Identifying the IT Readiness of Small and Medium Sized Enterprises

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Identifying the IT Readiness of Small and Medium Sized Enterprises

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ABSTRACT

Several studies show that often IT projects are not successful in being on-time, on-budget and include full functionality. There can be multiple causes for this, and an important factor in this context is the extent to which a company is ready for an IT project. To help understand this aspect, this paper presents a framework for analyzing the ‘IT readiness’ in SMEs (small and medium sized enterprises). The framework defines IT readiness with a basis in three overall dimensions (company, management, and employees), which are subdivided into different characteristics. To illustrate the framework a case study of a Danish SME is presented. Furthermore, the paper discusses how to improve the IT readiness of a company.

Keywords

IT readiness, IT adoption, small and medium sized enterprises, IT project management

1 INTRODUCTION

During the last decades the use of Information Technology (IT) has dramatically changed the way in which companies operate. In spite of the massive use and investments in IT, IT projects are often not successful in being on-time, on-budget and including full functionality. In fact, an extensive review of systems development practices by Clegg et al. (2000) found that up to 90% of all IT projects fail to meet their goals, and that 80% do not meet the deadline and are over the budget, while 40% are abandoned. To deal with this issue multiple threads of research within this field exist. One thread is related to identifying the way in which companies adopt to IT (Swanson and Wang, 2005). Most such research, however, concerns larger companies, while there has been little research in the factors related to introducing IT in small and medium-sized enterprises (SMEs) (Premkumar, 2003; Riemenschneider et al., 2003; Morgan et al., 2006). Thus, this paper aims to contribute to IT adoption in SMEs.

There are different definitions of SMEs in relation to the maximum number of employees and the maximum turnover in SMEs. In this paper, the European Commission definition is used. The European Commission definition from 2003 defines an SME as having less than 250 employees and a maximum turnover of 50 million Euros or a balance sheet total of 43 million Euros. SMEs are extremely important for the economies of many countries. In Europe, 99.8% of the companies are SMEs, and these are responsible for two-thirds of the turnover and business employment (Carayannis et al., 2006). In relation to IT projects, SMEs differ from larger companies as they typically have less financial resources and IT expertise (Fink 1998; Thong 1999; Utomo and Dodgson 2001). Thus, the same IT investment would constitute a greater part of the turnover in an SME than in a larger company, for which reason SMEs need to be more careful in such investments. In fact, literature suggests that information system theories and practices aimed at large companies may not be suitable for smaller ones (Farhoomand and Hrycyk, 1985; Premkumar, 2003; Lee and Runge, 2001).

Different drivers and barriers related to IT implementation in SMEs have been identified in literature. However, it is not clear which ones are the most important. Thus, it may be difficult to estimate the IT readiness of a company for an IT project, i.e. how well a company will adopt a specific kind of IT solution and obtain benefits from this. Obviously, the more the characteristics of the company are known, the easier it is to make such an evaluation. However, since not all aspects are of equal importance, it needs to be defined on which characteristics to focus. To deal with this issue, this paper provides insight
into the question: what are the main factors deciding the readiness for IT in SMEs? The question is investigated by converting relevant literature and the experience of the authors into a framework for accessing the ‘IT readiness’ in SMEs. The framework is illustrated by a case study of a project from before, during and after an IT implementation.

The remainder of the paper is structured as follows: First a literature review is presented. Next the findings from literature review are converted into a framework for estimating the IT-readiness of a company. The next section presents a case study, which illustrate the proposed framework. The paper ends with a conclusion in Section 5.

2 LITERATURE

Literature about drivers and barriers related to IT implementation in SMEs was investigated. To provide a clearer overview of this literature, this paper proposes to organize these drivers and barriers into three overall categories: company, management, and employees. In the following subsections, these dimensions are described.

2.1 Company Characteristics

The first identified type of company-related factor constitutes the resources available (especially financial) (Chau 1995; Fink 1998; Thong 1999; Utomo and Dodgson 2001). The amount of available resources is strongly related to the risk-willingness of a company, for which reason the relatively limited financial resources in SMEs often imply careful consideration before making a decision and less ambitious projects. In this context, it has been argued that risks of failure can discourage the management in SMEs from implementing IT (Agarwal and Prasad 2000; Love et al. 2001). Furthermore, limited financial means can also imply that the adequate external expertise is not obtained (Attewell 1992; Cragg and King 1993).

The second identified type of company-related factor is the pressure to change existing procedures. Different external factors can put pressure on a company to change existing procedures: competition, suppliers, customers, government, consultants and vendors. In a competition-oriented perspective, IT projects often have the purpose of gaining competitive advantage or minimizing the gap to competitors (Earl 1989; Galliers and Sutherland 1999; Turban et al. 2002). In this context, IT can be aimed at providing new services to the customers or to make the company more efficient. Next, in relation to suppliers and customers, IT can be used to achieve more efficient transaction processing, shorter response time, reduced costs of transactions, etc. (Hollander et al. 2000). Furthermore, customers and suppliers may request particular data formats and types of information and thereby put pressure on the focal company to initiate an IT project. Also, there may be government regulations, which force a company to upgrade their IT systems. For example, the government may require that some type of information is documented, which may require that new IT systems are implemented. In relation to IT assistance, this is often provided by consultants and IT product vendors (Fink 1998; Utomo and Dodgson 2001). In fact, SMEs are typically more dependent on external expertise and services for information systems than larger companies, which have more in-house experts (Premkumar, 2003). Besides providing expertise, consultants and vendors may try to persuade a company to invest in certain IT solutions and thereby produce some form of pressure. But although there may be pressure to initiate an IT project in order to change existing processes, the inertia generated by old technologies may represent a negative adoption factor (Hovav et al., 2004).

2.2 Management Characteristics

The first identified type of management-related factor is IT acquaintance. Limited knowledge of IT may be a barrier for IT implementation (Venkatesh and Brown 2001), but on the other hand, adequate knowledge of IT adoption and its organizational impact may discourage management from an IT project (Agarwal and Prasad 2000; Love et. al. 2001). Also, the strategy chosen in relation to IT implementation (proactive, reactive, technology leader/follower, etc.) has been defined as a significant factor (Swanson and Ramiller, 1997; Lewis and Cockrill, 2002; Teo and Pian, 2003). Since the management of a company decides on the strategies chosen, the acquaintance with IT of the relevant managers is of major importance. Research indicates that in large corporations, having IT projects managed by such internal experts play a critical role for the adoption of IT (Beath, 1991; 1990; Palvia and Chervany, 1995). However, compared to larger companies, SMEs often are not able to afford or attract adequately IT competent employees.

The second identified type of management-related factor is management motivation. Managers are responsible for assigning resources to an IT project, for which reason manager motivation is vital for the success of an IT project (Lanz 2002; Mehtens et. al. 2001; Thong, 1999). The motivating factor for the management for initiating an IT project is to achieve benefits that are greater than the estimated costs. The risk factor is often preventing management from initiating such projects. Cragg and King (1993) examined the evolution of IT in small businesses using cases of six small companies. They found that the strongest motivating factor for IT projects was the enthusiasm of the company owners regarding IT. On the other hand, they found that lack of managerial time was one of the strongest impeding factors. Finally, having technology
leaders who support the technological change in a company has been argued to be perhaps the most significant factor for project success (Sharma and Rai, 2003; Pitt et al., 2006).

2.3 Employee Characteristics

The first type of employee-related factor is IT acquaintance. The IT acquaintance of the employees in SMEs has a positive impact in relation to IT implementation (Fink 1998; Lanz 2002). It has been argued that employees are likely to accept and support IT projects if they are convinced of the advantage and are confident that they can use the IT (Davis 1989). Furthermore, training often has a positive impact on the attitude towards an IT system and the usage of it (Attewell 1992; Love et al. 2001). In this context it should be noted that SMEs often have difficulties in recruiting and retaining internal experts, among other things because of the limited career advancement prospects in SMEs (Kuan and Chau, 2001).

The second identified type of employee-related factor relates to the changes of the company that an IT system may imply. More specifically, this aspect relates to fear of job loss (Love et al. 2001) and reluctance to change work routines (Drew 2003; Love et al. 2001).

3 A FRAMEWORK FOR IDENTIFYING THE IT READINESS OF SMES

Based on the literature review and the authors' experience with SMEs, six main characteristics divided into three overall dimensions are defined in Table 1.

<table>
<thead>
<tr>
<th>Company characteristics</th>
<th>Examples of determinant factors</th>
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<tbody>
<tr>
<td>Pressure to change existing processes</td>
<td>The technological abilities of competitors</td>
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<tr>
<td></td>
<td>Ability to manage information internally</td>
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<td></td>
<td>Demands from customers and suppliers</td>
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<tr>
<td>Room for risks</td>
<td>Profit ratio</td>
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<td></td>
<td>Net capital</td>
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<td>Banking relations</td>
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<table>
<thead>
<tr>
<th>Management characteristics</th>
<th>Examples of determinant factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT acquaintance</td>
<td>IT related education</td>
</tr>
<tr>
<td></td>
<td>Experience from participation in IT projects</td>
</tr>
<tr>
<td></td>
<td>Experience from using IT</td>
</tr>
<tr>
<td>Motivation</td>
<td>Time for carrying out existing responsibilities</td>
</tr>
<tr>
<td></td>
<td>Experience from IT projects</td>
</tr>
<tr>
<td></td>
<td>Room for initiating risky projects</td>
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<table>
<thead>
<tr>
<th>Employee characteristics</th>
<th>Examples of determinant factors</th>
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<tr>
<td></td>
<td>Experience from participation in IT projects</td>
</tr>
<tr>
<td></td>
<td>Experience from using IT</td>
</tr>
<tr>
<td>Job security</td>
<td>Job development potential</td>
</tr>
<tr>
<td></td>
<td>Multitude of employee abilities</td>
</tr>
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<td></td>
<td>Relation to management</td>
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Table 1: Determinant factors

Table 1 is converted into the framework proposed in Figure 1. The framework is subsequently discussed.
In the company related matrix in Figure 1, the combination of high 'pressure to change processes' and high 'room for risks' is defined as being 'IT ready'. On the other hand, if the processes are already considered to be efficient, while having room for some risk, it is less likely that such a company would initiate an IT project right away. However, there is a need to maintain this efficiency in the long run, for which reason IT investments still need consideration. When there is a great need to change processes, but there is little room for risks, projects need to be initiated with some precaution in order to minimize risks and ensure short payback periods. If there is no great need for process change while little room for such investments, such companies are categorized as having 'little IT readiness'. In both company related dimensions there may be dissimilarity between how the management of the company perceives the situation compared to how independent experts would categorize the company. In the 'room for risk' dimension, the company may have a large net capital but believe that this money should not be put at risk, for which reason there is little room for initiating IT projects. However, if a company achieves a better understanding of the possibilities of IT and potential benefits this may change their perception of the 'room for risks' for IT projects, since such projects may appear less risky than originally anticipated. In a similar manner, the company may believe that its processes are satisfactory, although from an external expert observer these would be classified as inefficient.

From a management perspective, the company is 'IT ready', if their motivation is high together with high IT acquaintance. On the other hand, if one of these two dimensions is missing, this is categorized as 'moderate IT readiness'. If there is a lack of motivation among the management, this is better changed before initiating a project in order to ensure the adequate support throughout the project. Such motivation can come from giving the relevant managers adequate time to plan the relevant projects and obtain the necessary information about technological possibilities. If the management has the adequate motivation, but the IT knowledge is missing, there is a great risk of wrong decisions being made during the project. In order
to prevent this, there is a need to educate existing managers or employ new managers who possess this kind of insight. If neither the motivation nor the insight is present among the managers, chances that IT projects will be very successful are slim.

From an employee perspective, high IT acquaintance together with high job security is considered to imply 'IT readiness'. On the other hand, since IT solutions most often have the purpose of automating parts of some processes, this may involve some employees getting new job routines or even getting dismissed. In such cases, to ensure employee commitment, it is essential that they have a clear vision of the future situation. If the employees do not fear redundancies or changed job routines, but have little IT acquaintance, training and education may be essential to ensure that they are capable of using the IT systems efficiently. If employees both fear process changes and have little IT acquaintance it will often be difficult to carry out an IT project.

From an operationalization perspective, a company needs some degree of IT readiness in all three dimensions to be ready for a project. Depending on the particular use of the IT readiness framework, it may be used to reflect the perception of the company itself or external observers. From the point of an external observer (e.g. a consultant), the proposed framework can serve as an indicator of how close a company is to being IT ready. From the point of the company itself, the framework may be used as a basis for self evaluation and as a basis for a decision to select or initiate an IT project. Also the framework may be used for identifying differentiating views between the company and external experts. To test and demonstrate the use of the framework, in the next section the framework is subjected to a case study in an SME.

4 CASE STUDY

4.1 Research Method

A research project on IT implementation in SMEs was carried out from mid-2009 to early-2010. The project studied three IT projects from the decision phase, through implementation, and to the operation phase. The companies were given an economical contribution to carry out the project in exchange for being closely studied during the project. In this paper one of the three cases is presented to illustrate the use of framework. The characteristics of the case are shown in Table 2.

<table>
<thead>
<tr>
<th>Industry</th>
<th>The rubber industry</th>
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<tr>
<td>Employees</td>
<td>29 (25 full time)</td>
</tr>
<tr>
<td>Turnover 2008</td>
<td>€2.8 mill.</td>
</tr>
<tr>
<td>Project focus</td>
<td>Implementation of CRM-module in C5</td>
</tr>
<tr>
<td>Persons to use IT solution</td>
<td>Sales and administration employees</td>
</tr>
<tr>
<td>Persons involved in the initiation phase</td>
<td>Sales and administration employees</td>
</tr>
<tr>
<td>Persons interviewed</td>
<td>The IT consultant, the project manager and two sales/administration employees</td>
</tr>
</tbody>
</table>

Table 2: Case characteristics

In the following sections, the case is described from the viewpoint of an external expert observer.

4.2 Case

Initial IT Readiness

In the process of the preparation for the implementation, the company’s overall IT readiness was identified in order to define the type of IT project, suitable for this company.

First, the IT readiness in a company perspective was identified. The pressure for changing existing processes was at a high level. Over the last year the company realized that their canvassing and follow-up of sales propositions were deficient and they had a substantial amount of excess production capacity. However, the company readiness was limited by the low explicit awareness of the improvement opportunities and a rather reactive way in dealing with IT. Thus, in the dimension 'pressure to change processes', the company could be placed in between 'satisfactory' and 'pressure to change'. In the risk dimension, the willingness to invest in IT in financial terms was low, since the company had a high cost-focus and very little awareness of the payoff from IT investments. Based on this, the room for risk was identified as low.

Next, the 'management IT readiness' was identified. The managing director’s acquaintance was low as he seemed to have little understanding of the technological opportunities of IT, which appeared to limit his motivation. Based on this, the management motivation was identified as low.
Finally, the ‘employee IT readiness’ was identified. The IT acquaintance for the employees was generally low. In the job security dimension, the ones affected by the project were the three owners of the company, a couple of highly trusted employees and one relatively new employee. The organizational boundaries in the company were rather vague meaning that, if one daily task was taken away from an employee, the employee could take on a new one. The staff related to the IT project performed a large multitude of daily tasks. Based on the staff composition, organizational boundaries and multitude of daily tasks, the job security was identified as high. Thus, the overall employee readiness could be defined as ‘moderate IT readiness’.

Using the IT Readiness in IT Project Selection

At the preliminary meetings a need for four IT related improvements were identified for the company: 1) an IT system improving the process specifications, 2) an IT system controlling and managing sales propositions and orders, 3) a solution for synchronization of e-mail records and 4) an IT system improving the production planning. Based on the identification of the IT readiness of the company, it was advised to initiate an implementation of a CRM-module. This project covered improvement area 2, and was expected to give visible short term results. However, the main criterion for advising the company to choose this project was the suitability with the company’s moderate IT readiness. The CRM-module was perceived to be an affordable and low-risk project for the company, and suitable in relation to the low levels of IT acquaintance of the management and the employees.

Improving the IT Readiness

In the preparation for the initiation of the project, it is possible to improve the IT readiness. From a company perspective, the company realized that the pressure for changing existing processes was higher than initially anticipated. This insight was obtained by inviting external experts inside and letting them examine their existing processes. The room for financial risk remained low and almost led to a cancellation of the project. However, advisement from an external expert convinced the company that the project would pay off rather rapidly. Thus, the room for risk was improved from in between ‘little IT readiness’ and ‘moderate IT readiness’ to in between ‘moderate IT readiness’ and ‘IT ready’.

The management readiness was in between ‘little IT ready’ and ‘moderate IT ready’ before initiating the project. The managing director compensated for his lack of IT acquaintance by inviting the staff related to the IT project to the meetings and cooperating with experts that he trusted. His own IT acquaintance was not directly affected by this, but the employees’ motivation for the project affected his motivation and the number of employees present at the meetings complimented and added to the IT acquaintance. After initiating the project the management readiness seemed to be improved.

The employees’ lack of IT acquaintance was an important factor for the decision to choose a simple project. A heavy emphasis on information, training and creation of simple routines was used to improve the IT acquaintance of the employees. The job security was at a high level even at the preliminary meetings, but one employee had only been at the company for half a year. His job security was made clear by appointing him project manager of the IT project. He was responsible for executing the project and the training of using the CRM-module was anchored at him. Thus, the employee readiness was improved.

The initial and transformed IT readiness of the company is illustrated in Figure 2.

Results of the IT Project

The company perceived the project to be a success. The identification of the IT readiness before initiating the project and using this identification in the selection of the project contributed to choosing a suitable project for the company. The success of the project is defined by two parameters: 1) the company achieved business results by the new sales opportunities that the CRM-module gave them; and 2) the company’s IT readiness was improved as the employees were trained in using IT and they gathered experience from participating in the IT project. For the first parameter, before implementing the CRM-module, the company did not canvas and systematically follow up on sales propositions even though they had a substantial amount of excess production capacity. After the implementation the canvassing and follow up of sales propositions were implemented in the daily operations. Furthermore, and not less importantly for the company, the CRM-module eliminated a number of manual daily operations resulting in less daily frustrations and giving the employees time to spend on more value creating operations. In relation to improved IT readiness, even before the project was ended, the company was planning their next IT project. Thus, this visible payoff from the project increased the room for risks of IT projects. The knowledge of the pressure to change processes remained intact at a high level after consulting external experts and seeing the payoffs from the project. The implementation of the new CRM-module increased the manager’s acquaintance with IT and the payoff from the project strengthened his motivation for IT. Although the project did not lead to a high level of IT acquaintance for the manager, the
project did, however, lead to a significant strengthening of this aspect, not least in relation to understanding potential benefits of IT use. The same was the case regarding the employee readiness. The employees received training as well as experience in using IT at a higher level. Finally, the company gained experience in carrying out an IT project, and none of the employees lost their jobs after the implementation, i.e. the job security was intact.

![Figure 2: The IT readiness transformation](image)

5 CONCLUSIONS

Based on a literature review and the authors' experience with SMEs, six main characteristics divided into three overall dimensions (company, management and employees) were defined in relation to estimating the IT readiness of a company. This framework was illustrated by a case study, which showed that the framework can support the selection of a suitable IT project for a company. In the case studied, the identification of the company’s low to moderate IT readiness resulted in the selection of a small and simple IT project. Along with the process of implementing the IT system the company’s overall IT readiness improved.

The case study illustrates that the proposed framework can serve both as a tool for identifying problematic areas in relation to IT projects and for illustrating the development of IT-readiness within a company. Furthermore, the case study exemplifies how the IT readiness of a company can be increased. Although it may be possible to highlight other characteristics than the six defined in the framework, the literature study and the case study indicate that the selected six dimensions provide a solid
To sum up, the paper provides insight into the concept of IT readiness in SMEs, which is of use in both academia and practice. The task for future research is to further investigate the framework by empirical studies.

REFERENCES


