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ASSISTING SMALL INFORMATION TECHNOLOGY COMPANIES IDENTIFY CRITICAL SUCCESS FACTORS IN WEB DEVELOPMENT PROJECTS

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Abstract

What makes small IT companies' web development practices for e-commerce successful is essential for small IT companies. Usually they do not have the resources to initiate research on such issues alone. The authors report on their work in progress towards the design of a system for promoting improved understanding of the Critical Success Factors for web development that supports the accumulation of knowledge for improvement of web development practices within a regional community of small IT companies.

Keywords: Small IT business, Web development practices, critical success factors

Introduction

Small IT companies do not usually have the expertise to apply sophisticated software development management concepts in their practice. They may have certain common features but at the same time they are affected by local, regional economic and cultural factors. Investigating dynamically these aspects of web software development and providing feedback to the small IT businesses may provide new opportunities for improvement of web development practices. This is one of the driving ideas behind this research.

A suitable technique for monitoring the performance in different management areas is the Critical Success Factor (CSF) theory (see Rockart, 1979). It has been widely applied in many aspects of Information Systems and Technology Management. More recently, CSFs in software development were investigated by (Reel, 1999) and Tackett and Van Doren (1999). In another publication, Liu and Arnett (1999) empirically study the factors associated with web site success in electronic commerce.

The question which one needs to ask is how applicable are the findings of the above studies to different organizations and especially to small IT companies in different countries. Due to the uniqueness of the conditions surrounding small IT companies in different geographic regions, the transferability of conclusions from such studies cannot be considered without taking into account the local situation in a particular country. Another problem is how to deal with the lack of expertise within small IT companies on the theory of CSFs. The above two questions have management aspects when considered at the level of the individual small IT company. They have also a social aspect given the considerable percentage of employees of those small IT companies and their overall role for the health of a given regional and national economy. These two aspects of web software development seem to be far less researched compared to the technical side of the World Wide Web (WWW) and the Internet.

This paper suggests an innovative approach towards improvement of the understanding of what drives web software development in small IT companies. It provides a solution for dynamic decision support for the management of small IT companies on the issue of CSFs in web development in the conditions of their region or country. It implements through Internet technology ideas from two areas: the critical success factory theory for IS development and community informatics.

The contribution of this research is that it shows how a traditional corporate IT management tool such as the theory of CSFs can be made available to a regional community of small IT businesses through appropriate technology and implementation methodology. Another reason for the theoretical and practical contribution of this work is that it shows how community informatics ideas can be applied to enable the diffusion of a traditional method in IS management as the CSF theory into the small IT sector. Literature search showed that the idea of providing a simple tool for gathering of field data on CSFs in web development in small IT companies has not been explored before.

This paper is organized as follows: the next section presents an overview of the theory of CSF applied to web software development, followed by a discussion on the methodological issues in the implementation of a project, enabling the application of CSF theory to web software development. Then a description of the practical work by the authors so far on this project is presented and possible directions for further work conclude the paper.

Justification of a Tool for Gathering Data on Critical Success Factors in Web Development

Critical Success Factors can be defined as a small number of easily identifiable operational goals shaped by the industry, the firm, the manager, and the broader environment that are believed to ensure the success of an organization. If these goals can be attained, the success of the firm or organization is ensured. (Rockart 1979). Usually fewer than ten critical success factors exist per business. The principle method used in CSF analysis is personal interviews with top managers to identify their goals and the resulting CSFs. The critical success factor approach has grown as a method of identifying the information requirements of executives within organizations. It has been expanded by Bullen and Rockart (1981) into a Strategic Information Systems Planning (SISP) methodology.

More recently, Fidler and Rogerson (1996) state that the critical success factor approach has enjoyed widespread popularity within the field of IS strategy development mainly because of its intrinsic conceptual simplicity and its relatively small use of resources. This is one of the reasons we considered this approach as suitable for small IT businesses.

The critical success factor methodology is a process that attempts to make clear those few key areas that dictate organizational or managerial success. Critical success factors emerge from structured dialogues (interviews), or structured questionnaires between a skilled critical success factor analyst and key personnel of an organization. Critical success factors should be elicited from managers who represent a cross-section of the organization's major functional areas.

Critical success factor analysis is a powerful and “deservedly popular technique” in IS strategy planning and business planning (Ward and Griffiths 1997). Through the identification of critical success factors for each project, organizations learn to identify what they need to change to improve their ultimate chances for success. Software development is a very complicated activity that requires the correct identification of many factors in order to succeed. This is particularly relevant for small software companies that are specializing in e-commerce and web development. They typically do not have the expertise and the human resources needed to implement a technique like CSFs. The field of web development is large and important, yet it is a relatively new area that is not researched thoroughly with respect to CSFs, especially in small IT companies. The Internet is one of the fastest growing technologies around the world. Many cultural aspects associated with web software development practices in different geographic areas are not investigated yet. Those need to be analyzed first through proper investigative tools providing data that is characteristic for a given geographic area. Hence the need to provide a tool for dynamic investigation of CSFs in web software development within small IT businesses in a regional context.

A possible methodology to be applied in order to implement a computerized system providing facilities to gather data on CSFs related to web software development in a local context is discussed in the following section.

On the Development of a System for Identification of CSFs for Web Development in Small IT Companies and Some Lessons from this Work

The research discussed here is characterized by several features that make it quite different and more complicated than the traditional way of applying CSF theory in IS as it was known for the past twenty years:

- The stakeholders are too many and dispersed geographically within the region of concern;
- The stakeholders do not have much expertise about the details of the CSF theory and how it can be useful to them;
- The nature of the activities of small IT companies and their environments are typically very dynamic and this needs to be captured by a method for implementation of CSF theory in such a situation.
- Small IT companies may not have the financial resources to support such an investigation.

The above provides ideas on the requirements towards a solution to the problem on hand. It has to allow dynamic data gathering and automation of the processing of the results and their dissemination. It has to implement the principles of the critical success factor methodology since the latter has proven itself in the corporate IT environment in the past. However in this case we do not deal with an uniform corporate environment and hence the implementation of such a solution in practice requires additional research on finding the best approach for the diffusion of the intended solution into the practice of small IT companies. The latter issue seems to be most difficult as it leads to questions that have been insufficiently researched within the IS discipline in the past.

Glass (2001) provides a useful summary of opinions of IS researchers related to the issues of rigor and relevance in IS publications. He indicates that some of the researchers in the IS community are not considering that the discipline should only passively survey phenomena in the IT industry with a certain time lag. The authors of this paper see that as an indication for the need to pay more attention to design aspects in information systems research in a line similar to that of Hevner (see Mathieu, 2002). Another conclusion from the findings by Glass (2001) is the necessity to find ways and tools to make IT management ideas more accessible to practitioners. The implementation of such tools requires a better recognition of the socio technical nature of information systems development in general and in web software development in particular.

The aim of the tool under consideration here is enabling the diffusion of the CSF concept (applied traditionally in large corporate environments) to the small business field and its deployment. This was explored in the work of the authors on the design of a solution to the problem of identifying CSFs for web software development in small IT companies, discussed in the next section.

On the basis of the discussion so far, it is possible to outline the methodological assumptions for such a solution:

- it needs to implement the principles of the CSF theory;
- it needs to support learning in a distributed environment.

The technology of such a solution has to address the following requirements:

- the solution needs to be based on a distributed IT infrastructure allowing access anytime from anywhere, such as the one provided by the Internet and the World Wide Web;
- the tools for development need to address issues of compatibility with the most widely used web technologies in the world and the latest trends in this fast moving field;
- organizational learning can be provided by exploring the latest achievements in the construction of knowledge portals.

The practical work by the authors on this problem so far is described briefly below. The research reported here has had two prototype implementations and is still in progress. One project was implemented in South Africa at the University of Natal in 2001 with the participation of the first, third and fourth authors. The web site was designed to allow the users to:

- learn about critical success factors in web development;
- submit their own information of critical success factors in web development within their small IT company.

The implementation of the first prototype required contacting relevant small IT businesses within the province of Kwa Zulu Natal. The developing team was interacting with the local branch of the Computer Society of South Africa (CSSA). The latter provided a list of possible small IT companies to be considered for the survey and was interested in the results obtained intending to distribute them as a service to the local members of the society.

A second project on CSFs in web projects was implemented with postgraduate students from the Masters Program in Computer Information Systems at Central Connecticut State University under the supervision of the first and second authors in 2002. It concentrated more on the task of creating awareness about the CSF theory and its role in web development in general. It simulated a training environment on the role of CSFs in e-commerce.

A common weakness of both projects was the fact that the deployment of the two prototypes was not having sufficient impact to capture the attention of broader sections of the regional small IT companies. In the second case that was not even an issue for the developing team. There is a need to refine the mechanism of the intervention associated with the development of such a solution. This can be achieved following the process of action research advocated by Checkland and Holwell (1998). Not enough attention was paid on the potential of a possible cooperation with a local chamber of commerce and industry. The latter type of institution may potentially be more directly concerned with the needs of small IT companies in a region than a professional organization such as a computer society.

Further work is needed on integrating the best aspects of both projects into one system and using it for gathering more field data on CSFs on e-commerce and web development by small IT businesses in a particular regional context. The challenge for further enhancements of the proposed solution is to apply methods for human enquiry that will improve the deployment strategy for such a tool. Possible methods may include stakeholder analysis and Soft Systems Methodology (see Checkland and Holwell 1998). They can contribute also for the development of the application domain knowledge about the problem. The latter is important as the software project management area, as well as the small business area are not traditional IS application domains.

Conclusion

The ideas presented in this paper show how a traditional corporate management approach such as CSF theory applied to web development can be made accessible to small IT businesses over the Internet. It aims to assist in the management of knowledge creation about CSF about web software development within the virtual community of small IT companies in a particular region. An interactive web site for online gathering of information on CSFs in web development projects was developed in two prototype versions.

Overall the challenge for further development is to enhance the system to provide an extensive interactive learning experience for the users about CSFs in web software development within small regional IT companies. Future work could involve a wider field research in different regions of the world, gathering data on critical success factors for web development in small IT businesses and possibly for the maintenance of web projects is needed. Thus the development of the proposed tool can contribute to empowering small IT companies to produce better web systems.

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