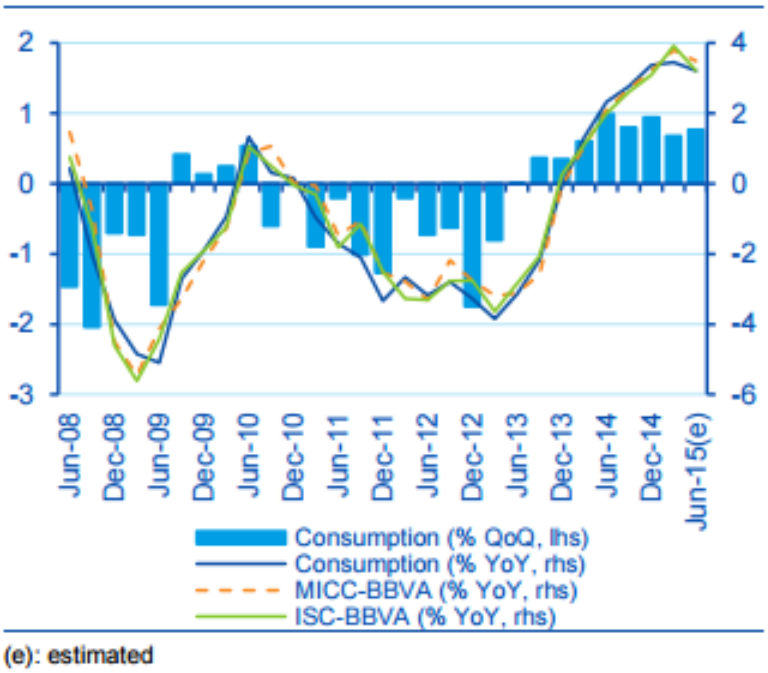

Figure 2.3. BBVA, (2015). Spain: observed data and real-time forecasts for household consumption.

It is deductible from these data that the construction sector will continue raising as remains the practicing investor politics that it is being practiced at present, beginning with a moderate increment of its most influent parameters, but very high compared to the experienced decline during the years of the crisis. The most prescient indicator of this regeneration is the number of affiliated workers to the Social Security (SS) and it's relevant and constant increase in recent years (see Figure 2.4), the source of income generated by these affiliations is a fundamental pillar of the national economy.

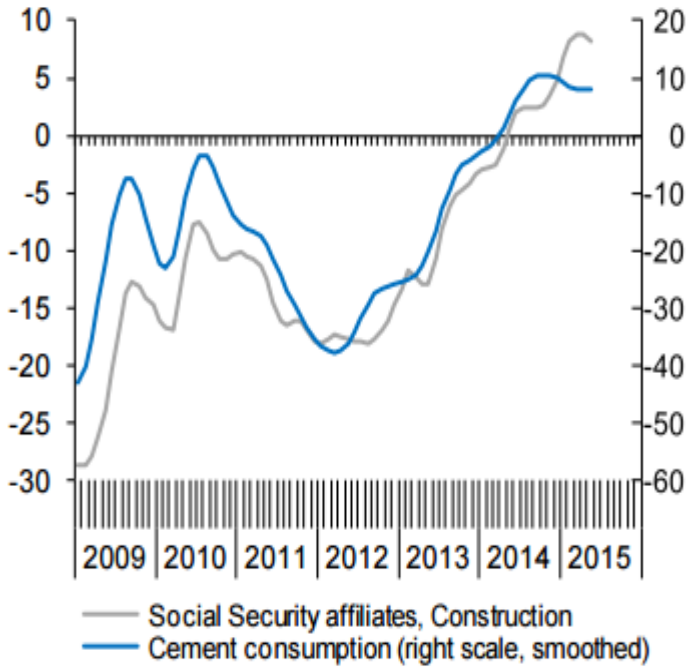

Figure 2.4. Ministry of Labour, (2015). The relationship between the number of affiliated members to the SS and cement consumption.

2.2.3. Fragmentation challenge

Fragmentation exists in the Spanish market, and significantly affects the construction sector, which has a representation of contractors, subcontractors, suppliers, traders, clients, tenders, autonomous workers, independent agencies, specialised technicians and so a long list of stakeholders, obstructing enormously fluid coordination and communication between all its organisms. According to the government report by OECD (2012) Spain has a high degree of decentralization and institutional fragmentation that spans the public sector, this affects the operability between private companies and state organisms, which are not regulated by a controller system that requires them to set a communication programs with private firms cooperating with the Administrations. This incoordination is one of the most frequent causes of confusion in interpreting the goals of the construction projects, creating uncertainty in how to operate, and too often changes from baseline designs overestimating the stipulated

prices in planning phase frustrating both public organisms and private firms. These high cost resulting from the fragmentation consequences hinder considerably the activity of enterprises, that do not have the same possibilities and rights, Gonzáles (1998) postulated that it has occurred a striking reduction in the average size of Spanish construction companies in the last 2 decades, up to 45.77% in the volume of workers who are, on the other hand, has shot the use of outsourcing, this procedure is constantly happening due to (Transfer LBC, 2013) numerous small organisations within the industry of construction are directly excluded from the competition and possibility of bidding for public tenders within the national level simply because for accessing to these is need to prove physical presence in the community where it is tendered, causing the impression of Spain being made by 17 small countries (one from each Autonomous Community) with low operability and cumbersome cooperation among them. Thus, almost all parties belonging to the construction have recognized that (PRC, 2011) fragmentation directly brakes the improvement in industrial development, therefore generating a negative impact, and that has led to 36% of the total construction output is produced by small firms of less than 13 workers, creating a network specializing in subcontracting.

To solve this issue, there is a (SON, 2013) need of eliminating this cost as well as the obstacles and barriers derivative from growth regulation has been one of the main demands that economic operators have been moving in recent years.

This fragmentation of the domestic market hinders effective competition and prevents to exploit economies of scale that offer the chance of operating in a market of larger dimensions, which discourages investment and ultimately reduces productivity, competitiveness, economic growth and jobs, with the significant economic cost that means regarding prosperity, employment and welfare of citizens.

2.2.4. Risk challenge

The risk in the Spanish construction is a factor that stands enormously at internationally. Malpractice and negligence of workers and coordinators lead to terrible statistics, (Galindo, 2006) in Spain three workers die daily and one of them belongs to the construction industry, this average is still maintained in 2016, (Iriarte M ., 2015) the analysis by sectors having as reference the incidence rate (calculated by dividing the number of accidents during the day per 100,000 workers) makes construction the highest incidence of work accidents, with a ratio of 6.195, 81% of them occurring during the execution of building labour and the rest during the development of tasks associated with civil work. Also, it is observable an indicative data, (Lopez et al., 2012) in Spain the lack of prudence when controlling machinery causes the most problematic and disgraceful hazards. This may lead to conclude 2 hypotheses, in the first one workers do not have adequate training to perform the presuppose known tasks, and the second one is the avoiding of a correct monitoring and control settled by and, for the reason that beyond that conscience and guiltiness of employees about their actions, the health and safety coordinators are responsible for their activities according to Law 31/1995: Prevention of Occupational Risks, 8 November 1995, and should exercise the necessary monitoring to avoid imprudence, so in most cases the worker is not the primary culprit of the unfortunate events produced by negligent use of quality systems implemented on site. Furthermore, unsafe management and risk ignorance come from organisational level, a survey carried out by National Survey on the Management of Health and Safety at Work (2009), concludes that there is an insignificant interest in organisations to identify potential losses under procedure related to health and safety, this gives rise to these costs not calculated and therefore, there is no explicit control over them, this situation occurred because the habit of using Management Accounting methodologies is not correctly engaged in Safety Management Organisations, and this is

due to (Dávila et al., 2015) firms do not have an information system based on a prototype that enables them to study in detail the economic implications of investing in safety work .

The mismanagements previously described has occasioned financial loss closed to 390 million euros annually. Eurostat (2012) data are shown in Figure 2.5 that the values of the standardized incidence rate have been consistently higher than the average of the EU-15, but in recent years (Eurostat data has not posted after 2012) that difference tends to decrease.

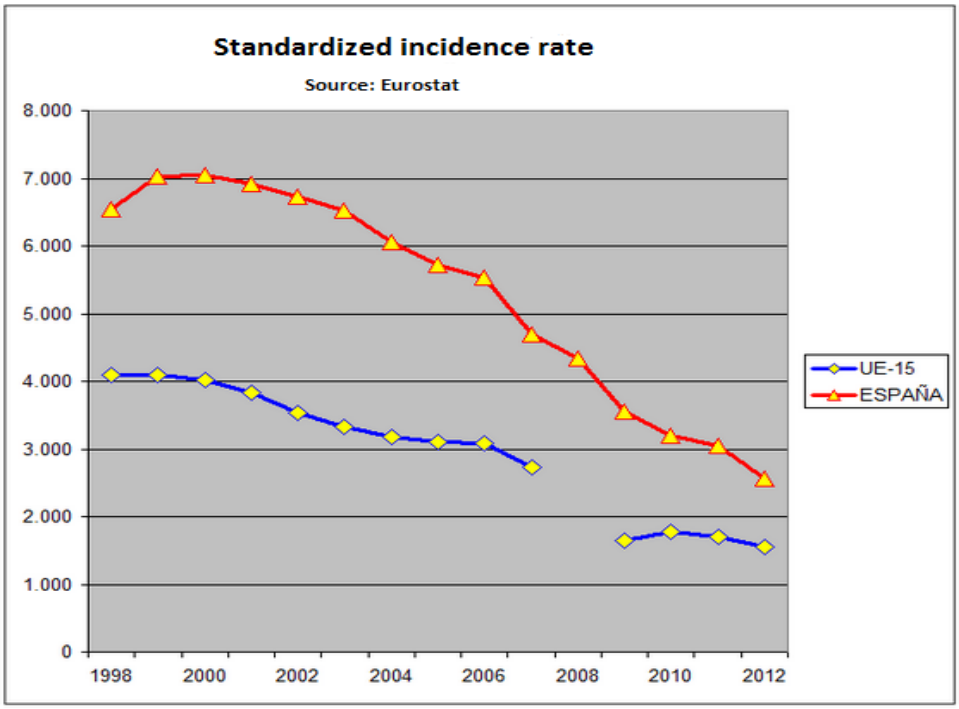

Figure 2.5. Eurostat, (2012). Evolution of the standardized incidence rate (accident / year per 100,000 workers) between 1998 and 2012 for Spain and the EU-15.

Summarizing, it is a cultural problem which has unconsciousness of the risk itself and the ways it can affect an organisation, and the only arrangement for this ideological backwardness is (Fernandez, 2009) creating a real safety culture also be strictly regulated and controlled institutionally, helping establish a concept of need among stakeholders of the construction. This is a necessary step to be taken as soon as possible,

because as has been shown in multiple studies research (Lopez et al., 2013) higher investments in safety and prevention produce lower number of accidents, an obvious example are the macro projects where large capital is invested in this area, and despite having a lot more labours, a wider variety of tasks and more complicate procedures than small projects, it present inferior records in accidents in proportion per number of employees as a result of this investment in prevention.

2.2.5. Innovation challenge

According to the Organisation for Economic Co-operation and Development (OECD, 2015) Spain has a low percentage of researchers PhDs level, obstructing the necessary change in strategic planning that the country needs to adapt planning systems in construction to the contemporary world, a fundamental fact in this sector because as ascertain (Halpin & Riggs, 1992) most of the processes and technology used in its development did not even exist 30 years ago. This is an indicator of how the evolution of technology, society and science are recorded as if the construction of a geological stratigraphic series were, as they evolve in tandem.

As determined Langdon, (2003) the keys that a country needs to establish an innovative culture in construction are: "provide a focus for continuous product and process development in the industry, develop technology transfer, and develop a culture of constant productivity improvements ". These bases for innovation have similarities with the PDAC system (Plan, Do, Act, Check), in which is generated a constant evolutionary advances chain based on the rule number one of Science: trial and error. Thus, some innovations become autonomous being, which by themselves help to conceive and subsequent develop other products and innovative techniques. According to EcoEFC (2015) this is achieved by an injection into the R & D (Research and Development) system and ensuring the financing of productive sector, therefore Spain is obliged to

deepen and systematize its expertise production to make the best of their comparative advantages, and this requires finding ways to add value in the primary sectors in productivity, as the construction sector.

The results obtained to make an appropriate investment in R & D are exemplified in the case study of the work of Spain in the offshore wind turbines procurement, as stated a senior executive at Entrepreneurial Wind Association (EWA), Rosique, (2015) Spain is on the top of the countries in investment for research and development of wind projects, and it is the third largest exporter in the world in wind turbines. This event was possible largely by restrictive legislation that prohibits the installation of wind farms on the Spanish coast, and the marine abrupt relief that highlight the problematic construction processes in them. Both situations have led to wind industries to reinvent and expand their market shares abroad, where the regulatory imposition of renewable energy installations have soared exponentially construction of the offshore energy sector. According to data from the European Energy Wind Association (2015), only the installed capacity in Europe increased at a rate of 1,000 megawatts per year, and forecasts indicate that the sector at global level in the next five years to increase by 28,000 MW, of which about 50% will be installed in the UK and Germany. Furthermore, over 20,000 people work in the wind sector in Spain, which exports technology worth about 2,000 million euros and invests in R & D around 85.5 million annually. Wind sector contributes directly and indirectly 2.623 million euros to the GDP of Spain (0.24%).

Spain already has the facilities and resources that make it a crucial element in the implementation of this energy worldwide, as firms in northern Spain not only operating in developed countries of the European continent but also a reference to emerging countries. The Wind sector can also be an essential in changing the production model

that needs Spain, and it is a perfect example of the productive advantages resulting from greater investment in R & D.

2.2.6. Competitiveness challenge

Competitiveness in the construction industry has grown significantly since the expansion of the construction boom and has become even stronger with the arrival of the global crisis, leaving little profit margin to professionals. With similar characteristics but different ways of operating two subsectors are distinguished: civil engineering and building. To understand the existing competitiveness both deserve a differentiated analysis such as that described below.

. Civil engineering:

The degree of competition in the infrastructure business (Martín and Gonzáles, 2010) is medium-high, the degree of concentration and balance among competitors, if it is stick to the ownership of projects, shows a fairly concentrated business, and 2% of companies, the largest, are responsible for 55% of turnover and the 28 largest companies account for 20% of national activity.

Nonetheless, usually main bidders are not the one who performs all the work. The law of contracts with government promotes business cooperation, providing business opportunities for companies that have adequate levels of specialization and efficiency. Subcontracting means, with joint projects in the form of TEU (Temporal Enterprise Union) and joint ventures, the collaborative mechanism par excellence and, since the law does not make strict limits on this practice, there are many companies that can benefit from the project civil works. Therefore, we can say that infrastructure construction is a relatively concentrated business. The turnover in civil engineering highlights two size segments for its importance in the business: macro companies "over

1,000 employees" are responsible for 20% of total turnover (over 25% of all new developments) and those employing less than ten workers (16% and 18% of the new building). In the last years, the medium companies "20-49 employees" has experienced the biggest drop, from 23.1% of total turnover in civil works, only 12%, and focused on jobs rehabilitation and maintenance of infrastructure.

In this respect, the most affected by the competitiveness will be the medium-sized business, especially those in the 20-49 of a workforce, because of having relatively high structures and it is not easy for them acting as principal actors in the works, which relegates them to a role subsidiary of the tenderers of the work. For all these reasons, the intensity of actual competition is in the upper-middle in civil works subsector.

Building:

The building is divided into three activities, residential, non-residential and rehabilitation and maintenance, according to the objective of the buildings and the work undertaken by them. The residential business is quantitatively the most relevant in construction. The new development for housing accounts for over a third of the building activity and has been the most dynamic in recent years in Spain. The non-residential business has a strong relationship with the general economic cycle. The demand for new properties is largest part of the investment in different sectors of activity, so there is a strong link between the economy and the vitality of the construction.

This relationship is also bidirectional since the mobilization capacity of construction resources influences the economy and is it able to boost or and make it back, depending on it activity. The products of this business segment are multipurpose (productive or related to political decisions). The business of rehabilitation and maintenance includes two activities upon properties already built for different purposes and demands of

different behaviour. Support aims qualities that property to apply work remains constant, regardless of its purpose. However, demand for this activity depends largely on the application proposed to the buildings, since it is marginal in residential and depends almost exclusively of productive property or related social facilities.

Rehabilitation aims to make improvements in the property. Quantitatively it is more significant in residential buildings, for numerous reasons, among which two stand out: the park of buildings for housing is greater than for productive functions; its age is higher (50% of the buildings have more than 30 years and almost 15% to reach the century of life (SEOPAN, 2015); maintenance of residential buildings is very small. Besides, the types of companies engaged in this type of work make it difficult to obtain reliable data, making the information available only useful for description of activities, applicants and the empirical demonstration of the strong new product substitutability and residential rehabilitation work.

Although, regardless of the purpose of the work, regarding end product, two different products (residential and non-residential) are remarkable, statements about either are extrapolated, with nuances, to both.

The degree of concentration and balance between competitors is less in buildings than in civil engineering, as the technical requirements are often lower, and there is a sufficiently large number of qualified companies. The smallest segment (1-9 employees) companies are responsible for 27% of turnover, with top weight in the residential subsector (30%) lower in non-residential buildings (16%). As for the characteristics of the work, these small companies develop 45% of the rehabilitation and maintenance in residential and 32% in non-residential.

Large companies with 500 or more employees have a continuing role in all classifications, despite the existence of specialists in each, but the intense fragmentation of business dilutes its role, especially in the residential sector and the activities in existing buildings.

In short: the level of competition in the industry at present is medium-high, as a result of crossing the contractionary stage of the cycle with highly virulent, causing many companies are having one inactivated part and are willing to decrease their margins considerably, in exchange for maintaining an appropriate pace for recovery of economic activity. It is crossed. Therefore, a step of reorienting business that lead in many cases, to considerably lighten their structures to survive a period of severe difficulties, which will be key to keeping a steady balance and be active at a multiple time whose duration 's hard to anticipate.

2.3. Contractor experiences

In the construction boom generated in Spain in the middle of the decade of the 90 had surfaced a lot of contractors with the intention of profit from the current economic trend. Many of these new contractors were usually workers engaged in construction, as bricklayers and many others only entrepreneurs without any training in this industry who decided to increase his fortune building or directly speculating. As stated Heesom, (2004) there are a lot of new contractors in the past decades with little experience and knowledge in performance in the construction sector, and Laufer and Tucker (1987) in his study corroborate the lack of experience and expertise in management planning is one of the most damaging factors for the industry, conveying their shortcomings from pre-project to the delivery, more troubling yet is that the need for reform the planning management is being overlooked. Most of these contractors have had a swift action in the Spanish industry and have disappeared.

Among the biggest problems that contractors are currently experiencing is poor planning management resulting in time and cost overruns, as explained Bacon and Jones (1998) the economic impact of the extra cost in construction projects is a potential loss of economic justification for the project in case this fails. Other investigators have developed studies supported by the participation of professionals of the construction industry like contractors, real estate developers, competent technical personnel, management planners and building and civil engineers, concluding that (Baiyi, 2006) the central issues in current construction planning process are: " 1. An inadequate method for information, 2. Insufficient training, 3. Misunderstanding of the nature of planning process, 4. Improper methods for planning coordination and 5. The cumbersome work structure in planning practice". By being the contractor's profession the legally responsible for almost all the problems occurred in the area of the construction, are affected by all these possible planning factors that obstruct the project development, the inadequate information is defined (Winch, 2002) as the difference between the available information for the execution of a project and the necessary information to achieve the wished point of the same.

Moreover it is remarkable the isolation of the construction contractors, since their few margin of operability, and their of subcontracting for the execution of most task in small companies, but at least the exit barriers are very small, since, at the end of the execution of works, there are no significant assets capable of divestment; fixed costs are relatively small, hiring of some staff as subcontracting from other companies is realised by each project and, once the work is complete, the contracts end without cost to the enterprise.

From this way, the contractors profits rate in this industry it is limited because it is linked to the public policies to promote infrastructures. The European objective is to create a transnational network of land transport that guarantees substantial investment,

most of them in neighbouring countries, to achieve the EU target. This situation could suppose an economic stimulus, but it only favours to big business and those who are not afraid to undertake projects abroad.

Meanwhile, most of the contractors are tied to the public Administrations, so it is fundamental their adaptation to its characteristics to remain active in the industry.

2.4. Summary

After analysing the main construction issues and principal challenges facing the contractors today, along with their experience and market position, there have been detected many possible causes of their fall, driving highly from political and economic, but also strongly affected by wrong practices resultants from fragmentation between stakeholders, a practically inexistent organisational health and safety culture, lack of funding for R & D, and a growing competitiveness derived from laws that do not offer the same opportunities to all companies.

To be presented in the following chapters as a hypothesis, and leading to the formulation of questions that will be the basis of the questionnaire developed in the next chapter, the following issues will be the basis for drawing up the questionnaire to obtain part of the primary data:

. What do you think are the most significant cause in the situation of construction?

. How could be resolved these errors or avoid these risks?

. What are the primary resources available in project planning?

. What do you consider are the key factors in project planning to mitigate?

. How would you improve the situation of the Spanish construction?

. What do you think it is most important to change?

CHAPTER 3 - RESEARCH METHODOLOGY

3.1. Introduction

The chapter discusses the research methodology implemented for the investigation. Evaluating the advantages and disadvantages of kind research methods and considering the purposes of the enquiry, a mixed-method research (MMR) was chose for the study. The mixed research methodology was carried out supporting itself on semi-structured questionnaires (SSQ). The chapter discusses the election behind the choice of semi-structured questionnaires and case studies and also discusses the way surveys were carried out.

3.2. Research Methodologies Available

The construction and all the subjects that compose it (Amaratunga et al. 2002) cover disciplines that can be classified into distinct kinds of social sciences, natural sciences, management and engineering. The approach presented in this dissertation analyses and reasons the varied implicit and resultant characteristics of the potential research developed in each of them.

The first step has been to consider the possible final effect that offers the paradigm of the methods of traditional studies, which have originated eternal scientific debates known as "paradigm war" (Cameron 2009), where never been reached a consensus with any clarified result with regard to the suitability of using specifically a concrete method, since the procedures employed in each method of investigation involve some degree of ambiguity that self-evident in results with a percentage of subjective, helping the dichotomy between qualitative (QUAL) and quantitative (QUAN) methods to be permanently present.

Along these lines it has considered the utility of each available method inside this investigation area, for later employ of the convenient technics in the analysis of data of rational and at the same time interpretative form, far beyond the "paradigm war", to avoid extremist approaches usually focused on purely QUAN or QUAL paradigms, and underpinning the belief of (Holt and Goulding, 2014) "QUAN and QUAL methods on the basis they complement each other, to achieve a more robust outcome".

3.3. Choice of Research Methodology

This dissertation was developed with MMR. The employment of this methodology avoids the hierarchical structuring that comprises the methods that depend purely on the QUAN or QUAL, and in this way the primary data is not strictly tied to QUAN aspects in which is not bear in mind the quality of the information coming from relevant experts and not in all cases is quantifiable, and in the opposite case it is not purely subject to evaluations included just inside the field of the personal opinion or experiences, and whose validity has usually a high dependency on the sample taken to realise the study, giving a questionable value to its reliability.

The determination of the methodology used in this study research allows the capture of a broad range of data, with the advantages that contribute the epistemological and ontological information relatives to a QUAL analysis, and the homogeneity and certainty with regard to the whole of the aspects in which the investigation consists and is offered by a QUAN investigation. Mixing both methods was accomplished the target of compiling quality information and simultaneously compensated since to solve a matter regarding a widespread problem, it is suitable to use a tool to obtain information as the one employed in this dissertation.

At the outset was contemplated the possibility of getting the literature that gives a global knowledge on a worldwide scale of construction sector, to achieve so it was necessary the use of an extensive source of rapid in significant scale access of complete knowledge in all the aspects that the construction includes, concluding that the best alternative was to synthesize, analyse and to study journals, articles, reports, e-books, and other information available sources on Internet, to supply of primary way the literature review. Through this literary research, it was studied and scrutinized in depth the idea of the reality that explores this project, and that is responsible for the current situation of the construction industry, of contrasted form between different means, giving validity and rationality of the information that here appears.

The basis of this investigation was seated with the research study included in the literature review, and afterward it was confirmed and extended while the use of SSQ sent to construction professionals actually employed at Spanish organisations, which have contributed to their evaluations, visions and experience to equal parts, giving a more panoramic view to the initially proposed exposition of the dissertation, and creating a linkage between the topics developed in the literature review, and the daily reality of the Spanish construction, confirming the adequate choice that supposed the election of this kind of multi-method to investigate the matter in question.

3.4. Research Method/s Adopted

Step 1 – Development of Research instrument

The search tool was chosen considering the final objective to accomplish in the dissertation. To clarify the target to be reached it was synthesized the steps that allow its consecution of organised and numbered manner, as it is reported in section 1.3 of this study, where are exposed the aim and objectives on which the search mechanism has been based.

The SSQ was settled with different sort of questions. It includes closed questions related to options and likert-scale and open questions. The firsts one refer to various types of construction areas, the purpose of its inclusion was the procurement of a general acquaintance with the field of actuation and experience of the respondents within the industry. The likert-scale questions go in the direction of deepen in the importance that supposes the most influence factors of construction to professionals through a direct quantification of these, specifically focusing on planning management, developing questions with the commitments of knowing if the amount of resources available in their job are fairly enough for the correct development of his tasks, and other related to their level of agreement concerning the context issues that are experiencing. Also, it was included open questions to identify the dedication of each participant and his company, moreover and critically determinant factor for the elaboration of this study: their points of view on the issue, letting them participate in their possible improvements to the industry, and consequently contributing to the solutions of this research.

All the questions previously mentioned correspond to the final phase of the draft questionnaire exposed in Appendix 1; it was originally outlined with the inclusion of a series of closed questions to focus on the main points of the need data.

Step 2 – Piloting

The questionnaire was sent to 75 persons from 3 different companies, most of them are known professionals with experience in construction project management, and relevant charges in the organisations within their businesses, 12 of them replied to the questionnaire.

These are the most relevant comments, all of them are encompass in the open question of how to enhance the Spanish construction situation:

Comment 1:

". Public-private partnerships for projects of public-social interest.

. Formation and retraining of the base staff to assist their integration in the construction sector.

. The offering of public subsidies to encourage R & D within the companies.

. Privatization of public housing to introduce them in the labour market.

. Create a collaboration system between administrations and sectorial associations at European level to facilitate the mobility of Spanish companies within the EU territory."

Comment 2:

"Actually, in Spain, there is an enormous imbalance in the allocation of economic resources belonging to the Administrations: vast quantities destined for the payment of salaries of public enterprises workers of scarce productivity (it is another form of subsidy), which leaves a very small margin for the investments destined to improve the infrastructures. It should search an ideal proportionality between both resources to be able to invigorate the economy."

Comment 3:

"Centring on the public work, I believe that the problem is that the governments in most of the fields are constituted by counsels, the absence of technical formation in the governments is evident and this drive to useless investments in public work."

Comment 4:

"The current model of public hiring is obsolete; it would be necessary to adopt a new one with more transparency, to increase the efficiency of the public enterprises."

Comment 5:

"Major public investment, at present the funding is minuscule. The existing low investment is only sent to big macro projects. What creates jobs and wealth, there are no macro projects, but the small projects, which generate considerably more economic movement and force labour with the same budget."

The final questionnaire is attached in the Appendix number 2.

Step 3 – Choice of Sample

The questionnaire was sent to different private companies whose occupation is the construction project development, inside the civil engineering and building, all of them dependent on the contract system for public work of the Spanish state, therefore the area of the sample comprises all Spain, since they all operate under the regulation and conditions of the Ministry of Development. The election of the samples for the questionnaire has been determined initially by the election of known experienced professionals inside these companies, due to the security and precision that their knowledge provides, after that it was elected another type of candidates inside the same organisations to diversify the sample with diverse characteristics that directly influences in the result with its appreciations, like different jobs, years of work experience, or various kind of work performed in the same field.

Step 4 – Data Collection and Recording

As a method to obtain primary data, have been elected on-line SSQ. The reasons are based on are that it is a very useful technique from the practicality of its use and it

allows to acquire a large number of valuable material using few resources for it, considering that it is more than enough to prepare a precise document based on the type of wished information to compile. The serviceability is not only for the sender of the questionnaire but also for the respondent, who does not have to determine a particular moment to be polled, and practically there is no pressure of answering hastily in the open questions as if would in interview case, which would worsen the quality of the collected data. Furthermore (Truel et al., 2002) the response quick of online questionnaires normally was considerably faster than the response speed of physical mail surveys. For the reasons previously described this investigation study has been carried out while the use of online questionnaires directly sent to the participants.

Online questionnaires were sent to the chosen participants as discussed above and letting them a period of 1 week to fulfil it and send it back. In the sixth day after sending the survey, 12 questionnaires were received fulfilling the need sample of 12 questionnaires from 3 different companies (4 per each one). 12 out 75 sent questionnaires represents a response ratio of 16%, according to studies realized by Fincham, (2008) "e-mail response rates may only approximate 25% to 30%", considering that the participants only had one week to respond and that the only incentive was the personal satisfaction of collaborating to a research study for enhancing the construction industry, it is an acceptable response rate, notwithstanding it is merely a data to satisfy the curiosity of the research, because as King and He (2005) explained, there is no need for calculating the response rates for all online surveys for the reason that this percentage might not be meaningful.

The questionnaires responses were recorded on SPSS Version 23 (Statistical Package for Social Sciences). A sample of the questionnaire collected is included in Appendix 3. The respondents were given codes (INT), and their replies were documented row by

row. There were some missing information in some answers (the ones related to the option "Other" from some questions) and were recorded as ‘Nil' to do not influence the final result.

Step 5 – Data Analysis

The analysis unit sought in the data analysis phase has been mainly people’s perceptions. The main reason is that to ensure validity and accuracy of this study findings, it is not enough literature on specialized media and presented in Chapter 2 of this dissertation, it has been highly important to contrast this information with professionals of construction sector who offered their perspectives, insights, theories and proposals that contrast and complement the professional reality previously researched.

To graphically analyse the data obtained with the responses of SSM it was used the SPSS software, for the convenience of its statistical tools firstly to develop a descriptive analysis that highlights the main findings of the questionnaires, and then to compare in an inferential way the statistics of different groups of responses.

3.5. Data Validity and Reliability

A critical factor in any research study that makes the difference between a clear, compelling and reliable result, it is the sample that is used to obtain the data that compose it. The target of the s chosen sample is to define a finding and an efficient method to follow with a global validity, which is extrapolated to the general situation of a whole country so that the sample chosen is a bright reflection of the contemporary reality of the country.

Accordingly to that, the professionals who have participated in this research study faithfully meet the requirements pre-established given a representative result. To

accomplish that there have been elected 12 workers from 3 Spanish companies, all of them professionals within the construction sector undertaking tasks related to work planning, management and implementation of projects, and currently holding labours within the fields of building and / or civil engineering, making them perfect candidates as sources of knowledge because of their awareness of the route that is following construction sector in Spain in recent years. These samples were chosen with different quantitative ranges of experience to diversify the sample, being them classified among the following levels: less than three years of work experience, Between 3 & 5 years, between 6 & 10 and more than 11 years of experience. This diversification contributes to the research study with a rich assortment of perspectives from different profiles of workers, so that the end outcome is globally representative and not only factual for long career professionals, or otherwise for new additions to the industry.

The SSQ irrefutably prove the preparation and expertise of respondents using open questions about their profession and dedication of their company, also of another kind of construction projects developed in their career. From this manner, it has been certified academic qualifications and disciplines in which the respondents participated. The questions have been developed as clearly as possible after analysing the initial idea put forward in the draft questionnaire and finally completed with the findings of the literature review, which has been the research instrument that has marked the guidelines in what the final questionnaire had to be focus, avoiding any possible subjectivity of bias from the author when considering possible answers and the process of gathering information from the structured questions. The focal issues that have determined the basis of the questionnaires and defined the fields in which should inquire to obtain the intrinsic essence of the problem have been posed in the previous chapter by scrutinizing the literature review, leaving in the summary thereof some of the questions in which the questionnaire should be based.

Finally, there have been included two open questions that supported the completion of the questionnaire with quality data from the perceptions of respondents, which has been individually helpful since it provides complementary points to the structured questions according to the principally responsible elements obtained from the literature review.

3.6. Summary

The research study adopted paradigmatically a mixed methodology approach to success in the consecution of the aim and objectives exposed in Chapter 1. The leading reason for this is the nature of this epistemological study defined in Chapter 2 whose features prevent a dichotomous outcome as that obtained by using traditional methods. The mixed methodology approach was carried out using 12 SSQ with construction professionals in diverse construction organisations. The primary data was scrutinized using statistical descriptive and inferential content analysis. The results derived from the analysis are presented in Chapter 4.

CHAPTER 4 - ANALYSIS AND INVESTIGATION

4.1 Introduction

This chapter debates the principal findings resulting from the questionnaire. The data collected from the questionnaire were analysed using SPSS analysis. The main findings are presented in 4 main sections. The first section introduces the professional features of the respondents of the different organisations that were participants in the survey. The second section presents the main findings while a statistical analysis of the questionnaires responses. The third part analyses by comparing the data resulting from questionnaires and chapter 2, the most significant conclusions of the study and presents a construction project management best practice guide for construction organisations. Finally, in the fourth section, the guide is tested and validates by a professional company.

4.2 Details of the participants/organisations/case studies

The primary unit of analysis is the worker currently performing any of the following jobs: architect, civil engineer, project manager or contractor on a construction company dedicated to any of these subsectors: building and civil engineering in Spain, and aware of the actual panorama of the construction industry. In the following Tables are classified the participants by company and job role, presenting the percentage of the number of responses for each profession, and work experience of each member.

Twelve participants were randomly selected for their job in 3 different Spanish private companies, all of them dependent on public works tenders released by the Ministry of Development. These companies have been assigned the following identification codes: A, B, C. Then, is presented a brief description of each company and kind of role.

. Company A:

Company A is an experienced organisation in the field of building construction, which makes design and implementation of projects of private houses, skyscrapers and residential buildings within the national and international levels. Its workforce oscillates between 130 - 150 workers annually.

Table 4.1: Job role of the respondents of A

Job Role	**Code**	**Number of Responses**	**Years of Experiences**
Architect	ARCH	11 (25%)	Less than 3 years
Contractor	CONT	11 (25%)	More than 11 years
Project Manager	PM	11 (25%)	Between 6 and 11 years
Civil Engineer	CE	11 (25%)	Less than 3 years
Total		44	

Table 4.2: Types of projects in which respondents of A have worked.

	INT 1	**INT 2**	**INT 3**	**INT 4**
Urbanism	X			
Building	X	X	X	X
Mining				
Maritime and Coastal Engineering	X			
Health & Safety	X			
Railway				
Environmental Engineering	X			
Other			X	

. Company B:

The firm B is specialized in the development of all types of construction projects in general, which can be grouped mainly in the fields of civil engineering and building, but it has also made environmental engineering projects, in addition to maintenance works and roads conservation. The company employs a total of 90 workers. Then its respondents' data is displayed:

Table 4.3: Job role of the respondents of B

Job Role	Code	Number of Responses	Years of Experiences
Architect	ARCH	11 (25%)	Between 3 and 5 years
Contractor	CONT	11 (25%)	More than 11 years
Project Manager	PM	11 (25%)	Between 3 and 5 years
Civil Engineer	CE	11 (25%)	Less than 3 years
Total		44	

Table 4.4: Types of projects in which respondents of B have worked.

	INT 1	INT 2	INT 3	INT 4
Urbanism	X	X		
Building	X			
Mining				
Maritime and Coastal Engineering	X		X	
Health & Safety				
Railway				
Environmental Engineering	X			
Other		X		X

. Company C:

The organisation C is exclusively dedicated to the planning and development of construction projects in the field of civil engineering, and it employs the majority of its workforce in project consultancy project, summarizing a total of 120 employees. The following figure shows the information of its participants:

Table 4.5: Job role of the respondents of C

Job Role	Code	Number of Responses	Years of Experiences
Architect	ARCH	11 (25%)	Between 3 and 5 years
Contractor	CONT	11 (25%)	More than 11 years
Project Manager	PM	11 (25%)	Less than 3 years
Civil Engineer	CE	11 (25%)	Between 6 and 11 years
Total		44	

Table 4.6: Types of projects in which respondents of C have worked.

	INT 1	INT 2	INT 3	INT 4
Urbanism	X	X	X	X
Building		X		
Mining				
Maritime and Coastal Engineering			X	X
Health & Safety				
Railway				X
Environmental Engineering	X			
Other			X	X

As shown in the above tables, the participants were chosen from 3 companies with similar purposes in the construction business, but with differences in the kind of projects developed. The percentage regarding professional occupation is equitable because it was chosen a contractor, architect, engineer and project manager in each, so that the overall result is not tied to a particular profession, and it is truthful to the opinion of the industry. The number of employees has determined that all are medium-sized companies with similar characteristics in their workforce, and dependent on subcontracting to develop large projects.

In summary, the sample presents a variety that allows concluding a series of hypothesis with validity extended to the entire construction industry, and also evenness in its parameters that make the result is not being partially conditioned.

4.3 Main findings

Below are the statistics results and analysis of the 11 questions made to the 12 participants of the survey. In the questions corresponding to nominal data, there have been calculated in term of frequency, mean, and partial or total percentage for each option or possible answer. For questions whose information is on ordinal or nominal

data, it was calculated the mean as a most representative value of respondents global opinion, and compared through inferential analysis to determine relationships and key findings. The likert-scale questions are answered in order of importance, rating from 0-5 (see complete questionnaire in Appendix 2). The qualitative questions deep into possible elements not previously contemplated to help to make a more robust guide.

1. How long have you been working in the construction industry?

In the previous section it was shown the average professional experience in years of each participant individually, Table 4.7 shows the frequency and percentage of overall experience in the construction of all members in general, exhibiting an amplitude class* of 16.6% and confirms that subsequent hypotheses are not conditioned to the parameter of years of professional experience.

*Amplitude class: the difference between the upper and lower limits of the class.

Table 4.7: Types of projects in which respondents of C have worked.

	Frequency	Percent
Less than 3 years	4	33.3
Between 3 & 5 years	3	25.0
Between 6 & 10 years	2	16.7
More than 11 years	3	25.0
Total	12	100.0

2. What kind of projects have you worked in?

The outcome of the second question of the questionnaire deeps in the understanding of the participants of sectored form, providing information about their types of knowledge numerically, and noting that the majority of respondents are aware of building, civil

engineering and its derivations or both, that are the main subsectors object of this study, as detailed in section 1.4.

Table 4.8: Kind of projects in which respondents of C have worked.

	Frequency
Urbanism	7.00
Building	6.00
Mining	0.00
Maritime and Coastal Engineering	4.00
Health & Safety	1.00
Railway	1.00
Environmental Engineering	3.00
Other	5.00

3. According to your criteria, select the importance of the followings construction project phases.

In A, whose dedication is exclusively related to building, there is a uniform distribution in the importance of the main construction phases, generating an identical average of importance for the contract, planning and execution, as the essentials. It is also striking that the 5 phases are considered between "important" and "very important".

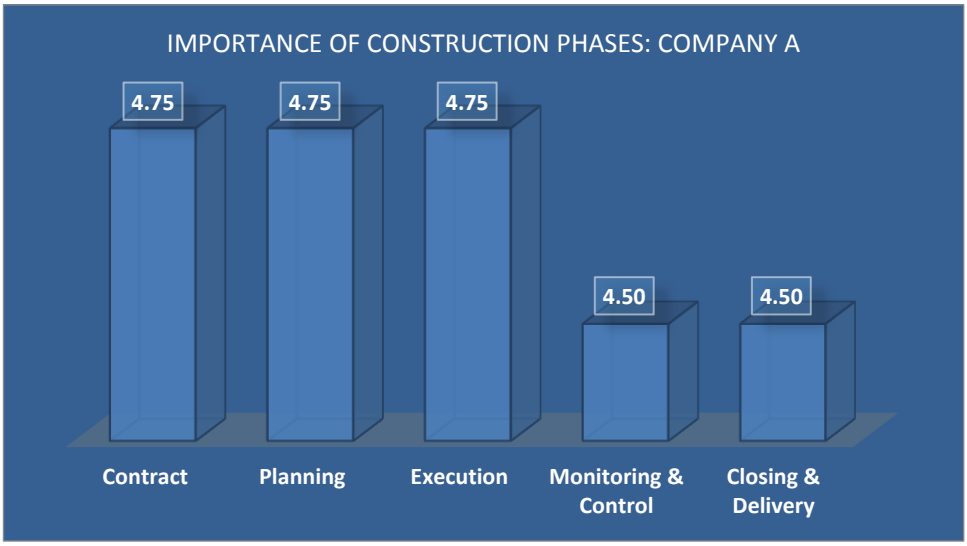

Figure 4.1. The importance of construction phases for participants of the company A.

In B, dedicated to almost all types of construction projects is highlighted the execution phase as the most relevant, and it is noteworthy that their employees do not consider important the contract phase (mean less than 4.00), which is at odds with the issues on competitiveness section revealed in chapter 2, considering inequality in tendering as an obstacle to the development of enterprises, and in question 11 of this questionnaire where participants request for more transparent contracts.

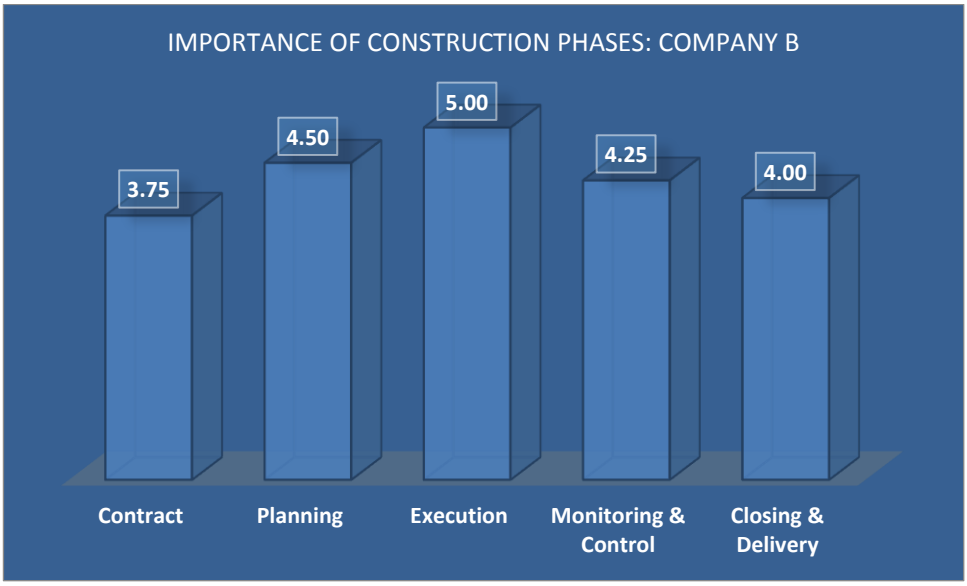

Figure 4.2. Importance of construction phases for participants of the company B.

The data corresponding to C is very similar to those obtained from A, displaying the planning and execution stages again as the critical phases.

From this appraisal can be demarcated an important conclusion, it is that the construction subsector in which the company is engaged is not decisive in the importance of the project phases, because A is exclusively devoted to building, and C only to civil engineering, nonetheless are presenting practically identical results.

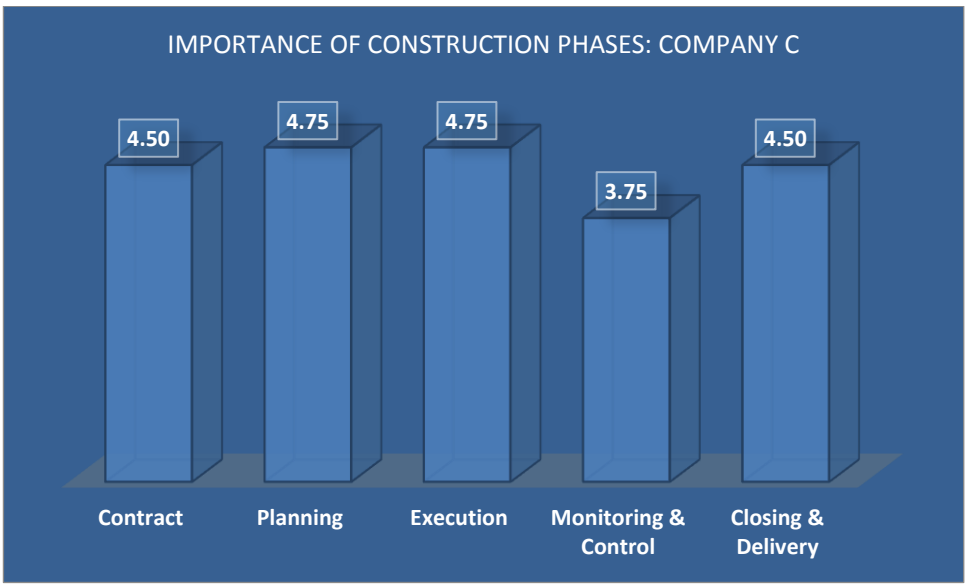

Figure 4.3. The importance of construction phases for participants of the company C.

The following Figure 4.10 proves the importance of all phases of construction according to the mean calculated for all participants of the 3 companies. It is quite clear that the most influential are the planning and execution. Going back to section 1.4 of this studio, it was expressed that planning is the stage where more value is added to the project. The fact of its importance is here contrasted, and also it adds information about that execution is considered the most key phase for industry professionals. Monitoring and control are viewed as the less necessary, as expressed in risk challenge section of chapter 2, it proves the necessity of implantation a proper organisational safety culture in Spain.

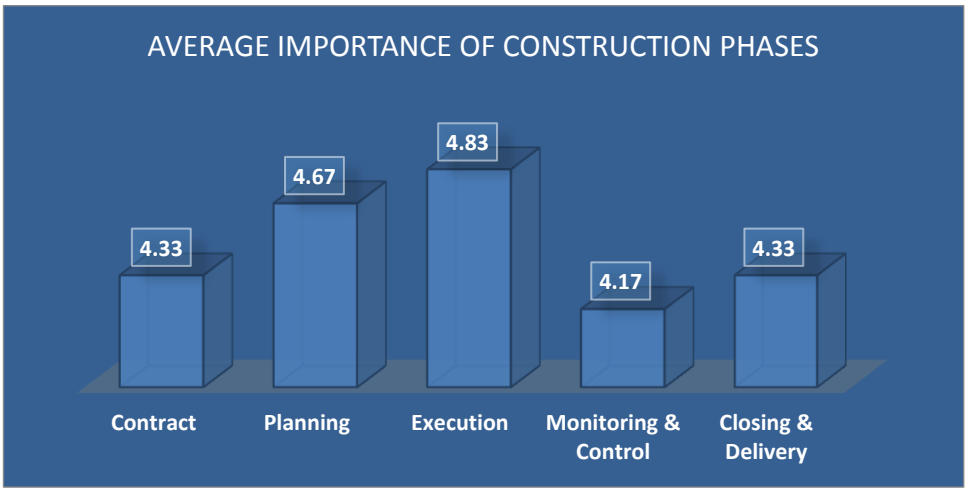

Figure 4.4. Average importance of construction phases.

4. What of the following resources do you consider more important for proper planning?

5. Evaluate your quantity and quality of resources available for Project planning.

The analysis of the responses 4 and 5 are used to determine together, firstly the most relevant sort of resources at the planning level, and then, the resources available to workers, to measure in what extent the construction is affected by the lack of means.

After calculating the arithmetic mean of responses resulting from questions 4 and 5, it has been descriptively determined (see Table 4.11) as in most industries human resources are the most necessary, being these fundamental to develop an efficient planning, furthermore, there have been considered relevant to a lesser extent financial resources, and with respect to other types of resources, it have not been considered particularly essential.

The comparative statistics display an output denoting a percentage variance of -0.73% and -0.75 respectively for human and financial resources. These rates reflect a definitive shortage of the most significant resources within constructions organisations, as already was mentioned in the political challenge section, it has been mainly produced by a decrease in investment from public Administrations and lack of finance support for SME's (small and medium-sized enterprises), and an unappropriated training and need of renovation of stakeholders.

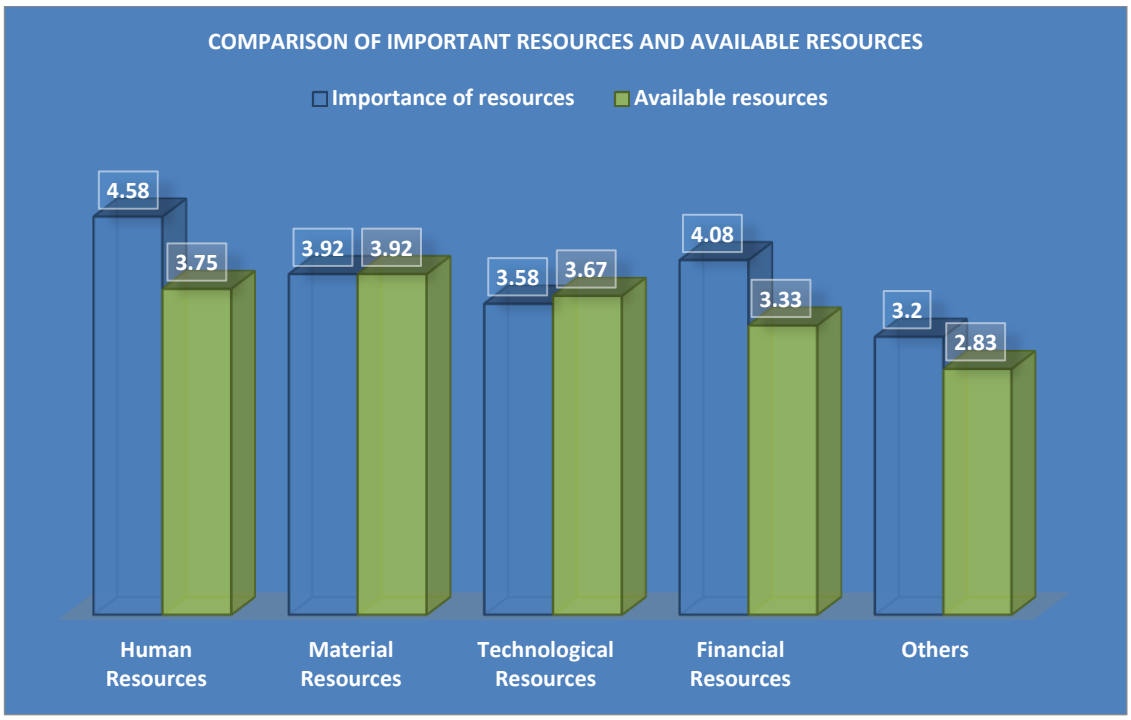

Figure 4.5. Most important resources against available resources.

6. Indicate the impact of the next factors in the Spanish construction situation along the last years.

The purpose of this question is to find quantitatively the responsible factors in the decline of construction. For this, it have been chosen the some possible hypotheses of the most significant causes of each of the 6 main challenges facing organisational contractors collected in chapter 2: the activity of public administration, lack of financing or subsidies, global crisis, lack of innovation, competitiveness into the industry, the framework of the Ministry of Development.

The results outlined in the following Figure 4.12 shows that the perception of workers blames the global crisis as the leading cause, followed by the activity of the government and his lack of financial support.

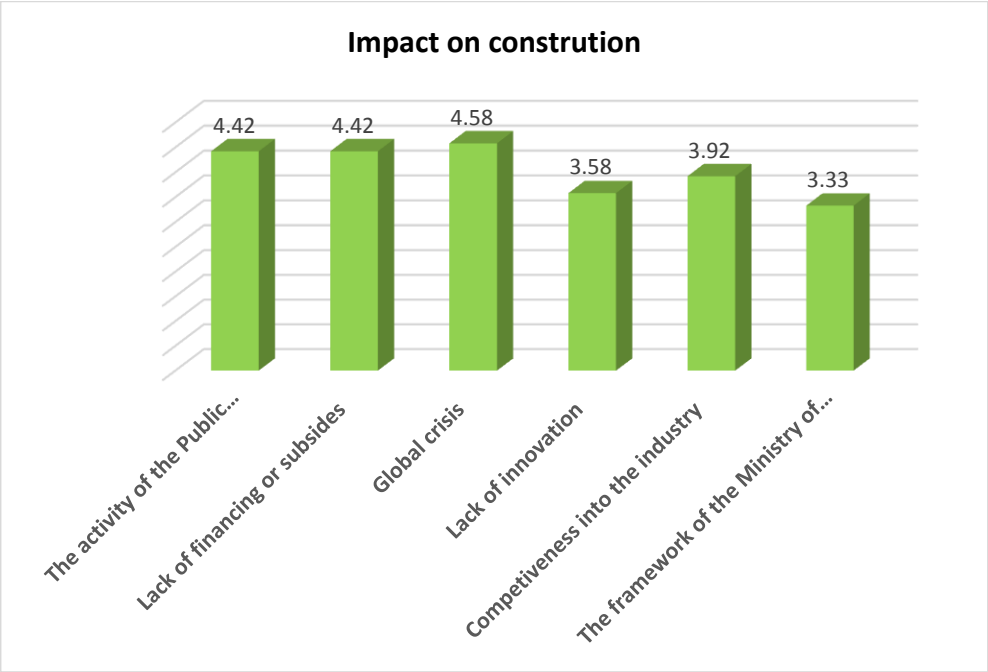

Figure 4.6. Most important resources against available resources.

It is confirmed the prior finding to corroborate by comparing and contrasting with the results of the questions number 7 and 8 question:

7. In the current context, indicate how much affect these factors to the proper project planning.

Participants found the greatest aspects affecting to planning management primarily due to economic circumstances, and then political, and the derivation of these such as lack of resources as proved in question 6, creating a direct relationship between the adversities of the industry and planning, with common cause from the political and economic situation. In third step also affecting to adequate planning is competition in the construction business, as is confirmed in both Figures of question 6 and 7.

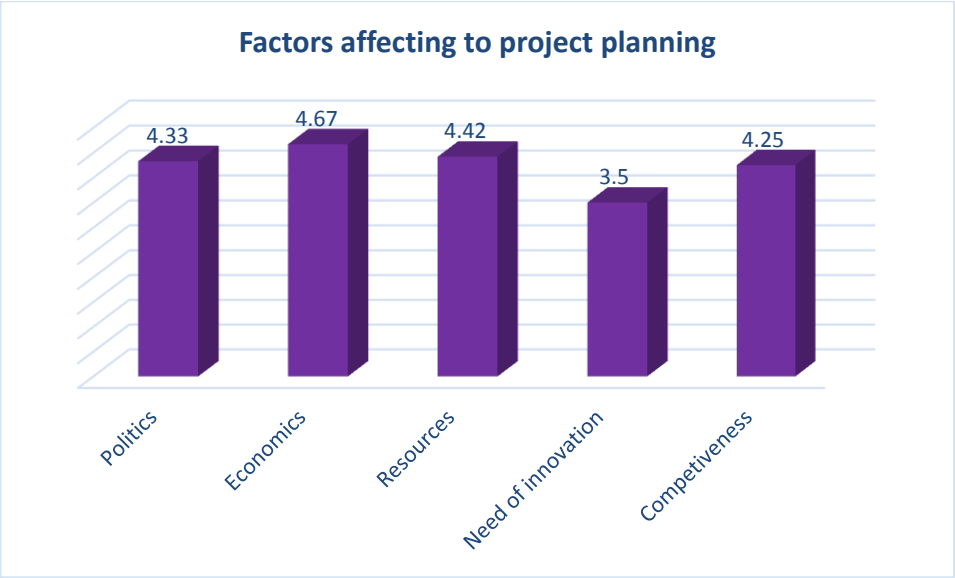

Figure 4.7. Main factors affecting to project planning.

8. Globally, indicate what the central issues in current construction planning process are.

The following Figure 4.14 exemplifies the issues that hinder the quality of management planning process. The two leading causes (inadequate method for information and techniques for planning coordination) are a sign of fragmentation experienced by different entities of the industry, which in short denotes an outdated communication system. It also emphasizes the obstruction supposed by the cumbersome work structure in planning, and really it can be said as mentioned in the literature review, these 3 major causes impeding the fluent planning process are the result of decentralization of public bodies that do not control the organisational structure, and an out of phase system worked well being responsible for fragmentation with political roots.

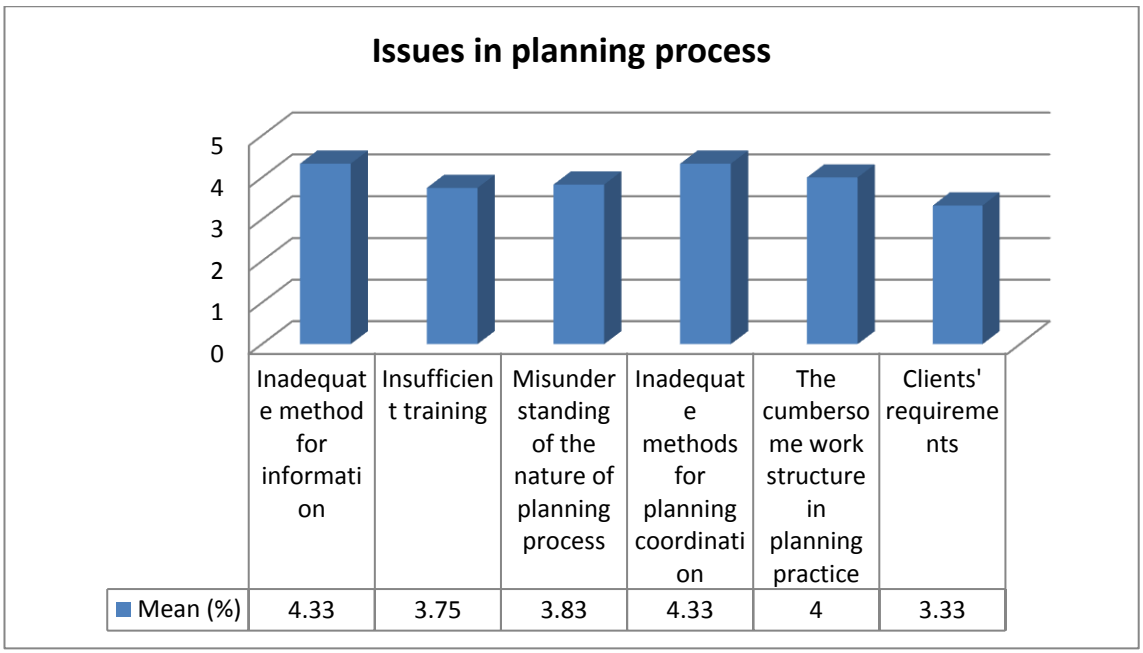

Figure 4.8. Main issues in project planning process.

9. In the current panorama, what do you think that it should change to guarantee the future of the construction sector in Spain?

Apart from the factors affecting the overall construction and planning analysed previously, this question incises on factors that may contribute to the future of construction, by changing facets that were determined in the literature review as obstructing the advancement of this business. As a major hurdle to progress appears the system of adjudication of public work, as defined in competitiveness challenge section, it only benefits to large companies that represent the minority of the country. Another characteristic finding is the fundamental to the progress of incrementing investment in R & D by the state, notwithstanding it is not considering implementing critical, not conventional construction methods, meaning that the country should invest in research, but only to enhance the traditional methods, not to create alternative, assuming that an investment is only necessary for the current methodology to ameliorate it. In another level of importance is attracting foreign capital, whose importance is relative as already it is explained in the case of wind projects contained in innovation challenge section,

and funding to address the self-employed to amend imbalances and generate employment as previously described.

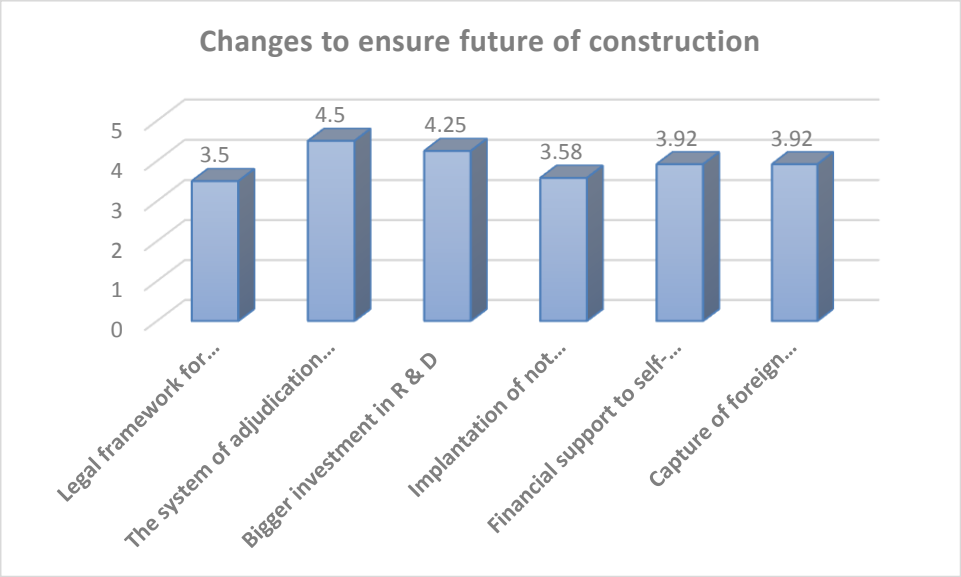

Figure 4.9. Changes to ensure the future of construction

The last two questions concern to a qualitative analysis of most relevant factors to construction planning, and personal contribution of each participant to know how they would improve the industry. This qualitative analysis is essential to complete the quantitative analysis with fundamentals that may have escaped the literature review and to gather possible solutions to the industry not identified in the previous study. It could be considered a brainstorming through questionnaires.

The responses of participants as follow:

10. Write according to your criteria, the 5 most important factors for project planning.

COMPANY A:

INT 1:

1. To destine major investment to plan projects.

2. Project development of obligatory nature for different specialty areas, and coordinated with general form from the Administration to guarantees its independence

3. To limit the downward bidding from the hiring, this ensures a better labour conditions and allows a major demand of quality of the realized works

4. To encourage the development of the planning on the part of private consultancy companies, with a public supervision.

5. Valuation from the Administrations of procedures of R&D that the consultancies put at the service of the planning works.

INT 2:

Enough planning resources

Methodology

Study in deep about the tasks

Coordination with stakeholders

Action systems ISO9001

INT 3:

1. Definition of the project (planning, resources, scope)

1.1. Tasks

1.2. Duration

1.3. Costs

1.4. Resources

1.5. Dependence between tasks

2. Planning communication

3. Management of resources at planning stage

4. Financial management planning

5. Quality management planning

6. Risks analysis

7. Acceptance plan

8. Plan of buys and suppliers management

9. Monitoring and control of phases.

INT 4:

1. Whenever a project is planned, the most important point is to be provided with a portfolio of contacts, with competent and responsible people and companies, so that the works are developed in an efficient way.

2. To be provided with experienced human capital specialised on planning.

3. Economic solvency.

COMPANY B:

INT 5:

1. Clear targets

2. Coordination of the above mentioned targets

3. Availability of resources

4. Investment in R & D

5. Monitoring the fulfilment of stablished objectives

INT 6:

. The traditional planning does not help to the execution.

. The tasks and its dependencies are detailed with too much emphasis and then the precision of the durations is reduced.

. Static planning that are never fulfilled.

. The re-planning is assumed like normal, thereof the dates are unreal.

. Frequently, are supposed available resources much over the reality.

INT 7:

Experience, human resources, economic resources, materials and coordination with clients and stakeholders (administration, public companies, etc.).

INT 8:

Human resources

Informatics resources

Material resources

Financial resources

Non-material resources

COMPANY C:

INT 9:

. Knowledge of the project in question to set concrete and realistic objectives.

. Processing information systems.

. Personal with specific training in the matter.

. Coordination with the promoter and all stakeholders.

. Evaluating periodic systems that allow appreciate the fulfilment of objectives.

INT 10:

Economic.

Labours.

Materials.

Time.

Quality control.

INT 11:

Collecting data.

Material resources.

Budget.

Subcontracting.

Organisational structure.

INT 12:

1. Definition of the scope.

2. Definition of the planning of execution.

3. Definition of cost.

4. Definition of the communication.

5. Stakeholders management.

The responses were analysed through a frequency study, to develop this process there have been considered groups of general factors, encompassing all the different responses depending on the same source, including the most prominent response study: "Management of resources" (it includes enough resources, human resources and all the similar), as with the answer to "Coordination and communication" (between stakeholders, with Administration, related to targets, etc.) and all the others. Thus, it has been possible to quantify the most important elements in planning, offering the frequency result of Figure 4.16.

The result clearly shows the following conclusions:

1º. Resources are the most essential for developing quality planning, as has been presented in the outcome of the comparative analysis of questions 4 and 5, the resources are considered essential, and companies show deficits in human and economic resources. The relationship between these three questions is an indicator that shows a direct link of this the primary cause of bad results in planning.

2º. Coordination and communication are also considered essential, as mentioned in question 8, inadequate methods for information, Inadequate methods for planning coordination and misunderstanding of the nature of planning process, are the central pain planning issues. Moreover, the definition of the project is a trouble with its origin in the coordination problem. The relation between these questions highlights its importance.

3º. The frequency related to specialised professionals, monitoring and control, planning information methodology and processing information system are an indicator of the need of actualizing the planning system in Spain, beginning with the workforce while knowledge retraining, and subsequently through the operating systems.

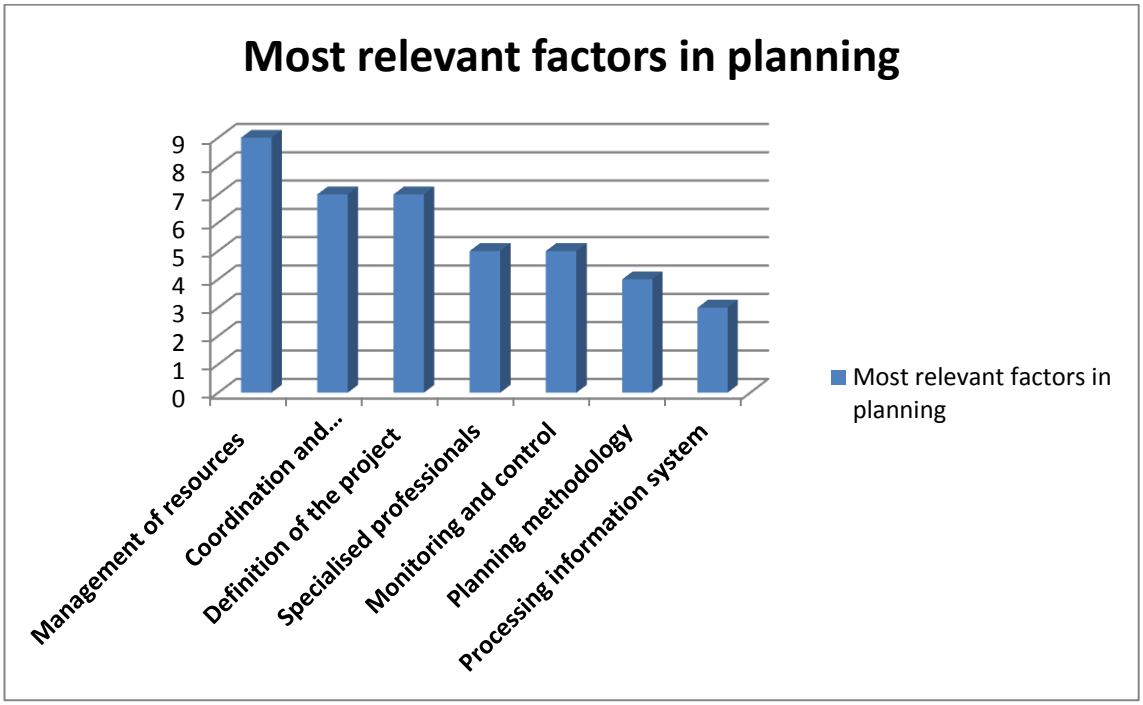

Figure 4.10. Most relevant factors in planning.

Finally, the scrutiny of the last question has been helpful to complete through creative ideas, the construction project management best practice guide for construction organisations, it is the ultimate aim of this study, as indicated in section 1.3.

11. Explain what you would change to enhance the actual Spanish construction situation.

COMPANY A

INT 1:

There is an enormous imbalance in the allocation of economic resources belonging to the Spanish Administrations: vast quantities destined for the payment of salaries of public enterprises workers of scarce productivity (it is another form of subsidy), which leaves a minuscule margin for the investments destined to improve the infrastructures. It should search an ideal proportionality between both resources to be able to invigorate the economy.

INT 2:

There are so many the necessary changes in the constructors industry that I do not believe that a real change can be possible until the present generation of obsolete managers would eliminate.

INT 3:

Firstly to clarify the Law of Competences and afterward the Attributions Law for the sake of the Civil Engineers, that they have been harmed in favour of the Architects and other sectors in the last years.

A significant investment (controlled and regulated) on behalf of the public sector since the private sector is not the problem.

I would increase the importance of the decision-making in politics on the part of the engineer.

INT 4:

About building, in Spain, there are more houses that people, therefore, the solution it is in a sustainable development.

Focusing on the public work, I believe that the problem is that the governments of most of the fields are constituted by counsels, the absence of technical formation in the politics is evident and this drive to useless investments in public work.

COMPANY B:

INT 5:

I would make a long-term planning accomplish continuity and consistency in planning.

INT 6:

To change the bidding system, switching to a more professionalised model and not dependently on politicians.

To optimize the expenses in MAEX (Maintenance and Exploitation) and to release many more contracts of this type, there is a big number of infrastructures in terrible conservation state.

INT 7:

The current model of public bidding is obsolete; it would be necessary to adopt a new one with more transparency, to increase the efficiency of the public enterprises.

INT 8:

The increase of the investment; decreases the amount of few productive workers belonging to government and open and transparent biddings.

COMPANY C:

INT 9:

Public-private partnerships for projects of public-social interest.

Formation and retraining of the base staff to assist their integration in the construction sector.

The offering of public subsidies to encourage R & D within the companies.

Privatization of public housing to introduce them in the labour market.

Create a collaboration system between administrations and sectorial associations at European level to facilitate the mobility of Spanish companies within the EU territory.

INT 10:

Bigger investment in Maintenance and Conservation.

INT 11:

Major facility to award public works to the small enterprises.

INT 12:

Major public investment, at present the investment is very low. The minimal investment is only sent to large-scale projects. What creates jobs and wealth, there are no large projects, but the small projects, which generate considerably more economic movement and of labour force with the same budget.

As in question 10, in this one has been counted the most repeated answers, giving the result of the Figure 4.17. Astonishing is the high outcome of the renewal of managers; it is a matter not previously considered quite important and which directly affects business productivity, as well as the urgent need of a political boost to relaunch construction by injecting an economic stimulus. Similarly, it is vital to change the bidding system to one accessible by any company, to balance capabilities between contractors.

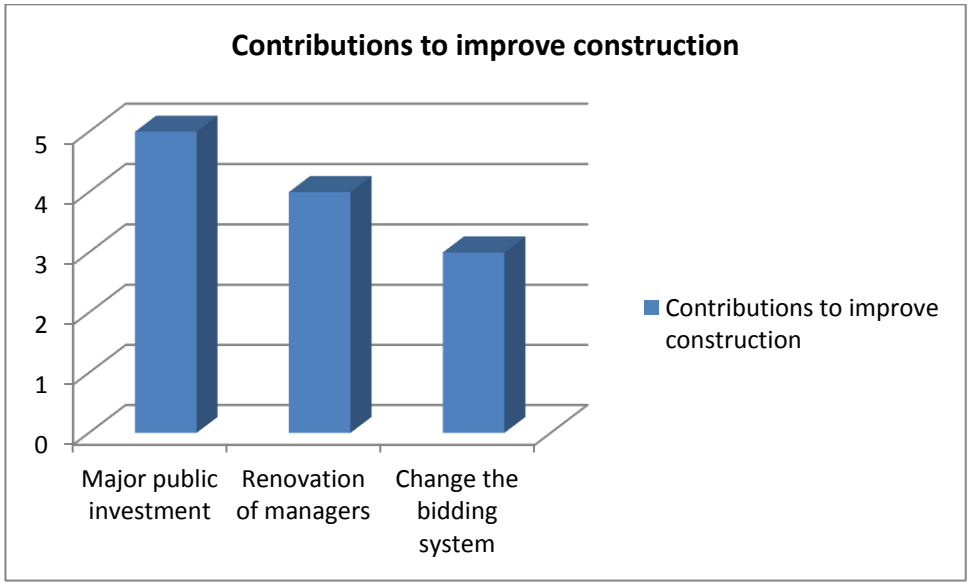

Figure 4.11. Contributions to improve construction.

In short, these 3 results summarized the need to confront the politic, economic, fragmentation, risk and innovative challenges analysed during the study, as encompass virtually all current problems, which largely are derivations of these factors.

With all this information was developed the guide presented in the next section, intended to mark the way forward for the industry professionals, and provide support for the enhancement of construction in Spain.

4.4 Construction project management best practice guide for construction organisations.

After the analysis of information made and the testing of previously exposed data, there have empirically determined and truthfully, what the main challenges facing the construction industry are, and not only that, there have been established efficient parameters based on the experience professionals, that in reasoned allow to theorize the possible hypothesis that would support the recovery and expansion of the construction sector in Spain, by implementing methodologies and practices that solve the main challenges outlined in Chapter 2, and consequently success in meeting the main aim of this guide, exposed in section 1.3.

Table 4.9: Construction project management best practice guide for construction organisations.

1	**Political**	According to findings presented here, the political factor has been one of the most influential and decisive factors in the state of the Spanish construction in general in last years and currently. The legislation of the Ministry of Development along with the activity of public Administrations have not provided enough support to contractors, as having disproportionate responsibilities and do not have the proper legal support of other professions. In this particular circumstance is added the general Law of Labour Reform approved in 2012, which has led to an increase in precarious contracts, generating an illegal submarket within the industry, characterized by hiring undocumented and unskilled, depleting the quality of the final product, which is also directly affected by the enormous amount of managers accommodated in the Administration whose productivity is

		really low. To these negative new circumstances, it has been joined the previously existents relatives to an obsolete system for the adjudication of public works, which favours only large companies and restricts the ability to enter the market to new firms, creating stagnation in the sector. Given the present political scenario the solution is a change in the foundation of the laws of public works, starting with the tendering project system, which in many cases is hampered by the reckless tenders offered by large organisations, presenting insanely small percentages with respect to the initial bidding budget, in much of public construction auctions, whether the financial bids would limit and regulated, it would possible more transparent and accessible auctions to SMEs, where primary project quality by not having to operate with such low margins, thus it would promote business development gaining equally organisations and industry. Regeneration and advancement of industry first passes through a renewal of its members, to create a productive model it is essential retraining of much of the managers already settled in the government, along with the need to monitor and control its competences, since these are accredited directly responsible for some of the factors that affects project planning: using of improper methods to gather information, poor communication

		and coordination and cumbersome structure in the planning phase. If referred political changes are applied to a labour reform that supports contractors, a more equitably projects contracting and are established recycling programs and effective training of administrative personnel, it would be moving in the right direction towards the revival of the industry.
2	**Economic**	According to the information gathered in the literature review and subsequently proven by statistical analysis of the questionnaires, the global economic crisis has been the leading cause in burdening the construction sector in general and the financial resources are the most scarce resource in the industry and adversely affects to project planning in particular. The situation of the construction is directly linked to the economic status, as the dependency created between them by making this sector the main engine of growth, and most important element of the GDP progression has caused them to fall together to the instability of the current context. This symbiosis also implies that the one revival would boost the development of another. This approach will be a real possibility if appropriate measures to the present economic panorama are settled, starting with the

		destination of largest investment to public works by the competent bodies. As demonstrated in the literature review, the greatest time of Spanish economic boom was caused by investment in public works that in the short term translated into profits. At the present, most of the percentage allocated to construction projects is invested in large-scale projects, erroneously because what generates wealth and global development is the investment in smaller projects, which is consequently creating more jobs and economic prosperity. One of the biggest mistakes made before the global crisis was the creation of a housing stock that remains disproportionate, the new model should be implemented in a sustainable way, and optimizing the available resources, it would be wise to lift the economy by privatizing public housing to introduce them into the labour market, this initiative would generate internal riches, by optimizing available resources and without any investment. Furthermore, the idyllic natural conditions of Spain, have made that a significant percentage of its housing stock has been acquired by foreign investors in recent years, whether would facilitate mobility between EU territory through collaboration systems, it would encourage the catchment of foreign capital, which would increase the resources within the industry and would a stimulus for job creation.

		The solution is to copy the proven economic model by running it in a sustainable way, making a prudent management of available resources This approach is a real possibility if appropriate measures are settled to the present economic panorama, starting with the destination of largest investment to public works by the competent bodies. As demonstrated in the literature review, the greatest time of Spanish economic boom was caused by investment in public works that in short term was translated into profits.
3	**Fragmentation**	The construction sector is represented by many different entities, all in some way dependent or influential but not all connected directly to each other, this causes an inter-industry fragmentation beginning in the political scope and ultimately affecting to customers. This guide has determined that the management of human resources is the most important thing to do for any construction company, and coordination and communication with relevant government agencies and stakeholders is one of the most essential elements of proper planning and the future of construction. Despite this, project planning is severely affected by the lack of communication and methods in which information is obtained, which in many cases is wrong or misleading, causing misunderstanding of the nature of the projects, which are presented incorrectly defined, and this

		happens by lack of coordination between stakeholders, it is an apparent consequence of the effects of fragmentation, which is roughly guilty in that project objectives are not met. The incidences of this disease would be minimized by implementing effective information processing systems, in which all information relating to projects would open permanently by stakeholders, generating their interconnectivity and ease of communication. These processing systems should be accompanied by monitoring and control of both public employees and private entities, to ensure constant collaboration and participation of both parties, and that the objectives defined in the project are accomplished, in this way would be avoided situations in which projects go away from their original duties or where resources are wasted through modifications or redoing.
4	**Risk**	Spain stands out as the EU country where more accidents and fatalities occur in proportion to the number of workers in the construction sector, generating not only human impairments but also significant economic losses. The main culprits of these adversities are negligence by employees and supervisors who despise methods of health and safety, and contractors do not employ the necessary resources in training to form workers in this matter or in hiring specialized technicians to ensure proper development of the particular

		procedure for each task. As explained in preceding paragraphs, a direct relationship between the solutions mentioned above and free of accidents work environment is observed, as would avoid unnecessary risks if investment by the state were higher, thereof it would help contractors to allocate part of financing in quality construction. Again are critical factors the correct definition of the project, which will determine the nature of the risk and the system of action to follow, as well as training of workers and the requirements of customers, who should be the first in requiring a correct implementation of projects, and to develop appropriate health and safety culture through internal each own company experience.
5	**Innovation**	There are two phenomena that reciprocally feed into each other within the Spanish construction sector, one is the small number of researchers doctoral level compared to other advanced countries, and the other the low percentage of GDP spent on R&D. This underfunding not only does not encourage the creation of Ph.D. researches but also causes a "brain-scape" to other countries where economically it is promoted research and creativity. Among the findings in innovation of this study there is a striking fact, first in quantitative analysis respondents have stated that the lack of innovation has not been a significant impact on the

		construction, and has not adversely affected the planning projects, however the qualitative analysis has proved to be one of the most important change to ensure the future of construction in Spain factors. This is a clear indicator of the need for new methodologies that allow reinvention within the industry, and the first step towards this is to create a market in which researchers can thrive.
6	**Competitiveness**	Competition in this sector has increased tremendously in recent years, resulting in the closure of a high percentage of SMEs that could not adapt to a changing market. This ferrous competitiveness has been the evolution of a process in which the Administrations were offering ever-lower tenders, companies had increasingly higher downgrades respect from the initial price at auctions of projects, and consequently, profits are shrinking. The solution to this problem is to limit the low percentage of tenders as mentioned in the political section. One factor that has contributed to the deterioration of the industry has been the professional intrusion from the change in legislation that adapts the Spanish academic system to the European model. Today, these adaptations have not been definitively approved the equivalence between old and new degrees and consequently the skills for each profession, creating

		conflicts between various specialized technicians, as among the associations of engineers and architects. There should be made the final approval between qualifications to avoid this professional intrusion and resolve the conflict.

4.5 Test and validate guide with domain experts

After elaborating the construction project management best practice guide for construction organisations, its accuracy has been verified and confirmed by the analysis of experts of a Spanish organisation dedicated to the construction generally, that in the following Table appraise, discuss and point out their personal vision in accordance with all the apart presented in previously, expressing their level of agreement with the above, and enriching the guide by their own contributions, so absolutely all their considerations here presented should be included in the guide, for completing and enhancing its content.

The literal transcripts of their comments are as follow:

Table 4.10: Construction project management best practice guide for construction organisations.

1	**Politic**	I agree with the vast majority of the factors mentioned, with direct impact on the difficulties encountered by SME's construction companies in Spain to face its sustainability. I just approach aside as regards the Law of Labour Reform, and I do not understand this as a cause of precariousness (the National Convention of Construction is one of the most favoured in Spain), but this is a consequence more of the ridiculous amounts

		to which contracts are finally adjudicated. On the other hand, I would identify as a worrying factor the unfair competition by the authorities awarding contracts directly to public enterprises in an unfair manner.
2	**Economic**	I agree broadly with all the statements made in this report may be pointed or qualified, if possible, why some of them in my humble opinion. Indeed are SME's maximum generators of wealth in the Spanish economy, but to reach their full potential for meeting that objective, they might have to invest on R & D, as the Spanish business sector suffers from not having a more professionalism and capacitation in some cases. Again and to make it possible, it is necessary public investment to encourage companies to invest in the acquisition of greater competitiveness. Either through grants or bonuses to improve efficiency and productivity. Concerning the privatization of public housing stock, effectively this could be a real solution. Perhaps the problem lies in adapting the supply of housing or in stock to actual demand in certain territories. According to many studies, in most cases such stock is oversized, so also it is considered a good idea to offer this glut of homes to other non-residential inhabitants as a second home, serving as a measure for both foreign and

		nationals. The rent is also a good alternative, and certainly in some cases it would more advisable than the ownership transfer of such housing from public to private sector, delegating only property management through subsidized rents for groups that cannot afford to access to housing, whether young, dependents or people without resources.
3	**Fragmentation**	I absolutely agree with this hypothesis. In Spain, the public service is in the process of digitization, and today there is not even an interconnection between different public entities that comprises it. This inevitably raises a mismatch that ultimately generates a lack of flexibility and process efficiency. Therefore, it affects all sectors since all are directly or indirectly related to public entities. And this affects the economy in general. When it refers specifically to the construction industry, this singularity results in delays and the increases of all processes, since a license to start work is requested until obtaining certificates of completion of the work. As regards to public tenders, due to this lack of communication between all stakeholders, most infrastructure projects end up with delays and budget overruns, which unbalance and hinder investments perform, with the consequences that have in such a

		strategic sector like this.
4	**Risk**	According to the factors identified as triggers of workplace accidents and that are motivated once again by the reduced budget amounts for educational, preventive and control activities. I would suggest as a solution, that these activities were not subject to lows done to budget when contracts are adjudicated, fully maintaining the monetary amounts provided from the project.
5	**Innovation**	Indeed, this is the Achilles heel or chief handicap of our production and to which it is referred in the comments economic section previously discussed. Although in this, it was done from the perspective of the construction sector, but the same approach can be applied to our labour market. In Spain, much money is invested in education compared with other EU countries, and we also have one of the highest ratios of member countries concerning the cost of our public education system. Paradoxically, we get the failure rate or highest dropout of EU with Lithuania and some countries less advanced than us. This is a clear sign of the necessity of reforms to promote the knowledge economy and curb the "brain-scape". Spain needs an education reform that favours retaining talent in companies and to enrich the country that has invested in the training of the same and yet not benefit from it other countries or foreign firms that have not contributed to this education

		system. Otherwise, it creates an imbalance.
6	**Competitiveness**	In agreement with the statements, especially concerning to limit low bid in respect to budget in which projects are tendered. It also seems appropriate from the obligation to settle the foundations of the competitions, that companies provide a series of specially trained technicians rather than more exclusive clauses favouring only large enterprises.

4.6 Summary

This chapter is the one that gives the greater value to the study because it has been possible to present the main points of the literature review of academic way, and contrast the quality of information by obtaining empirical data from the professional field, determining the percentage of reliability or unreliability of the conclusions that had been raised in previous chapters.

It has been determinant the possibility of obtaining conclusive data about the context surrounding the construction business, and more specifically to management planning, by statistical analysis of the perceptions of professionals to quantify the reality of their environment descriptively. The most valuable of this procedure is the procurement of data impossible to obtain only from literature offered by the media, for by the different appraisals of the primary data it has been capable of developing a validate a guide that shows the status of the construction of Spain with full fidelity.

CHAPTER 5 - CONCLUSIONS

5.1. Overall conclusions

The discussed study was presented with the aim of developing a guide of accessible knowledge and easily interpretable by any professional linked to the construction business, in which could get useful practices to develop and improve the various elements that strongly affect the proper planning, focusing on the main branches of construction in Spain: building and civil engineering.

To be successful for this purpose, there were established a series of objectives that enabled through its ordered achievement, to scrutinize the necessary process to achieve the ultimate aim previously described. The first target was based on synthesizing core literature from experienced professionals, project management methods and construction technology, through this practice it could get a reasonably accurate idea of the reality experienced in the construction sector, focusing the spotlight on the available literature on different media, to cement the final guidance on the findings already available by other studies carried out by experienced professionals with detailed acquaintance with the construction, as well as the procedures and technology used in this environment in order to ascertain the key organisational priorities and challenges facing contractors in Spain

Having identified the main challenges experienced by contractors in construction firms, there have been classified into political, economic, fragmentation, risk, competitiveness and Innovation. So it was possible to analyse the challenges individually sub contained within each of them, this has given accurate discernment of the issues involved, and allowed to investigate in all these aspects, exploring the root causes.

Achieving this goal has established questions trough the most convenient methodology designed for the purpose, managing to express the intricacies of all these particular problems descriptively by analysing the questionnaires submitted by three different professionals Spanish construction organisations. Going further, it has not only contributed to determining the responsible factors but also have helped to present the findings needed to solve them.

Once there have been identified potential solutions that would amend the issues that suffer the construction business, it was developed a best practice guide in construction planning, which in sectioned way exposes the necessary changes in the industry, reasoning how to ensure a prosperous future in the same.

Finally, the guide developed has been tested and validated by domain experts from a construction company, which submitted their agreement and differences about the same, and have further clarified their views and made possible improvements that make valid this project management best practice guide for any construction organisation in Spain, besides presenting hypotheses for the revival of construction in general.

5.2. Recommendations

5.2.1 To industry

As demonstrated in this study, the planning management of construction projects is a core factor for the development of the industry. The link between both is so binding that it conditions the adequate development of construction business, as it is at this stage that are managed all the resources that afterwards will be necessary for the efficient progress of the project, with particular attention to human and financial resources that should be handled realistically according to the capabilities of each company, and accomplish that successfully organisations must have an appropriate structure for the progress of the

planning system, where communication and coordination with all stakeholders are adequate, and the availability of a trained workforce by specialised professionals who understand the nature of the project, to define its tasks accurately. Taking into account these practices can adequately manage all requirements presented in any project.

5.2.2. To Academia

The findings presented in this study are valid for any future research that may be developed related to the construction in Spain. Here are presented literary useful information regarding the evolution of the construction in recent years, whose validity is permanent in time, by adding further information that attempts to approximate the path that the industry will follow in the coming years.

It would statistically interest to check whether forecasts regarded to industry described herein are met reliably within a few years, by that analysis could be mathematize accurately of research tools used in this dissertation, by adding nuances or readjusting parameters showing possible discernment with reality because, as usually occurs with studies estimate, only time can truthfully complete its exact degree of exactitude.

It is also possible to reuse all the information presented and expand it by including data from questionnaires sent to a wider range of companies, perhaps because the final result is closest to reality if the sample is larger and more varied.

There may even consider alternative ways of performing this study keeping the same main concept, such as analysing the inclusion of case studies of successful projects, or projects where there was especially prominent in procuring its objectives by their planning development.

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APPENDIX 1 – DRAFT QUESTIONNAIRE

1. How long time have you been tied to the world of construction?

2. What kind of construction projects have you worked in?

3. What importance do you give to the management of planning construction projects?

4. In what phases would you divide the planning of projects?

5. What planning phase do you find most important?

6. What resources do you usually have available for planning?

7. What resources do you consider most essential for planning is adequate?

8. How many members are generally used in planning and what are their jobs? (Job they do)

9. Is it necessary to include the collaboration of a partner in a project?

10. Apart of the technical team of the company, what more bodies are involved in the management of project planning?

11. What do you consider are the key factors in project planning?

12. What do you think are the biggest mistakes or risks committed in the project planning?

13. How could be resolved these errors or avoid these risks?

14. In what way is measured or evaluated the success of the project planning as such and at the level of each of the stakeholders?

15. How is monitored and controlled project planning?

APPENDIX 2 – FINAL QUESTIONNAIRE

PROJECT PLANNING QUESTIONNAIRE

Your current profession:

Dedication of your company:

In each of the following questions, mark an X or underline the number in the box that best fits in your opinion about the relevance of the matter. The scale that appears above the numbers reflects the different opinions.

1. How long have you been working in the construction industry?

Less than 3 years	
Between 3 & 5 years	
Between 6 & 10 years	
More than 11 years	

2. ¿What kind of projects have you worked in?

Urbanism	
Building	
Mining	
Maritime and Coastal Engineering	
Health & Safety	
Railway	
Environmental Engineering	
Other	

3. According to your criteria, select the importance of the followings construction project phases.

Phases	Importance scale				
	Without importance	Few important	Neutral	Important	Very important
Contract	1	2	3	4	5
Planning	1	2	3	4	5
Execution	1	2	3	4	5
Monitoring & Control	1	2	3	4	5
Closing & Delivery	1	2	3	4	5

4. What of the next resources do you consider more important for proper planning?

Resources	Importance Scale				
	Without importance	Few important	Neutral	Important	Very important
Human Resources	1	2	3	4	5

Materials Resources	1	2	3	4	5
Technological Resources	1	2	3	4	5
Financial Resources	1	2	3	4	5
Others	1	2	3	4	5

5. Evaluate your quantity and quality of resources available for Project planning.

Factors	Importance Scale				
	Very limited	Limited	Neutral	Large	Very large
Human resources	1	2	3	4	5
Materials resources	1	2	3	4	5
Technological resources	1	2	3	4	5
Financial resources	1	2	3	4	5
Others	1	2	3	4	5

6. Indicate the impact of the next factors in the Spanish construction situation along the last years.

Factors	Importance Scale				
	Without importance	Few important	Neutral	Important	Very important
The activity of the Public Administrations	1	2	3	4	5
Lack of financing or subsidies	1	2	3	4	5
Global crisis	1	2	3	4	5
Lack of innovation	1	2	3	4	5
Competitiveness into the industry	1	2	3	4	5
The framework of the Ministry of Development	1	2	3	4	5

7. In the current context, indicate how much affect these factors to the proper project planning.

Factors	Importance Scale				
	Without importance	Few important	Neutral	Important	Very important
Politics	1	2	3	4	5
Economics	1	2	3	4	5
Resources	1	2	3	4	5
Need of innovation	1	2	3	4	5
Competitiveness	1	2	3	4	5

8. Globally, indicate what the main troubles in current construction planning process are.

Factors	Importance Scale				
	Without importance	Few important	Neutral	Important	Very important
Inadequate method for information	1	2	3	4	5
Insufficient training	1	2	3	4	5
Misunderstanding of the nature of planning process	1	2	3	4	5
Inadequate methods for planning coordination	1	2	3	4	5
The cumbersome work structure in planning practice	1	2	3	4	5
Clients' requirements	1	2	3	4	5

9. In the current panorama, what do you think that it should change to guarantee the future of the construction sector in Spain?

Factors	Importance Scale				
	Without importance	Few important	Neutral	Important	Very important
Legal framework for construction	1	2	3	4	5
The system of adjudication of public work	1	2	3	4	5
Bigger investments in R & D	1	2	3	4	5
Implantation of not conventional methods of construction (3d printing, offsite construction, etc.)	1	2	3	4	5
Financial support to self-employed workers	1	2	3	4	5
Capture of foreign investment	1	2	3	4	5

10. Write according to your criteria, the 5 most important factors for project planning.

Explain what you would change to enhance the actual Spanish construction situation.

APPENDIX 3 – SAMPLE OF RECEIVED QUESTIONNAIRE

PROJECT PLANNING QUESTIONNAIRE

Your current profession: CONTRACTOR

Dedication of your company: CIVIL ENGINEERING

In each of the following questions, mark an X or underline the number in the box that best fits in your opinion about the relevance of the matter. The scale that appears above the numbers reflects the different opinions.

1. How long have you been working in the construction industry?

Less than 3 years	
Between 3 & 5 years	
Between 6 & 10 years	
More than 11 years	X

2. What kind of projects have you worked in?

Urbanism	X
Building	
Mining	
Maritime and Coastal Engineering	
Health & Safety	
Railway	
Environmental Engineering	X
Other	

3. According to your criteria, select the importance of the followings construction project phases.

Phases	Importance scale				
	Without importance	Few important	Neutral	Important	Very important
Contract	1	2	3	4	5
Planning	1	2	3	4	5
Execution	1	2	3	4	5
Monitoring & Control	1	2	3	4	5
Closing & Delivery	1	2	3	4	5

4. What of the following resources do you consider more important for a proper planning?

Resources	Importance Scale				
	Without importance	Few important	Neutral	Important	Very important
Human Resources	1	2	3	4	5

Materials Resources	1	2	3	4	5
Technological Resources	1	2	3	4	5
Financial Resources	1	2	3	4	5
Others	1	2	3	4	5

5. Evaluate your quantity and quality of resources available for Project planning.

Factors	Importance Scale				
	Very limited	Limited	Neutral	Large	Very large
Human resources	1	2	3	4	5
Materials resources	1	2	3	4	5
Technological resources	1	2	3	4	5
Financial resources	1	2	3	4	5
Others	1	2	3	4	5

6. Indicate the impact of the next factors in the Spanish construction situation along the last years.

Factors	Importance Scale				
	Without importance	Few important	Neutral	Important	Very important
The activity of the Public Administrations	1	2	3	4	5
Lack of financing or subsidies	1	2	3	4	5
Global crisis	1	2	3	4	5
Lack of innovation	1	2	3	4	5
Competitiveness into the industry	1	2	3	4	5
The framework of the Ministry of Development	1	2	3	4	5

7. In the current context, indicate how much affect these factors to the proper project planning.

Factors	Importance Scale				
	Without importance	Few important	Neutral	Important	Very important
Politics	1	2	3	4	5
Economics	1	2	3	4	5
Resources	1	2	3	4	5
Need of innovation	1	2	3	4	5
Competiveness	1	2	3	4	5

8. Globally, indicate what the main troubles in current construction planning process are.

Factors	Importance Scale				
	Without importance	Few important	Neutral	Important	Very important
Inadequate method for information	1	2	3	4	5
Insufficient training	1	2	3	4	5
Misunderstanding of the nature of planning process	1	2	3	4	5
Inadequate methods for planning coordination	1	2	3	4	5
The cumbersome work structure in planning practice	1	2	3	4	5
Clients' requirements	1	2	3	4	5

9. In the current panorama, what do you think that it should change to guarantee the future of the construction sector in Spain?

Factors	Importance Scale				
	Without importance	Few important	Neutral	Important	Very important
Legal framework for construction	1	2	3	4	5
The system of adjudication of public work	1	2	3	4	5
Bigger investments in R & D	1	2	3	4	5
Implantation of not conventional methods of construction (3d printing, offsite construction, etc.)	1	2	3	4	5
Financial support to self-employed workers	1	2	3	4	5
Capture of foreign investment	1	2	3	4	5

10. Write according to your criteria, the 5 most important factors for project planning.

. Knowledge of the project in question to set concrete and realistic objectives.

. Processing information systems.

. Personal with specific training in the area.

. Coordination with the promoter and all stakeholders.

. Periodic evaluation systems that allow appreciate the fulfilment of objectives.

Explain what you would change to enhance the actual Spanish construction situation.

Public-private partnerships for projects of public-social interest.

Formation and retraining of the base staff to assist their integration in the construction sector.

Offering of public subsidies to encourage R & D + i within the companies.

Privatization of public housing to introduce them in the labour market.

Create a collaboration system between administrations and sectorial associations at European level to facilitate the mobility of Spanish companies within the EU territory.