CHEMICAL ENGINEERING TRANSACTIONS
VOL. 52, 2016
A publication of AIDIC
The Italian Association of Chemical Engineering
Online at www.aidic.it/cet
Guest Editors: Petar Sabev Varbanov, Peng-Yen Liew, Jun-Yow Yong, Jiří Jaromír Klemeš, Hon Loong Lam

ISBN 978-88-95608-42-6; **ISSN** 2283-9216
DOI: 10.3303/CET1652185

A Master Plan for the Implementation of Sustainable Enterprise Resource Planning Systems (Part III): Evaluation of a Roadmap

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An implementation of Sustainable Enterprise Resource Planning (S-ERP) systems is challenging that requires multidisciplinary skills, knowledge, and coordinated efforts of all levels in an organization. Related study in S-ERP systems had been done, however, they only highlighted on the imperative of the system and empirical analysis of the system implementation without looking into detail on how to implement this integrated system. This lack of comprehensive plan and direction to guide practitioners in implementing S-ERP system would result in increased sustainability implementation cost and time and the decline in the quality of products and services. This problem motivates the researchers to propose a master plan of the S-ERP system implementation that consists of a roadmap, a framework, and guidelines. A development of S-ERP roadmap has been underscored in the previous paper. For the next phase, the roadmap is then evaluated by using a peer review method, which is the focus of this paper. The evaluation consists of two main processes including data collection and data analysis. In this regard, twelve experts had participated in the peer review. As a result, the developed roadmap needs to be expanded into two roadmaps, namely roadmap towards sustainable enterprise and roadmap towards sustainable integrated enterprise. From the evaluation results, the experts confirmed that the proposed S-ERP implementation roadmap can generally be used for implementing the S-ERP systems in all types of industry. The roadmap could serve as a theoretical base for further research into S-ERP system research, which can give more insight into the system implementation. In addition, this roadmap could serve as a tool for practitioners in implementing S-ERP systems within organizations.

1. Introduction

The role of S-ERP system is imperative to solve the segregation issue in the sustainability implementation (Chofreh et al., 2014a). It enables to integrate sustainable business functions, processes, and data into a single platform. Misalignment between sustainability strategy and information systems strategy inhibits the achievement of sustainability objectives (Goni et al., 2013b). As mentioned in the work of Chofreh et al. (2014a), various software vendors developed this system in assisting the organizations to solve the segregation issue. However, the organizations are faced a difficulty to implement this system as it is a complex system that requires multidisciplinary skills and knowledge.

The implementation of the S-ERP system can be adopted from its previous generation, namely Enterprise Resource Planning (ERP) systems. The ERP system is a potential solution for organizations to improve the effectiveness and efficiency of business processes (Goni et al., 2013a). Sykes et al. (2014) mentioned that ERP system implementation is multifaceted. It needs managerial and technological capabilities to manage

Please cite this article as: Chofreh A. G., Goni F. A., Klemeš J. J., 2016, A master plan for the implementation of sustainable enterprise resource planning systems (part iii): evaluation of a roadmap, Chemical Engineering Transactions, 52, 1105-1110 DOI:10.3303/CET1652185

(Sahran et al., 2011). The ERP system was rapidly adopted by organizations in 2000s (Chae et al., 2014), however the implementation of this system has high overall failure rates (Nelson, 2007).
Numerous studies, such as Goni et al. (2012), had highlighted the failure factors of the ERP systems implementation. Some of the failure factors are lack of top management support, poor project management, and users' resistance to change (Goni et al., 2011). If the organizations unable to solve these problems, they can be a major obstacle in the system implementation. As a result, the organizations cannot earn the benefits of the systems, such as improve production, information accuracy, and decision making capability (Sadrzadehrafiei et al., 2013). Since the S-ERP system is more complex than ERP system, the result could be unsuccessful.
Another problem that organizations face to is lack of a comprehensive a master plan master plan that shows the stages, perspectives and steps for implementing the S-ERP systems in the literature (Chofreh et al., 2014a). This lack of comprehensive plan and direction to guide practitioners in implementing S-ERP system has resulted in increased sustainability implementation cost and time and the decline in the quality of products and services. Therefore, this study attempted to develop a master plan for the implementation of the S-ERP systems that consists of three main components including a roadmap, framework, and guidelines.
The researchers have developed the roadmap in the previous paper entitled "A Master Plan for the Implementation of Sustainable Enterprise Resource Planning Systems (Part II): Development of a Roadmap". Although the roadmap has successfully captured and correlated the existing concepts that have been confirmed in the literature to provide a new approach to the S-ERP implementation, its usability needs to be evaluated by experts in order to improve the quality of the roadmap. Therefore, the aim of this paper intends to evaluate the proposed roadmap via peer review methods.
Section 2 recalls the roadmap development process, which was the objective of the previous paper. Section 3 explains the methodology and the rationale behind its choice. Section 4 describes the evaluation approach and its results. Section 5 provides the overall discussion of the research findings. Section 6 concludes the study with lists of contributions, conclusions, and suggestions for further research.here.

2. Review of the roadmap development

A roadmap for the implementation of S-ERP systems has been proposed in the prior study. The development of this roadmap was performed by using conceptual research methods. This method relies primarily on the literature in sustainability implementation roadmap (Chofreh et al., 2015), ERP implementation roadmap (Chofreh et al., 2014b), and project management for direction and formation of ideas and concepts. The roadmap refers to stages intended to implement S-ERP system. Each stage presents a group of the steps in the master plan. Based on an examination of the literature, there seems to be no general stages and concurrence in designing sustainability and ERP implementation roadmaps. Various researchers are looking at different perspective in order to develop the roadmaps. Thus, this study adopts necessary phases and stages from the existing literature that involve effective processes in the life cycle of the S-ERP implementation project.
Project management concept was used in order to design the roadmap. The advantage of this concept is that it is a common knowledge, skills, tools, and techniques between practitioners in planning and guiding a project. The other implicit advantage is that it provides specific ways of managing the project throughout its life cycle (Chofreh et al., 2011). The roadmap adopted five process groups in project management as stages in the roadmap. These stages are initiating, planning, executing, monitoring and controlling, and closing. In addition, the roadmap adapted three project phases introduced by Motwani et al. (2005), who categorized the ERP system implementation into pre-implementation, implementation, and post-implementation. The structure of these phases and stages were synonymous with the project management concept. They reflect the effective and comprehensive flow of the project throughout its life cycle. The formation of the initial roadmap is shown in Figure 1.

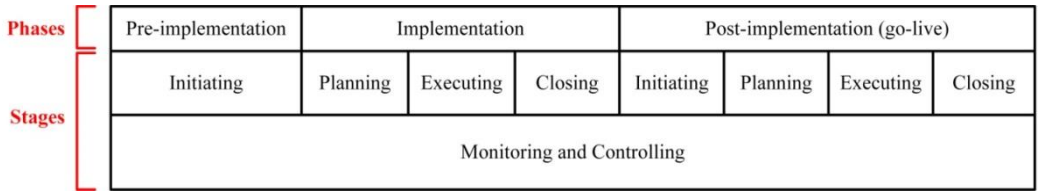

Figure 1: Roadmap for the implementation of S-ERP systems

3. Research methodology

The evaluation process is divided into two main processes including data collection via peer review method and data analysis by using ATLAS.ti 6 analysis software. This study used judgment sampling technique in doing the data collection since the number categories of people that have the information are limited. The experts were selected based on their expertise in the subject investigated and knowledgeable about current information and perceptions regarding the topic under investigation. This study used 12 samples because the saturation of knowledge had been reached until this level. In addition, the numbers of experts who have integrated skills in sustainability, ERP, and S-ERP system areas are limited, hence, the sample collection was stopped at 12 amounts of experts. Most of the experts were selected through LinkedIn website based on their expertise in the field of sustainability, ERP, and S-ERP system implementation. The researcher contacted 92 academicians and practitioners, who had research and practical experiences in the development and implementation of sustainability and ERP systems. From these, 44 experts responded and 16 experts agreed to participate in this study. However, the researcher conducted interviews with 12 out of the 16 experts, which included 1 academician from Hungary; 8 practitioners from SAP Germany, SAP U.S., SAP Italy, and SAP Japan; 1 practitioner from IBM U.S., 1 practitioner from a Non-Governmental Organization (NGO) in U.S., and 1 practitioner from a sustainability consultant firm in Canada.

Concentrating on those 12 experts, a semi-structured interview through Skype Call Phones was used as the data collection method. Telephone interviews are best suited when respondents are spread over a wide geographic area so the data can be obtained quickly (Sekaran and Bougie, 2010). The unit of analysis in this study is the individual. The interviews were recorded by using Evaer.v1.2.0.17 software and then transcribed into text. Conversations in the interview with 10 experts were recorded with the exception of 2 experts who did not allow the conversation to be recorded. However, one of these 2 experts provided the answers in a form of text and another expert provided a report of discussion.

The first step in qualitative data analysis is concerned with data reduction through coding, categorization, and conceptualization. ATLAS.ti 6 software was used to aid the coding of the text of the interviews and the analysis of the data collected during the interviews. After coding, the next step in data reduction is categorization. Categorization is the process of organizing, arranging, and classifying coding units (Sekaran and Bougie, 2010). Boeije (2002) mentioned that one of the important tools in grounded theory is constant comparison. In constant comparison, the researcher compared data from an interview to data from another interview. After a theory has emerged from this process, the researcher compared new data to the theory. If there is a bad fit between data (interviews), or between the data and the theory, then the categories and theories have to be modified until the categories and theory fit the data.

According to Miles and Huberman (1994), data display is the second major activity should be considered by the researcher when analysing the qualitative data. Data display involves taking the reduced data and the displaying theme in an organized and condensed manner. Along these lines, diagram is constructed to show the patterns and relationships in the data so that the drawing of conclusions is facilitated.

Drawing and verifying conclusions is the final analytical activity in the process of qualitative data analysis. Sekaran and Bougie (2010) stated that it is the essence of data analysis and the point where the researcher answers the research questions. According to Miles et al. (2014), any early conclusion typically needs confirmation, checking, and verification. The most frequently used methods are as follows: following up, triangulating, making if-then tests, and checking out rival explanations. Adhering to this credence, this study used following up method to verify the conclusions. Further detail of the data analysis and results are given in the next section.

4. Evaluation of the roadmap

As stated in the previous section, an evaluation of the roadmap is divided into two main processes: data collection and data analysis. The steps in data collection include designing questions for interview, executing a pilot study, contacting the experts, conducting interviews and obtaining feedback, and creating a transcription. Furthermore, the data analysis consists of three main steps including data reduction, data display, and drawing/verifying conclusions. These steps are an interrelated and iterative process that occurred before data collection, during data collection, and after data collection (Miles and Huberman, 1994).

4.1 Data collection

The data collection consists of five activities including design questions for interview, execute a pilot study, contact the experts, execute the interview and get the feedback from experts, and create transcription. Telephone interviews were conducted in order to get the feedback from experts. Furthermore, the interviews were recorded and transcribed into text.

The questions for the interview contained main questions, also known as leading questions, to lead the respondent to the researcher's way of thinking. This questioning technique is good for getting the desired answers while leaving the interviewees' feeling that they could consider other arguments (MindTools, 2014). By adopting this method, the researchers could obtain the necessary information on the issues of interest (Sekaran and Bougie, 2010). The questions were designed based on the key constructs in the study and an extensive literature review. The main questions were formulated in the form of open-ended questions in order to learn how a respondent thinks, to discover what is really important to the respondent and to get an answer to a question with many possible answers. The questions were first evaluated by three respondents to discover any issues and to ensure that the questions were worded correctly and were clearly understood by the interviewees. The questionnaire was distributed to the respondents and experts via email. There is no time limitation was given for the respondents of the pilot study and the experts to respond the email.
In-depth semi-structured interviews were conducted with 12 experts via telephone. Both academic and practitioner participants were interviewed in order to get their perspectives about the roadmap. Conversations in the interview with 10 experts were recorded with the exception of 2 experts who did not allow the conversation to be recorded. However, one of these 2 experts provided the answers in a form of text and another expert provided a report of discussion. As the last activity, the data were then transformed into text for analysis preparation.

4.2 Data analysis

The data analysis consists of three steps including data reduction, data display, and drawing/verifying conclusions. In doing the data reduction. the interview transcription was analyzed using a deductive logic approach. This step involves the process of coding, categorizing, and conceptualizing. These steps facilitate in drawing the final conclusions and verification (Miles and Huberman, 1994).
The next process in data analysis after data reduction is displaying the data in a compressed way to facilitate understanding in order to draw conclusions, further analyze or take other actions (Morse and Richards, 2012). In this process, the integrated codes were placed in the final roadmap. This process stated the application of recommended comments from experts into final roadmap.
The last step in data analysis is drawing/verifying conclusions. This step involves giving meaning to the data. It consists of noting patterns, explanations, casual flows, and prepositions (Miles and Huberman, 1994). To confirm, check, and verify the conclusions, this study used following up technique. The initial findings were re-sent to the experts until a consensus was reached.

5. Discussion of the results

The purpose of the roadmap is to show the stages for transforming the organizations towards a sustainable enterprise and a sustainable integrated enterprise. As a solution to fulfil the experts' comments, the initial roadmap must be separated into two parts: 1) Roadmap towards sustainable enterprise and 2) Roadmap towards sustainable integrated enterprise. Figure 2 and Figure 3 present the final S-ERP implementation roadmaps.
Based on the experts, the structure of the stages should be modified. First modification is the planning stage that must be in pre-implementation, implementation, and post-implementation phases. Second modification is the initiating, planning, and executing stages must be iterated. Third modification is adding a new stage: transition stage, which shows the transition process between implementation and post-implementation phases. Fourth modification is the stages in post-implementation must be replaced with plan, do, check, act (PDCA) and these stages are iterated.
According to the experts, there is a need to perform a value discussion before the organizations transform their business strategy into practice. A value discussion is a team meeting to discuss the strategy of the company in embedding sustainability into value chains and then integrate all sustainable business functions into one platform by regularly measuring knowledge of the strategy and whether or not this knowledge turned into practice and action.
The implementation of sustainability portfolio and S-ERP project involve several phases including pre-implementation, implementation, and post-implementation. The purpose of each phase is described in Figure 15 and 16. The pre-implementation and implementation phases contain various stages including initiating, planning, executing, and closing. In addition, the stages in the post-implementation phase include plan, do, check, act, with an iterated process (loop and feedback). The monitoring and controlling stage enables the organizations to track and review progress and performance of every stage in pre-implementation, implementation, and post-implementation.
The proposed roadmap has substantial research implications. The identification of the stages in the roadmap that made up the master plan structure is an important contribution to the theory on S-ERP system researches. Through this newly formed concept, it is currently possible to systematically implement the S-ERP

system in an organization. Thus the research value of the master plan structure concept cannot be underestimated. In addition, the roadmap would give the practitioners a bird's eye view of the S-ERP system implementation process.

6. Conclusions

The research objective laid out at the beginning of the research was met. A structure of the roadmap for the implementation of S-ERP system project has been evaluated and refined by using peer review methods, which yielded improvements in the structure. It encompasses the transformation activities during pre-implementation, implementation, and post-implementation. The role of the roadmap might be as guidance for organizations to implement an S-ERP system.

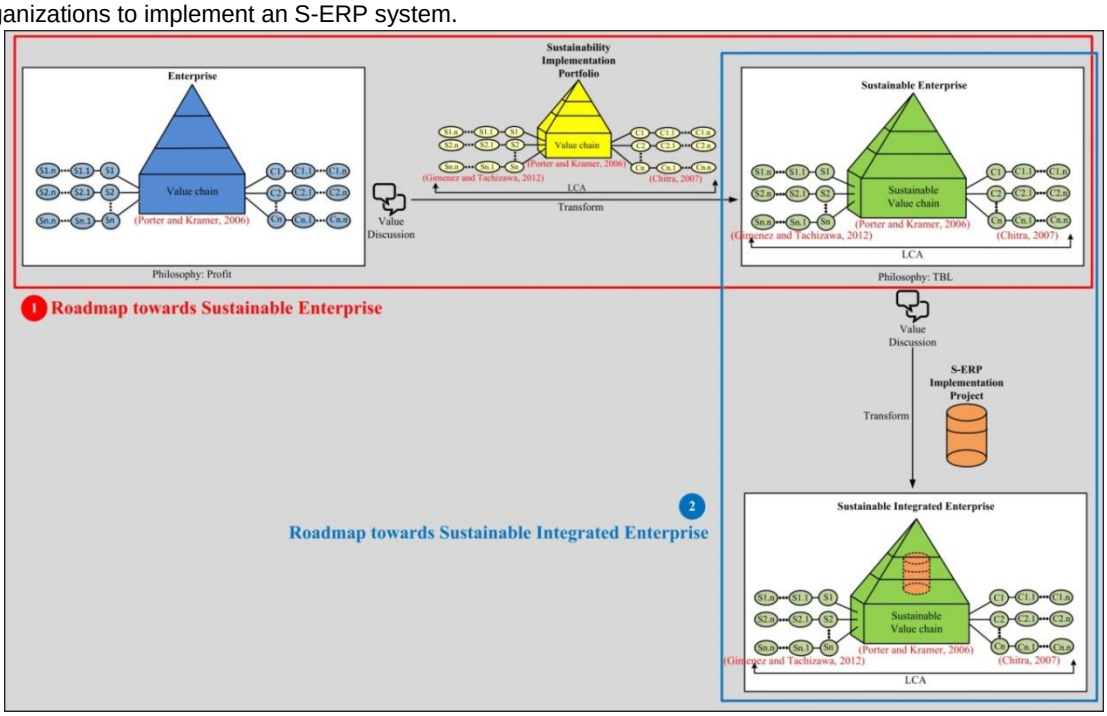

Figure 2: General overview of the final roadmap

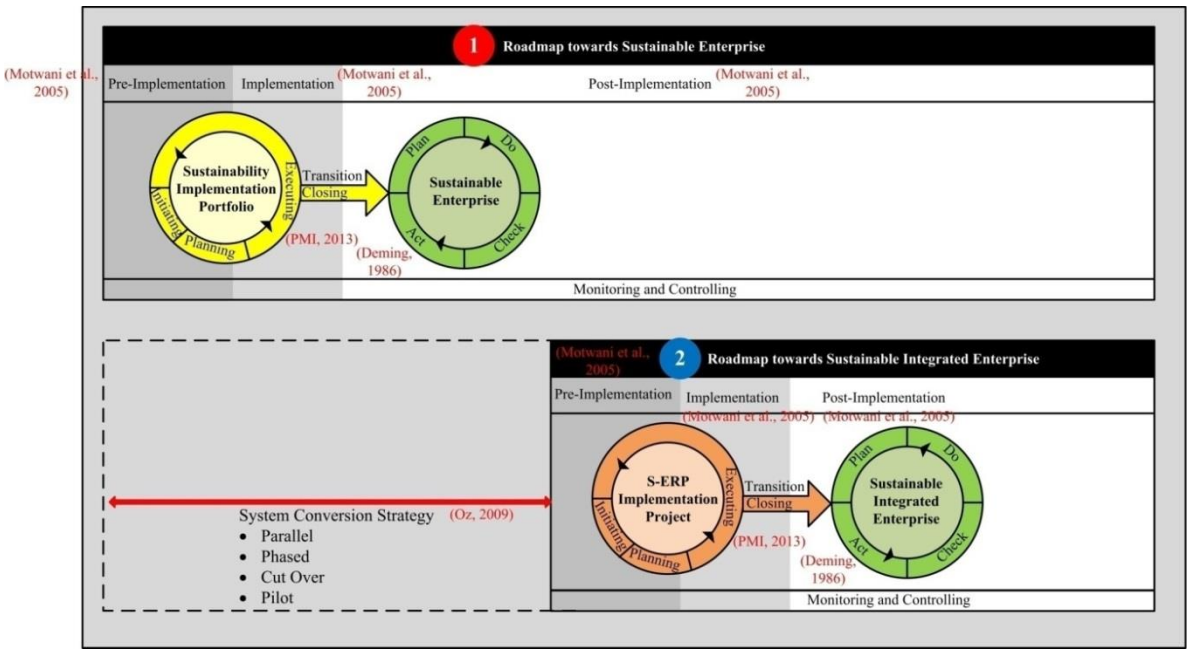

Figure 3: Specific features of the final roadmap

The peer review method is suitable for evaluating the research findings from the topic that is still infrequently studied and the relevant information is still scarce. In this regard, the study needs a number of experts from related fields to improve the research findings. Two main phases can be identified in this evaluation process. They are data collection and data analysis. The data collection has been conducted using semi-structured interview with 12 experts. The interviews was recorded and then transcribed into text for data analysis. The data analysis had been completed via three main steps including data reduction, data display, and drawing/verifying conclusions.

As a research outcome, it was necessary to expand the initial roadmap into two parts, namely roadmap towards sustainable enterprise and roadmap towards sustainable integrated enterprise. According to the experts, the proposed roadmap is promising for use in implementing S-ERP systems. Furthermore, the lessons learned from the theoretical and practical concepts underlying the roadmap have been achieved via the adopted method. However, further study needs to be performed regarding the development and evaluation of the framework and guidelines for the implementation of S-ERP systems, as they will be discussed in the next papers.

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