

Success Factors in Implementing Knowledge Based Systems

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Abstract: The various dimensions of the problems of productivity and technology cannot be found in technology alone, but rather there are also human factors that either facilitate or constrain the ability of firms and workers to adopt and implement new technologies. This paper discusses the factors that contribute to Knowledge Management Systems effectiveness. Through a case study and literature reviews a general framework has been delineated. This framework describes dimensions involved in the adoption of technology at both the users and organisational level.

Keywords: information communication, technologies, technology adoption, information, social software, social aspects, knowledge management systems

1. Introduction

Due to the current changing business environment, organisations are facing challenges of global competitiveness. The quest for competitiveness and sustainability has led to recognition of the efficient use of information and communication technologies as a vital ingredient for survival and profitability in the knowledge-based economy. Furthermore, organisations are confronted more and more with issues such as rapid technological changes, shortened product lifecycle, downsizing, and high market volatility. In order to cope with these challenges, organisations need to be able to manage the highly distributed diversified knowledge. Knowledge is seen by many as a key source of competitive advantage and innovation in organisations. Challenges rely on the identification of crucial knowledge that improves the business process (Edvinsson & Malone, 1997). Thus, it is recognised that companies need to take care of their most important assets which is the organizational knowledge.

Knowledge is defined as information in context with understanding to applying that knowledge (Brooking, 1999). In addition, knowledge is seen very subjective, because it depends on the beliefs, values, intuition and the emotions of the individual (Sunassee & Sewry, 2002). It is necessary to recognize the different types of knowledge in order to expose its potential contribution to the performance of the organization (Pemberton & Stonehouse, 2000). The wide-based knowledge definitions highlight the presence of several forms of knowledge; tacit, explicit, implicit and systemic knowledge at the individual, group and organisational levels (Davenport & Prusak, 2000; Dixon, 2002; Inkpen, 1996; Nonaka & Takeuchi, 1995; Polanyi, 1958).

Explicit knowledge has a tangible dimension that can be easily captured, codified and communicated (Firestone, 2001). In contrast, tacit knowledge is linked to intuition, emotions, beliefs, know-how, experiences and values. The distinction between tacit and explicit knowledge is important since their management is quite distinctive and requires different knowledge management initiatives.

Knowledge management (KM) initiatives are expanding across all types of organizations and companies worldwide (Rivière, Bechina Arntzen, & Worasinchai, 2007). The KM project implementation can be very different; it ranges from building knowledge based repositories to social software deployment. Several documented benefits resulting from the successful implementation of KM have been published (Alavi & Leidner, 2001; Becerra-Fernandez, Gonzalez, & Sabherwal, 2004; Coleman, 1998; Jennex & Olfman, 2004).

Even though a number of research studies have outlined the importance of the use of Information Communications Technologies (ICT) as enablers for knowledge management practices, there are still

some issues concerning the socio-technical factors influencing the success of the KM implementation (Chua & Lam, 2005; Kaweevisultrakul & Chan, 2007).

Despite the fact that many current implementations of KM initiatives are based on highly advanced information technologies, there are still challenges to cope with in order to ensure the effectiveness and efficiency of such KM initiatives. Several studies and surveys having investigated the reasons leading to the KM initiative failure, highlighted that organizational culture and others psycho-social factors play an important role to the KM success (E&Y, 1996; Knowledge Management Review, 2001; Tuggle & Shaw, 2000).

The earlier KM implementations focused strongly on the Information Communication Technology (ICT), however today most of the researchers and practitioners recognise the importance of the "soft" dimensions of KM initiatives (Anantatmula, 2005; Gee-Woo, Robert W. Zmud, Young-Gul, & Jae-Nam, 2005; Ribière, 2005).

It is commonly agreed that although there are plenty of technical solutions supporting different knowledge processes such as knowledge creation, representation, storage, and sharing and so forth, there is still a need to understand the factors impacting not only the acceptance of the knowledge management systems (KMS) by the knowledge worker but also their efficient usage.

Questions arise as to what motivates individuals to use information communication technologies in their workplaces. What is the motivational gap between people at various age groups and education backgrounds? Are the benefits of technology fully realised?

This research paper discusses the challenges and issues encountered while using the information communication for implementing knowledge management initiatives. The next section investigates the motivations and encountered challenges for technology use, while section three presents a general framework encompassing success factors for a knowledge based system effectiveness implementation.

2. Challenges in the use of ICT in working environment

The last decade, Internet and the World Wide Web emergence have brought a revolution in the way people communicate and interact with each others. The accessibility and interconnectivity they offer answer to more capability and opportunities. Furthermore, it is recognized that Web-enabled tools have transformed work processes in ways that are important and pervasive. In testimony the large number of software used in workplace such for instance SAP, Oracle, Microsoft and so forth.

The penetration of new technologies in the workplace has generated new type of issues and challenges. For example, selection and adoption of technology is a complex process that is based on a number of alternatives including technological choices, perceived benefits, cost based models and organizational strategies (NAE, 1991). However technology itself needs adaptation to organizational goals and strategies (Laulmann, Nadler, & O'Farrell, 1991).

Motivations for technology use are both intrinsic and extrinsic. Adaptability of technology to user needs user confidence and motivation to its adoption. Kanter's has identified five characteristics of successful technology adoption, the five Fs -: **F**ocused, **F**ast, **F**lexible, **F**riendly and **F**un (Rosabeth Moss. Kanter, 1990).

Dias (2002) has identified three motivation factors for using technology, namely; perceived usefulness, perceived ease of use and perceived enjoyment (Dias, 2002). Dias (2002) argues that "information technology implementation is an intervention we make in order to improve the effectiveness and efficiency of a socio-technical system".

Effectiveness of information or knowledge based systems has been a research theme within the academia. In testimony there is a plethora of work related to this topic (Nakayama & Sutcliffe, 2008; Park & Kim, 2005) .

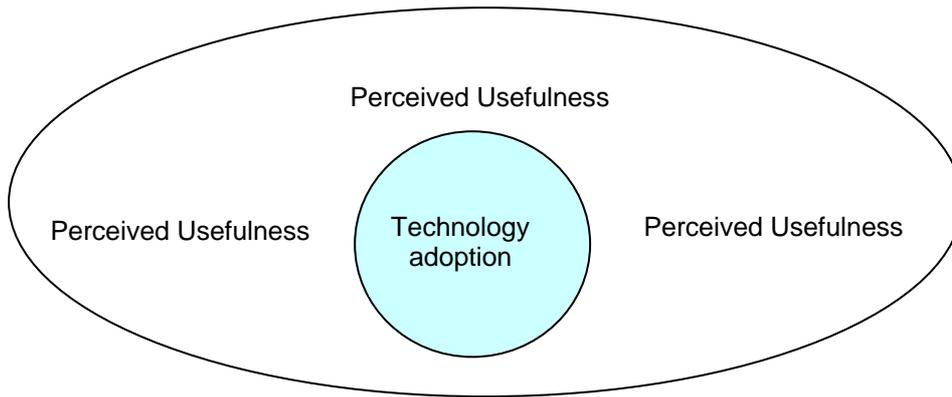


Figure 1: Model of using technology (Dias, 2002)

The factors influencing the effectiveness of such technical systems are defined by the system quality, information quality. Therefore new scales and measures, along with continued research into organizational effectiveness and user satisfaction have been investigated (DeLone & McLean, 1992; Scott, 1995).

Recognition is now given to the fact that a successful implementation of knowledge based systems at enterprise level is strongly influenced by the quality of content, technical quality and by the user's commitment to the use of that technology. It has also been recognized that new technologies are often not optimally utilized, or inefficiently used. The underutilization problems are linked to diverse factors and these ultimately undermine business performance.

The role of the people in the introduction of new technologies is increasingly becoming a major focus of research. Although technology per se is a product of engineering it is also part of a larger system which includes other input and output components. These inputs and outputs are required in the design, building, and operation of new technologies. As Laumann *et al* (1991) have noted "*technology is fundamentally an organizational and human endeavour linking what is theoretically possible to what happens in the laboratory, in the design shop, in the operating room, in the office or in the plant floor*". This is a departure from historical perceptions where engineers have assumed that implementing technology means that people will adapt and learn to use the new equipment.

Social scientists have recently added new dimensions on the implementation of technology by recognising factors such as organizational decision-making, the characteristics of new workplace technologies, worker satisfaction, workers' skills and motivation for adaptation of those technologies, organizational structures and management roles. The organisational structures form a centre in which all other factors operate. Work procedures, rules and organisational chart govern daily work environment.

In the context of this paper, it is important to determine the factors related to the users and the implementation of knowledge Management systems. The next section describes a case study that helps us to gather enough data to understand the success factors that play a role in the adoption of technical systems.

3. A model of success factors involved in knowledge based system

3.1 Context of study: Åmot Municipality, Norway

Reinvention of the public administration has become a key motive to achieve in order to cope with the pressures to innovate that the government is facing. Today the government is expected to not only provide better services to the citizens, but also to guarantee social cohesion, to improve the transparency and accountability and to use / apply efficiently the information and communication technology. In other words, public sectors need to move towards an innovative e-government. Today, it is well acknowledged that knowledge and its management are the drivers fostering innovation in the public sectors. There are many KM initiatives but the common challenge resides in achieving a

synergy by integrating people, processes and technology. The picture 2 highlight some of the technologies and KM practices used in the public sector in Norway.

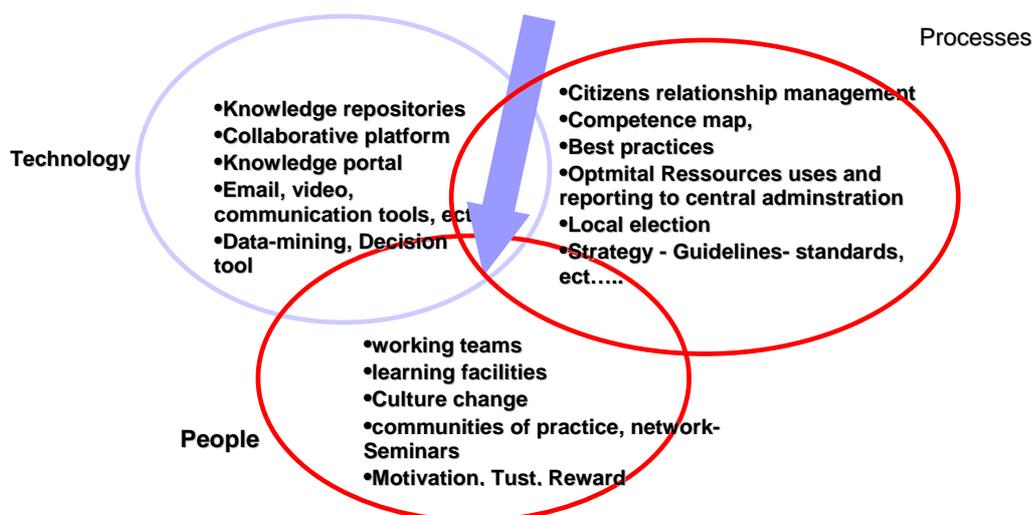


Figure 2: Processes, technology and people components interaction adapted to the public sector source (Arntzen Bechina 2007)

A case study was done to establish knowledge on what Åmot Municipality in Norway needed to pursue in order to improve the business processes and their administrative routines leading to provision for innovative services to the citizens and the companies. The research project had following objectives:

- Assessment of knowledge management practices in Åmot municipality
- Assessment of the way Information and Communication technologies were used by the civil servants in performing daily tasks
- Determination of the knowledge processes needed for improving the business processes.

In the framework of this paper, we focused on the second objective. The aim being to investigate the factors influencing the use and the success of several software applications used in the framework of managing knowledge.

We adopted qualitative and quantitative approaches. Several interviews were conducted with the top and middle managers of the municipality. The main aim was to understand the work routines in the municipality and how the use of the information communication was perceived by the employees. We designed a web survey that was sent to the municipality employees. In order to ease the process of collecting data from several departments of the municipality, we decided to design an online questionnaire that was sent directly by e-mail. The choice proved convenient for respondents and improved response rates.

The web survey was developed in cooperation with managers in the Municipality. In order to improve the response rates, a two-phase web mail survey was performed. A proper system of reminder was set up in order to minimize non-response. Experiences from surveys of organizations show that people reluctant to answer are biased towards lower computer usage compared to the more disposed respondents. Therefore, we asked the managers to inform as well the employees that they needed to check their email and send the responses of the survey.

Furthermore, we were aware that the respondents of the public sector might need more time to reply. This is due to the somewhat larger and more complex organization, where for example addressing the respondent internally requires more time.

Surveyed individuals were able to complete the questionnaire in less than ten minutes. The interface was designed in such a way to ease the progress monitoring. No respondents dropped out prematurely. Also in order ensure maximum confidentiality no user name or password was required to access the online questionnaire. There were a total of 63 respondents, 32 males and 31 females.

From the literature reviews and a first round of a data set collection, we present in the next section a framework encompassing factors that will contribute to understand the adoption of technologies to a larger extent with a special focus on the knowledge management systems

3.2 Findings and discussions

Technology itself, even when it is not intended as a communications product, serves as communication medium between the users (P. S. Adler & T. Winograd, 1992). Communicative interactions also inform the users of their day-to-day operations as they deal with challenges that continually arise on the technology's potential. Every technology thus has communication embedded on it. And this is even more valid for knowledge systems such as discussion forum, social software, Web 2.0 where the dimension of interaction and participation is the core of their functionality. This is an important aspect that dictates the decision by management to invest in technologies.

However, this is not the main factor. Others factors at the organisational level that contribute to the KMS effectiveness are related to leadership, training, clear business strategy, aligning business goal with the technologies, collaboration, adaptive culture. They are represented in the bottom of the figure 3.

Communication is also very crucial in the implementation of any technology. Very often different segments of people might share an interest in the implementation of new technologies at workplaces. However as Laulmann *et al.* (1991) have observed, very often engineers and consultants, scholars, work managers and union representatives, despite their common interests in the implementation of new technologies, do not often meet and talk together. There are language barriers across the groups either within or across. Very often there are conflicting goals and expectations, theoretical interests of scholars versus the day-to-day concerns of managers, technological priorities of engineers versus the human resources priorities of personnel managers and labour leaders; underlying values of autonomy or control, individualism or collaboration. Conflicting interests of the stakeholders are so acute in that every specialist has his/her rigid way of thinking within the confines of his/her discipline, have different priorities and methods. Sometimes the differences and perceptions are so acute that finding an optimal solution is impossible.

The role of **leadership** in the successful implementation of Knowledge Management Systems should be considered. Leadership is central in the implementation of technological change. Leadership often comprises of managers, union leaders, executives and professional. The decision to implement technological changes is often a management decision accompanied by professional consultation.

The **Cultural framework** for implementation depends on the organisational structure and the flow of decision-making. The degree of involvement, transparency, shared vision and goals are essential prerequisites for successful implementation of KMS. Management styles create or limit spaces for participation, provide psychological support to employees, provide training opportunities for the employees who are in any case the ultimate users. The cultural context is therefore crucial for KMS. The level of involvement of employees appears to be an important factor in the implementation of KMS. It becomes more important in relation to other factors such as psychological preparedness to implement KMS. As Laumann *et al.* (1991) have noted the opposite to employee participation would be resistance. Quoting Van de Ven they provide a summary of why people resist change.

Training and incentives: training is also a necessity for the successful implementation KMS. Technology has several implications on the job skills; they can either upgrade or degrade skills. They can also make certain skills redundant. Incentives and rewards can also be used as an inducement for training, motivation etc.

Organizational structure and environment /context have a strong influence on implementation of ICT. In their chapter on *The Usability Challenge*, Adler & Winograd (1992) note that all too often, new technologies are introduced into the workplace without sufficient planning for their implications for their workforce. Sometimes managers adopt policies that trigger reaction from employees, in the form of resistance to new technologies or reorganization, distrust of managers. At the same time as newer technologies are developed and implemented, they encounter usability challenges. Employees' distrust of managers stems from the fear of losing that their work would be taken over by technology, that their skills would be made redundant as a result of investments in technology. At the same time as Adler & Wonograd (1992) have noted, managers are often reluctant to give any guarantees that

protect employees against layoffs due to fears that such guarantees undermine their managerial authority. In reaction the workers unions often insist on clinging to existing job descriptions and skills requirement.

One factor concerns the **alignment of the ICT with the business goals**, quite often companies have different units using different software or technologies that's inhibit the data sharing between tools. Therefore an overall ICT strategy is needed.

It is evident, that embedding human factors in system designs is a valuable tool for addressing some of the challenges in KMS: It takes into cognisant of the fact that interaction between human and technology takes place within an environment – physical, socio-cultural and organisational. These factors are presented on the top of the framework (figure 3) and contribute to the user satisfaction that will contribute to the KMS effectiveness.

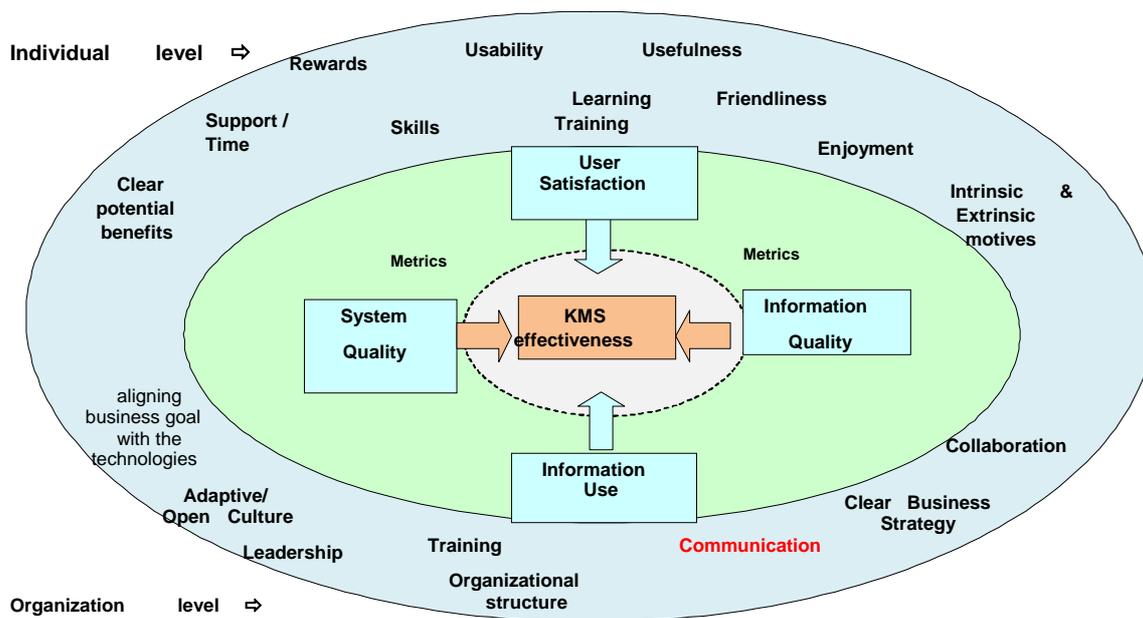


Figure 3: Factors enabling KMS effectiveness

Chen & Sharma (2002) have noted how users of the system are facing more challenging dynamic working conditions and have to adapt to these changes immediately. They classify KMS users as either dedicated users or casual users. Dedicated users are those who spend considerable time in various programs and are therefore more comfortable and known to the system, whereas casual users make use only of a particular program and that too occasionally and would never become friendly to the system. Therefore casual users often have many problems and questions about the system and might become critical of the system refusing to accept it (Chen & Sharma, 2002). They suggest a human-centred interaction design which puts users' needs first, technology second. Designs should be human centred and in accordance with the user's tasks, needs, capabilities, learning abilities, backgrounds, motivations and work styles. Human factors while a necessity for user-oriented designs also present challenges.

Employee conception of **user-friendliness**, defined in terms of the time it takes to learn to use new technology and the potential benefits is also a determinant factor in the employees' eagerness or reluctance to use new ICTs. A system **usability** criterion is defined by Alder & Wonograd (1992: 7) as 'the extent to which it supports the potential for people who work with it to understand it, to learn, and to make changes.

Learning and training is essential in the adoption of the systems. Quite often top management or IT department are asking employee to use specific software but do not provide adequate training. Therefore, sometimes the systems implementation is proved to be a failure because people do not have the right **skills**. While designing a system, it is important to integrate the notion of **enjoyment**. In

order to encourage the use of systems, some companies have set up some **rewards** mechanism that proved to be efficient.

The success of KMS therefore hinges on the interplay between these factors. These determinant factors can be construed with a system theoretic perspective, whereby one considers all the elements or part of a whole system, instead of a reductionism perspective where one considers individual parts separately.

4. Conclusion

In recent years researchers agree that the implementation of technological innovation rests largely on readiness for change and that human factors are crucial for this change as change is not always perceived positively (Rosabeth Moss. Kanter, 1991). Human factors are defined as knowledge of human abilities and limitations to the design of systems, organizations, jobs, machines, tools, and consumer products for safe, efficient, and comfortable use.

This paper has presented an ongoing research study investigating the factors ensuring the effectiveness of knowledge Management Systems. A model of factors contributing to a successful implementation of knowledge based system is presented.

The organizations' desire to achieve competitive edge in world markets is a growing concern for managers and academics alike. As the National Academy of the Engineering Staff (1991) has observed, '*as has always been true when greater efficiency and higher productivity are desired, managers have turned to new, sophisticated workplace technologies. New technologies, however, have not proved to be a panacea for all the problems of productivity*' (NAE, 1991).

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