

E-business adoption and the use of strategies in small and medium enterprises

Suggestions for the progression of SMEs' e-adoption

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Abstract—This paper presents a classification of SMEs according to their level of e-adoption and their use of formal strategies and e-business strategies. The five distinct groups established in this classification are described and suggestions for the progression of SMEs e-adoption are given.

Keywords—e-business; small and medium enterprises; strategy, classification

I. INTRODUCTION

This paper presents the findings of a mixed-mode, mixed-method study of small and medium enterprises (SMEs) and their attitude towards e-business and strategies. The study concluded in 2009 and followed a sequential explanatory design [1], also referred to as quantitative research that facilitates qualitative research [2]. Priority was given to the quantitative approach, which is typical for the mixed-methods data collection process in the sequential explanatory design [3]. Integration of the phases occurred during selection of the participants for the qualitative follow-up analysis based on the quantitative results of the first phase which is, again, typical for this design [3][4]. The mixed-mode approach used in the first, quantitative stage has been discussed in [5] and findings from the quantitative stage, focussing on the univariate statistics, have previously been published in [6]. The more interesting findings from the multivariate statistics have however only been presented briefly and have not yet been explained in more detail, while findings from the qualitative stage of the study have not been included at all.

II. CLUSTER ANALYSIS

A multivariate analysis technique was used in the quantitative stage of this study, namely cluster analysis. Five different types of SMEs in relation to their strategy, e-business strategy and e-adoption were found and labelled

- E-business strategy leaders
- Old fashioned SMEs
- Blind e-business users
- E-adoption leaders
- Formal strategy leaders

The analysis was based on three variables

- The use of formal strategies (attributes: no strategy, verbally defined strategy, written down strategy)
- The use of e-business strategies (attributes: no strategy, verbally defined strategy, written down strategy)
- The current position on the UK Department of Trade and Industry (DTI) e-adoption ladder (attributes: none, e-mail, web site, e-commerce, e-business, transformed organisation)

The diagram presented in Fig. 1 offers a quick way of identifying which group an SME belongs to.

If an SME has an e-business strategy (labelled β on the e-business strategy axis) it should be seen as an e-business strategy leader. E-business strategy leaders are represented by the green colour in Fig. 1. In the quantitative part of this research the e-business strategy group was the smallest group with roughly a third of the members of the blind e-business users group. It is therefore expected that only a small proportion of SMEs will fall into this category.

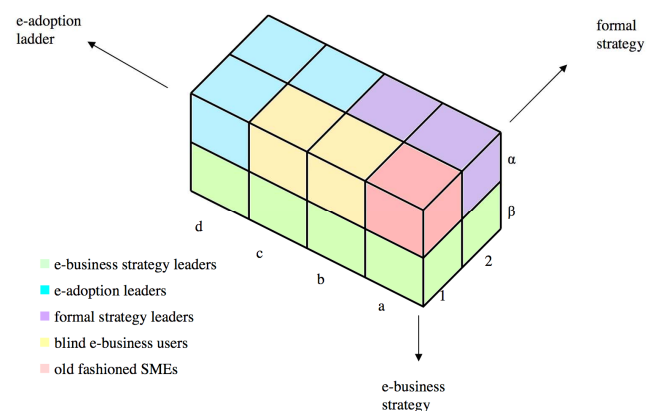


Figure 1. Strategy and e-adoption classification for SMEs

An SME is classified as an e-adoption leader if it does not have an e-business strategy (labelled α on the e-business strategy axis) and is either classified as doing at least e-

commerce (labelled d on the e-adoption ladder axis) on the e-adoption ladder, i.e. the company is at least buying or selling online, but could also have a higher level of e-adoption, such as having the e-business processes integrated into their supply chain, or if it is classified as having a web site (labelled c on the e-adoption ladder axis) on the e-adoption ladder and it has a business strategy (labelled 2 on the formal strategy axis). E-adoption leaders occupy the blue positions in Fig. 2 and in Fig. 1. It is worth mentioning that there were combinations of the variables that did not occur in the sample used in the quantitative stage. There were no SMEs that were classified as transformed organisations, the highest stage of the e-adoption ladder and there were no e-adoption leaders on the e-commerce stage of the e-adoption ladder that had a verbally defined business strategy. When looking at the data from a real world point of view and without keeping the strict, chosen cluster analysis rules in mind, it could be argued that the e-adoption leader group should be split into two groups: the e-adoption leaders with a higher level of e-adoption and less use of business strategies and the e-adoption leaders with a high use of business strategies and a low level of e-adoption (see Fig. 2). An analysis of the dendrogram and the abbreviated agglomeration schedule, omitted in this paper to keep to the page limit, do not support this split. The quantitative analysis also suggests that a split would provide an unbalanced mix of group sizes as the second smallest group of this taxonomy would be split even further. The group was therefore left unchanged even though a split would be possible. SMEs on the e-commerce stage of the e-adoption ladder that have a verbally defined strategy should be counted as e-adoption leaders.

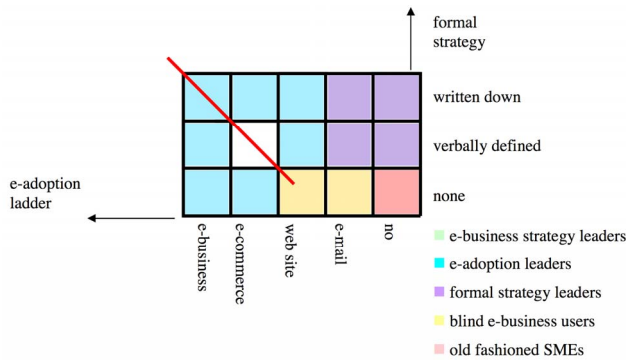


Figure 2. Split of e-adoption leader group

Formal strategy leaders are SMEs that do not have an e-business strategy (labelled α on the e-business strategy axis), but have a business strategy (labelled 2 on the formal strategy axis) and have a very low e-adoption ladder classification, i.e. they either do not do any e-business (labelled a on the e-adoption ladder axis) or they reached the e-mail stage on the e-adoption ladder. Formal strategy leaders are represented by the purple blocks in Fig. 1.

The biggest group that was found in the quantitative stage was the group of blind e-business users. SMEs are classified as blind e-business users if they do not have an e-business strategy (labelled α on the e-business strategy axis) and if they do not

have a business strategy (labelled 1 on the formal strategy axis) and if they started the introduction of e-business technologies, but are still on the lower stages of the e-adoption ladder, i.e. they are either on the e-mail stage (labelled b on the formal strategy axis) or on the web site stage (labelled c on the formal strategy axis). Blind e-business users occupy the yellow blocks of the model in Fig. 1.

The last group is the group of old fashioned SMEs, which is made up by SME that do not have an e-business strategy (labelled α on the e-business strategy axis) and do not have a business strategy (labelled 1 on the formal strategy axis) and do not use any form of e-business and are on the lowest level of the e-adoption ladder, do not have a business strategy (labelled a on the formal strategy axis), meaning that they do not have a web site and do not use e-mail. The qualitative stage of the study has shown that some of these companies did engage in e-commerce in the past, but stopped this because of previous disappointments. This group is represented by the red block in Fig. 1.

III. LIMITATIONS / SCIENTIFIC REQUIREMENTS VS. REAL WORLD PROBLEMS

A. On the difficulties of finding a representative sampling frame

Several issues surfaced during the quantitative stage that need addressing. The first issue relates to the choice of data source. The study was conducted in the UK, but as established in [6] there is no publicly accessible register of businesses in the UK. The most representative database holding information about businesses in the UK is probably the Inter-Departmental Business Register (IDBR), a list of UK businesses maintained by the Office for National Statistics (ONS), which complies with several European Union Regulation, most importantly European Union Regulation (EC) No 177/2008, described in [7], which aims at establishing a common framework for business registers for statistical purposes [8]. Even though access to analyses derived from this database is available to the general public, direct access to the database is very restricted [9] [10]. Even IDBR, arguably the best database available for the purpose of this study, would still produce a sampling frame that differs from the population being studied, the main reason being that businesses not registered for VAT might not be included because currently (as of 1st April 2010) UK businesses only need to register for VAT when their taxable supplies exceed the threshold of £70,000. Many micro enterprises might therefore be missing from the database, which would introduce bias. Other databases might be less representative of the population and might therefore introduce even more bias. To deal with this real world problem several steps have been taken to try to ensure that the data is as representative as possible under these circumstances, starting with the choice of database used and including measures like testing for non-response bias. However, it has to be said that the real world problems discussed here mean that there is no sampling frame available that is representative of all UK SMEs. The qualitative stage of the study was therefore not only used to select SMEs to be included in the qualitative stage but

was also used to validate the findings from the quantitative stage.

B. On the limitations of cluster analysis

Another real world problem in contrast with scientific requirements is related to the choice of multivariate analysis technique used: cluster analysis. Since the different variables used for the cluster analysis are ordinal scales, computing the dissimilarity matrix is not without problems [11]. Furthermore, there are arguments that natural clustering cannot exist and is created by the algorithm of the clustering technique [12]. This problem must surely be magnified with ordinal scales, in the case of this study even more so because of different numbers of categories in different variables and it could therefore be argued that the resulting groups are artificially created by the algorithms used and that variations in the algorithms used are responsible for creating the different groups. Again, measures were taken to combat these real world problems. The sampling adequacy and the overall significance of all correlations were ensured by testing the Kaiser-Meyer-Olkin measure and Bartlett's test of sphericity and different choices within cluster analysis were weighed up. The qualitative stage proved, again, extremely useful in validating the findings from the quantitative stage which could otherwise be criticised on mathematical grounds.

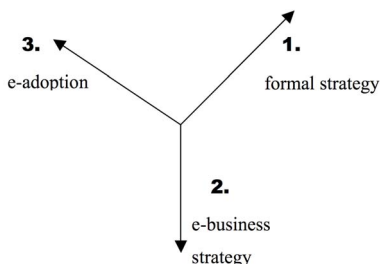


Figure 3. Suggested path of progression

IV. SUGGESTIONS FOR PRACTITIONERS

As the use of strategies is important for the traditional business area and for e-business [13][14][15][16][17], the aim of every company should be to be classified as an e-business strategy leader. This does not imply that all companies should be e-business active. An informed decision not to take part in e-business could also be seen as an e-business strategy. Since having an e-business strategy was a relatively rare occurrence in the qualitative stage of the study, the e-business strategy leader group in the e-adoption strategy classification includes companies at different levels of the e-adoption ladder. All e-business strategy leaders did however also have a business strategy for the traditional business area, additional to their e-business strategy.

The general advice for companies would be to progress first on the formal strategy axis (see Fig. 3), this means that

- old fashioned SMES should aim to become formal strategy leaders

- blind e-business users should aim to become formal strategy leaders or e-adoption leaders
- e-adoption leaders should work on a business strategy if they do not have one already

Some of the companies interviewed for the study progressed from lower e-adoption and strategy groups to higher groups in the 18 months between the quantitative and the qualitative stage. Three of the old fashioned SMEs moved to the e-adoption leaders group, two blind e-business users moved to the e-adoption leaders group and two formal strategy leaders moved to the e-business strategy leaders group. The fact that SMEs that changed their group moved similar to the suggested path of progression supports the idea that the natural progression is to move along the three axis as shown in Fig. 3.

As a next step companies should progress on the e-business strategy axis. Having an e-business strategy will help them to understand their e-business needs, even if it turns out that there is no need to use e-business technologies or if it turns out that there is no need to increase the adoption of e-business technologies. Companies should therefore strive to become e-business strategy leaders. The progression to higher levels of e-adoption might take different forms depending on the existing level of e-adoption. Possible progression paths are presented next, accompanied by examples from companies interviewed during the qualitative stage of this study.

A. Progressing from low levels of e-adoption

If there is a planned increase of e-adoption, it should be opportunity driven. A typical opportunity afforded to progress from very low levels of e-adoption could be improved communication. When looking at progress upwards from very low levels of e-adoption the benefits should usually outweigh the costs in the cost-benefit analysis, at least in developed, high income countries as defined by the World Bank [18] since access to computer hardware is relatively easy.

In his Adopter Categorisation on the Basis of Innovativeness, Rogers shows five adopter categories with the approximate percentage for each category with the latest adopters, the laggards, making up approximately 16% [19]. The interviews in the qualitative stage discovered that 13.8% of companies had a much lower level of usage when it comes to Internet technologies, which is in line with Roger's Adopter Categorisation. Half these companies stopped using Internet technologies, while the other companies were very reluctant when it comes to the adoption of e-business and Internet technologies. Reasons were lack of knowledge and lack of necessity to make profit because of special ways of funding.

There were very few interviewed companies who did not see making the first step on the e-adoption ladder as being beneficial. The companies not wanting to be on the first step of the e-adoption ladder were companies who used e-business technologies previously, but decided to stop their use of e-business technologies. In these cases the reasons for not wanting to stay on the ladder were a mixture of previous disappointments, when unplanned e-adoption was not successful plus perceived low opportunities through e-adoption

because of the companies' industry sectors and the type of customers the companies cater for.

B. Progressing from high levels of e-adoption

The first steps on the e-adoption ladder did not seem to cause problems for the interviewed companies once e-business technologies have been introduced. The transition from the e-mail stage to the web site stage of the e-adoption ladder did not provide insuperable obstacles for the companies interviewed and should not do so for other companies because they are now already familiar with simple e-business technologies.

The next step, moving from already high levels of e-adoption to even higher levels, e.g. from the web site stage to the e-commerce stage, is usually more work intensive, especially when selling products and services online, as the e-commerce systems need to be kept up to date which usually requires that the company creates mechanisms or procedures to regularly update databases, e.g. for stock levels or prices.

The next step, being on the e-business stage of the e-adoption ladder, can be very rewarding for companies. While companies at the e-commerce stage buy or sell online but have not integrated these systems with their supply chain, there is the danger of keeping redundant data in different, not integrated systems. Not only is synchronising the data between the e-commerce system and the supply chain a time and work intensive task, there is also the possibility of the data becoming inconsistent in the different systems. When moving onto the e-business stage the need for keeping the e-commerce systems up to date with the 'reality' of the company is eliminated, but tying in the e-business systems with existing legacy systems can be very difficult and will require expert knowledge most likely not found in companies who are not 'born on the net' but who started as a traditional company and moved towards e-business later. If companies are not able to integrate their systems they cannot move up to the e-business stage. In this case the reasons for not being able to progress are internal, which makes these reasons potentially easier to overcome than external reasons. Whether the benefits gained from being on the e-business stage justifies the cost, in this case the tangible cost of paying for the integration of the systems by hiring a company or in some cases possibly by training existing IT staff should however depend on the outcome of a cost-benefit analysis.

Other reasons for not being able to move up to the e-business stage are external influences, which are more difficult to overcome as they might be outside of the companies' influence. If companies deal with business partners who do not have e-business capabilities, they often end up in a situation similar to one of the interviewed companies that used an EDI based system in the past, but reverted back to more traditional ways of exchanging data because orders are being dealt with manually by the business partner. This resulted in a less than optimal solution with information sent back from the business partner to the company being delayed, e.g. the acknowledgement of the order or a warning that the order can not be fulfilled in the required time frame.

The concept of the transformed organisation which represents the highest stage of the e-adoption ladder is not

defined as well as the other stages, like the web site or e-commerce stage. Most companies have not yet reached the e-business stage and no company in this study was a "transformed organisation". The progression from very high levels of the e-adoption ladder to the highest level is therefore not discussed because there is was no information found in this study to base this discussion on and because becoming a transformed organisation seems to be more realistic for a large dot com company than for an SME.

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