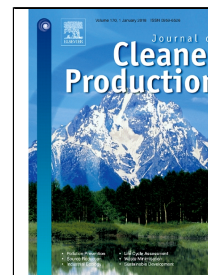


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A Roadmap for Sustainable Enterprise Resource Planning Systems
Implementation (Part III)



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A Roadmap for Sustainable Enterprise Resource Planning Systems

Implementation (Part III)

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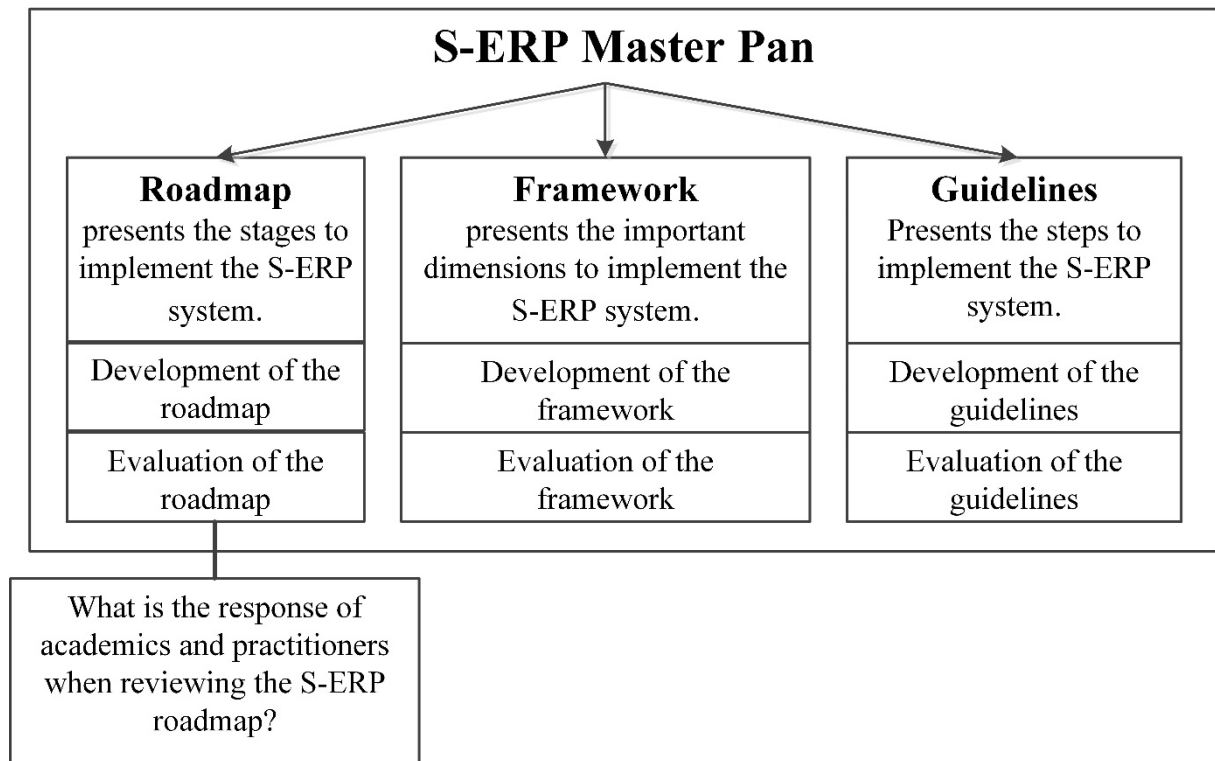
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Abstract. The organisation needs multidisciplinary skills, coordinated efforts, and adequate knowledge in order to implement successful Sustainable Enterprise Resource Planning (S-ERP) systems. Various studies have been conducted on S-ERP system, however, many of which only focused on the empirical analysis and imperative of the system without concerning on the effective implementation of the system. The absence of a validated plan and guide of S-ERP implementation would increase the cost and time of the system implementation and decrease the quality product and service. The recent research contributions have dealt with developing a master plan for the S-ERP system implementation that includes certain components, such as a roadmap, framework, and guidelines. A previous study has highlighted the development of the S-ERP roadmap. To advance the formulation of the S-ERP master plan, this presented study aims to evaluate the usability of the developed roadmap through peer review method. Data collection and analysis are the major actions to be performed in the evaluation. The peer review is performed by twelve experts including academics and practitioners. According to the peer review results, the S-ERP roadmap required to be divided into a sustainable enterprise and sustainable integrated enterprise. The experts verified that the S-ERP roadmap could be generally applied to various types of industry. It can provide a guide for practitioners to implement S-ERP system in organisations. In addition, it provides a theoretical basis for other related studies to comprehend the S-ERP system implementation.

Keywords: Sustainable enterprise resource planning; implementation; master plan; roadmap; evaluation.

Graphical Abstract:



Research Highlights:

- Development of the S-ERP roadmap is reviewed.
- Methodology to implement the S-ERP roadmap is explained.
- The usability of the previous S-ERP roadmap is validated through peer review.
- The process of data analysis is provided for S-ERP implementation.
- Recommendation of future research on S-ERP system is presented.

1. Introduction

Since the early of 20th century, various industries changed their production process towards modern manufacturing (Chofreh et al., 2014a). Esteban et al. (2015) argued that this massive transformation affected the emergence of overexploitation of resources problem, which includes human, natural, and economic resources. This issue became more crucial and it got a distinctive response from the local and international governments through several local and international declarations, such as the Magnuson Act 1976 and the United Nations Conference on the Human Environment, that initially applied the term of sustainability (Goni et al., 2015).

The academics frequently assigned the definition of sustainability from The Brundtland report 'Our common future'. According to The Brundtland report 'Our common future', sustainability can be defined as "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*" (Brundtland, 1987)." This concept implies the resources management to fulfil the essential needs of human being in the long period of time. Elkington (2004) argued that achieving sustainability future requires an integration of three sustainability components including environment, society, and economy. In this approach, organisations need to envisage planet, people, and profit in managing their business.

The sustainability concept has been profoundly incorporated into the extended value chain in organisations as it is gradually more vital in the business (Chofreh and Goni, 2017). They need to have sustainable raw materials from their suppliers and deliver sustainable products and services to their customers (van Herpen et al., 2015). The organisations require to assess their sustainability performance and report the results to their stakeholders. However, Chofreh et al. (2014a) claimed that several organisations face the segregation issue between suppliers, business functions, and customers during implementing the sustainable business process. They

manage the sustainable data and processes using tools and procedures that are separated from an integrated information system. Numbers of them still apply a collection of spreadsheets to collect the data and information. This process would not be successful if the practitioners need to execute and repeat the sustainable business process on an every day, quarterly, or monthly basis and when the data must be audited by a third party. As a result, the decision-making is isolated and the organisations unable to evaluate their sustainable business performance. This problem indicates a strategic misalignment between sustainability and information systems. The attainment of sustainability objectives could be inhibited due to this misalignment issue (Goni et al., 2013b). Therefore, a new generation of an enterprise system, such as Sustainable Enterprise Resource Planning (S-ERP) system is necessary to tackle this problem.

S-ERP system is essential to overcome the problem of segregation in sustainability implementation as it facilitates the integration between sustainable data, business functions, and processes into a single system (Chofreh et al., 2014a). Chofreh et al. (2016c) stated that several software vendors, such as Systemanalyse und Programmentwicklung (SAP) and Microsoft, have built this system to solve the segregation problem during the sustainability implementation. However, the organisations still have difficulty in implementing the S-ERP system as the absence of a master plan that provides a guide for practitioners to implement the S-ERP system in organisations.

The concept of the S-ERP master plan has been introduced by Chofreh et al. (2016a). They defined the objective of the master plan, which is to aid the organisations to implement the S-ERP system within estimated time and budget. The S-ERP master plan has three interlocking components including a roadmap, framework, and guidelines. The roadmap refers to a general plan intended to implement the S-ERP system. The framework refers to some important aspects that need to be considered in implementing the S-ERP system. The guidelines refer to a number of sequential activities to implement the S-ERP system.

Chofreh et al. (2016b) have developed a component of the S-ERP master plan, which is the S-ERP roadmap, using the project management concept. However, this roadmap does not prejudge the final decision and it needs to be evaluated by experts. Therefore, this present study aims to evaluate the S-ERP roadmap using a peer review method to improve its effectiveness and worth. The novelty of this study is twofold. In academic perspective, the S-ERP system topic is new in academic research. There is still a limited study that observes how this system is implemented in an organisation. In practical perspective, the final S-ERP master plan would be a new method that can assist the practitioners to implement the S-ERP system in their organisations. Figure 1 presents the overview of the S-ERP master plan.

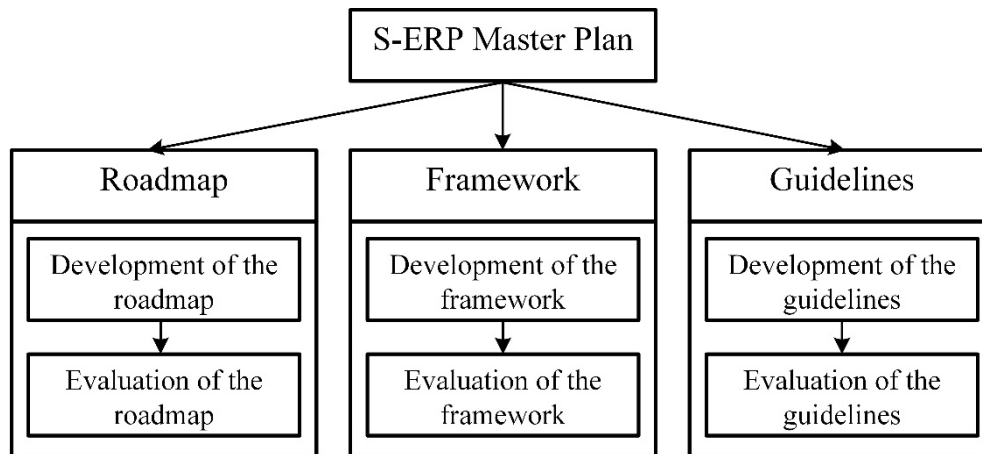


Figure 1. Overview of the S-ERP master plan

According to Figure 1, the S-ERP master plan consists of three components: roadmap, framework, and guidelines. Each component needs to be developed and evaluated for completing the structure of the master plan. This paper contributes to the evaluation of the roadmap and it is organised as follows. Section two recalls the process of developing the roadmap. Section three describes the methodology used in this study. Section four focuses on the roadmap evaluation, as well as the obtained results. Section five provides a general discussion of the findings. Section six concludes the study with contributions and recommendations for further investigation.

2. Review of the Roadmap Development

Chofreh et al. (2016b) have developed a roadmap for the S-ERP system implementation using conceptual research method. This technique relies on the literature to formulate a new concept. A number of literature references from three diverse research fields including sustainability implementation roadmap, ERP implementation roadmap, and project management have been reviewed and analysed in order to expose the knowledge gap and contradiction in the literature as well as getting a new idea to formulate the structure of the S-ERP roadmap. Figure 2 provides a clear illustration of the process.

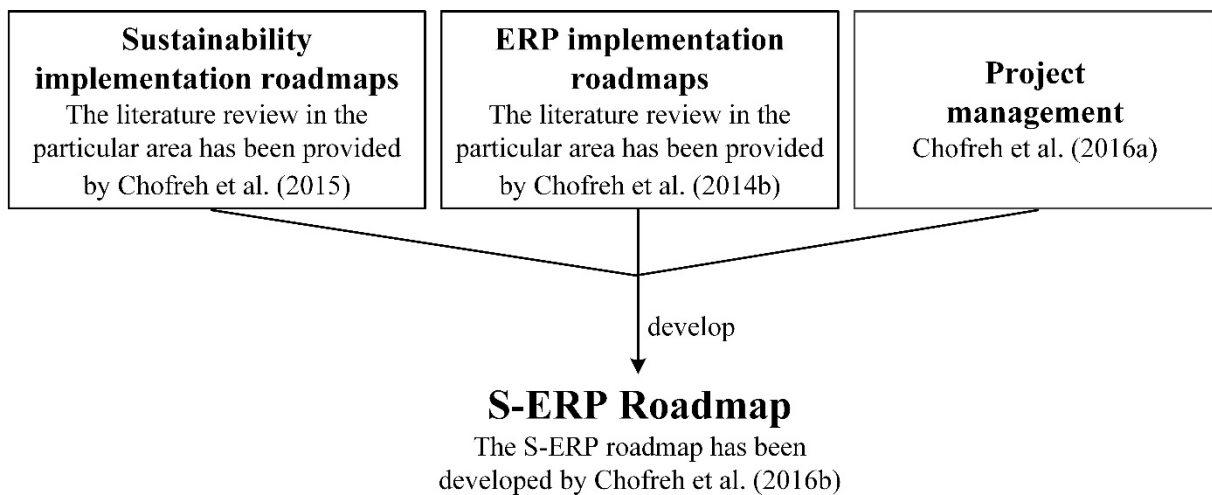


Figure 2. Literature review for the roadmap development

Chofreh et al. (2015) discussed numbers of studies that proposed a sustainability roadmap. Lubin and Esty (2010) proposed a roadmap, which encompassed five main areas leadership, techniques and models for value assessment, strategic alignment, integration, and reporting and communication, to implement the sustainability initiatives in organisations. Ahmed and Sundaram (2012) developed a roadmap to transform an organisation towards sustainable organisation using experts review. They considered two paradigms including decisional paradigm (strategic, tactical, and operational) and sustainability paradigm (environment, economy, and society) in developing their roadmap. Arena and Chiaroni (2014) proposed a

roadmap for sustainability implementation by analysing the business process of an Italian company. The roadmap, named as Green Roadmap, comprised of three main layers including organisation, processes, and products. The authors argued that the business transformation towards sustainability need to be initiated from a cultural change. Therefore, they considered organisational change as the initial component that required changes in the organisations. According to the literature review, numerous components were considered in the proposed sustainability roadmaps. However, there is no similar technique used by the existing studies as various authors adopted various concepts. For instance, leadership concept used by Lubin and Esty (2010), decision support system concept used by Ahmed and Sundaram (2012), and change management concept used by Arena and Chiaroni (2014).

The S-ERP system implementation can be mirrored from the experience of the ERP system implementation as this system is a basis of the S-ERP system. The philosophy between ERP and S-ERP system is fundamentally different. The philosophy of the ERP system is based on profit, whereas the philosophy of the S-ERP system is based on profit, people, and the planet. In addition, the S-ERP system integrates the sustainable business functions in an organisation. The data that need to be centralised are related to sustainability and they are more complex. Therefore, the implementation of this system would be different since the practitioners need to add more complex dimensions to the S-ERP system.

Numerous studies proposing the ERP implementation roadmaps were reviewed by Chofreh et al. (2014b) in order to get ideas of designing the S-ERP roadmap. Chen et al. (2009) developed an ERP roadmap to avoid the ERP implementation failure. Based on the existing ERP models in the literature, they formulated a new roadmap, which was then evaluated by a number of practitioners in a multinational company. Yilmaz and Ozcan (2011) presented a roadmap developed by SAP for implementing the ERP system. This ERP roadmap has been used in several organisations and it has been proven that they were successful in implementing

the system. Samaranyake and Abeysinghe (2011) proposed a roadmap by emphasising the critical success factors to implement the ERP system. Similar to Chen et al. (2009), the conceptual roadmap was then assessed through a case study method. Based on the literature analysis, the project management method is generally used as a fundamental concept to develop the ERP roadmap. They incorporated the project management process groups and knowledge areas as the components of the roadmap. However, the studies did not envisage the complete elements of the process groups and knowledge areas. For example, Chen et al. (2009) considered only the initiation and controlling process groups. In the SAP ERP roadmap observed by Yilmaz and Ozcan (2011), it is considered the initiation, planning, execution, and monitoring/controlling. Samaranyake and Abeysinghe (2011) considered the initiation, planning, and execution. The studies that have been reviewed are given in Table 1.

Table 1. Summary of studies on sustainability and ERP implementation roadmaps

Reference	Research Area		Concept used
	Sustainability implementation roadmaps	ERP implementation roadmaps	
Vanegas (2003)	√		Built environment sustainability and decision-making levels.
Strong and Volkoff (2004)		√	System implementation methodology and project management.
Chuang and Shaw (2005)		√	System development process and project management.
Motwani et al. (2005)		√	Key success factors and system implementation methodology.

Could and Wallbank (2007)	√		Sustainability, change management, system implementation methodology.
Waage (2007)	√		Strategic sustainability decision-making and product design process.
McGinnis and Huang (2007)		√	Knowledge management and system implementation methodology.
Verville et al. (2007)		√	Strategic planning process.
Duarte et al. (2008)	√		Sustainability and system implementation methodology.
Nidumolu et al. (2009)	√		Sustainability and strategic management.
Chen et al. (2009)		√	Project management and system development life cycle.
Lubin and Esty (2010)	√		Sustainability and leadership.
Sahran et al. (2010)		√	Key success factors and project management.
Samaranayake and Abeyasinghe (2011)		√	Key success factors and system implementation methodology.
Yilmaz and Ozcan (2011)		√	Project management.
Ahmed and Sundaram (2012)	√		Sustainability and decision support system.

Goni et al. (2013a)		√	Key success factors and project management.
Arena and Chiaroni (2014)	√		Sustainability and change management.
Pitic et al. (2014)		√	Project management and system selection process.

Project management method is commonly used as a basic concept to manage the sustainability and ERP implementation. Goni et al. (2011) stated that the effective application of this method is one of the critical success factors in implementing the ERP system. The main purpose of integrating this concept is to enhance the effectiveness and efficiency of the sustainability and ERP system implementation (Sadzadehrafiei et al., 2013). This experience can be used in S-ERP system area by adopting the project management concept in developing the S-ERP roadmap.

The S-ERP is a multifaceted system and it requires the involvement of top, middle, and low management levels in an organisation. Therefore, a well the adoption of the project management concept in the S-ERP roadmap is necessary (Chofreh 2016b). The main strength of the project management concept, which is a general knowledge, skills, methods and tools for planning and managing a variety of projects (Chofreh et al., 2011), would be advantageous to manage the S-ERP implementation project. Table 2 provides numerous studies that underscored the application of the project management concept.

Table 2. Summary of studies that highlight the application of project management concept

Reference	Research area
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	Sustainability	ERP
Ngai et al. (2008)		√
Edum-Fotwe and Price (2009)	√	
Hurt and Thomas (2009)	√	
Fernández-Sánchez et al. (2010)	√	
Chofreh et al. (2011)		√
Goni et al. (2012)		√
Bryde et al. (2013)	√	
Silvius and Schipper (2014)	√	
Brones et al. (2014)	√	
Brook and Pagnanelli (2014)	√	
Sánchez (2015)	√	
Marcelino-Sádaba et al. (2015)	√	

According to Project Management Institute (2013), the project implementation process is guided through five process groups in project management including initiation, planning, execution, monitoring and control, and closing. These five process groups were considered as the main stages in the S-ERP roadmap. They are an iterative and ongoing process that have interdependence and are generally completed in the same sequence on each project. In addition, three phases of ERP implementation project, which include pre-implementation,

implementation, and post-implementation (Motwani et al., 2005), were adopted as S-ERP implementation phases. It is noteworthy that the phases and stages were arranged in line with the concept of project management, reflecting the effectual process of the project throughout its lifecycle. The structure of the S-ERP roadmap is illustrated in Figure 3.

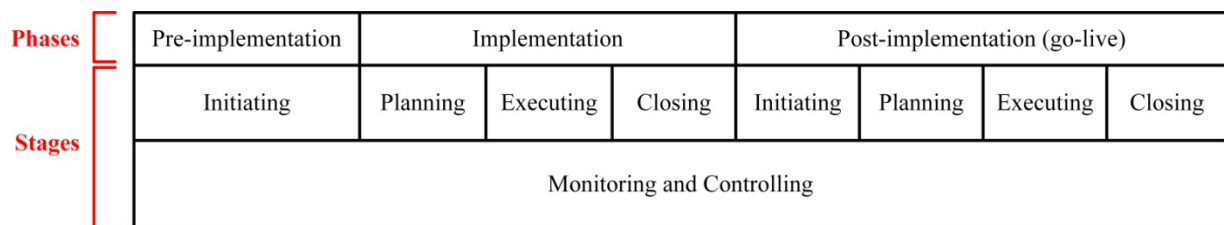


Figure 3. Roadmap for the implementation of S-ERP system (Chofreh et al., 2016b)

3. Research Methodology

This study would like to answer a question of “what is the response of the practitioners and academics when reviewing the S-ERP roadmap?” In doing so, a peer review method is used to get the feedback from the experts regarding the content and structure of the roadmap. According to Tavakoli (2012), this qualitative method is suitable for evaluating the research findings from the topic that is still infrequently studied and the relevant information is still scarce, such as the S-ERP system implementation.

The purpose of the peer review process in this study is twofold. The first step is to evaluate the content and category of the preliminary roadmap. The researchers inquire 12 experts to thoroughly evaluate the roadmap and to create important comments for further improvement. The second step is to refine other necessary stages and information that could serve as inputs

for the final S-ERP roadma

eer review method.

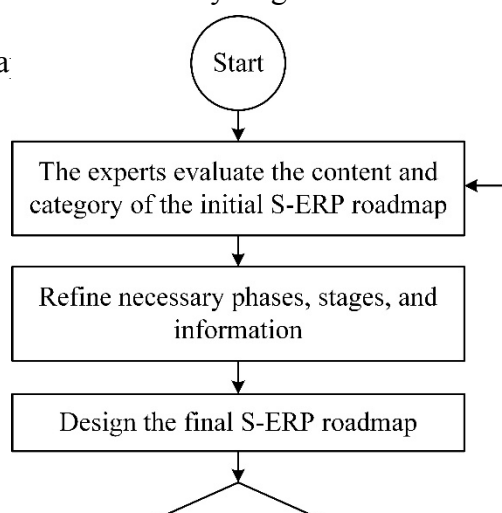


Figure 4. Process of the peer review method

The evaluation of the roadmap was performed in two key procedures including data collection through peer review method and data analysis using ATLAS.ti 6 software. According to Hwang (2008), ATLAS.ti 6 is simple qualitative data analysis software that can manage large data sets. It is reliable by creating the research processes more replicable. Figure 5 depicts an overview of the evaluation process.

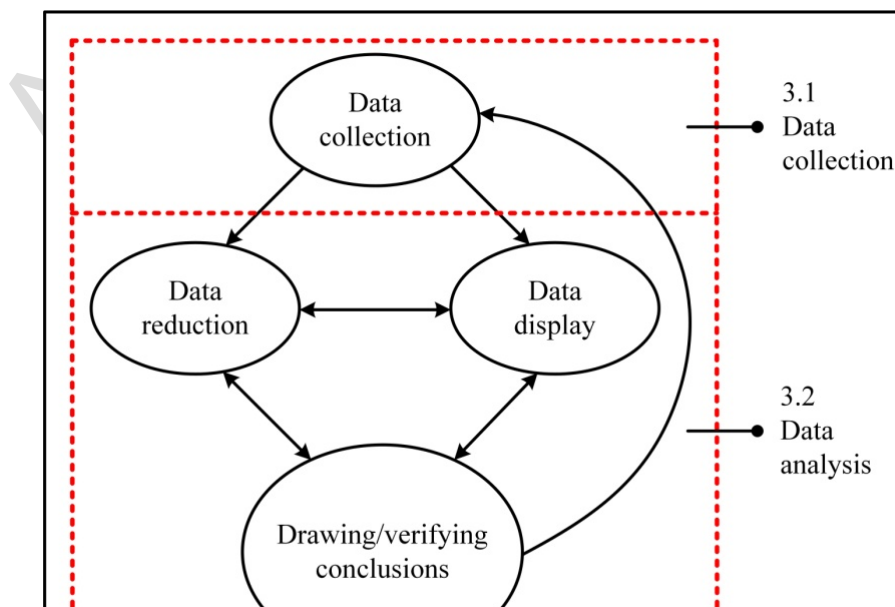


Figure 5. Process of the evaluation (adapted from Miles and Huberman, 1994)

3.1 Data Collection

Figure 5 shows that the data collection is the first stage of the S-ERP roadmap evaluation. In this process, this study used non-probability sampling to collect the data. According to Given (2008), it is a common procedure in a qualitative analysis that allows the researchers to use their decision for choosing a sample. The present study selected a judgment sampling as an appropriate sampling technique as it is generally used for a study that the topic is a new and limited number of experts have the knowledge and related information. Sekaran and Bougie (2010) stated that in this technique, the researcher requires selecting the experts to be sampled according to their proficiency. In this regard, adequate knowledge and expertise in the topic investigated are the major criteria for the experts' selection. This study adopted a number of selection criteria of the experts from the work of William et al. (2001). These selection criteria are mentioned as follows:

1. Publication of articles on sustainability, ERP, or S-ERP systems for minimum last five years; or
2. Teaching of educational courses relevant to the subject under investigation; or
3. Engaging on a number of projects to the subject under investigation for minimum five years.

Sekaran and Bougie (2010) argued that the common rule in qualitative research is that the researcher can continue collecting samples until they cannot acquire new data, which is known as data saturation. The sample size will, at least partly, depend on the heterogeneity of the population. Mason (2010) stated that the sample size for qualitative studies ranges from 4 to 87. In the present study, data saturation was obtained at 12 samples as the experts had provided similar information. Therefore, the process of collecting the sample finished after selecting 12 experts. These experts were selected via the LinkedIn website according to their proficiency. As a result, 92 academicians and practitioners were contacted, 44 experts responded, and 12 experts were interested to contribute in this work. These experts including an academician from a university in Hungary, a practitioner from IBM (USA), a practitioner from a non-governmental organisation (NGO) in the USA, a practitioner from a sustainability consultation company in Canada, and eight practitioners from SAP (USA, Italy, India, and Japan).

For collecting the data, a semi-structured interview was performed with these selected experts via Skype phone call. Sekaran and Bougie (2010) declared that a phone interview is the best method for quickening the data collection process in the case of experts residing at diverse geographical locations. The semi-structured interview is useful for exploratory research as according to Morse and Richards (2012), it has flexibility in terms of adapting and adopting new questions.

3.2 Data Analysis

Some general approaches for qualitative data analysis have been developed over the years. Miles and Huberman (1994) stated that qualitative data analysis comprises of three principal stages: data reduction, data display, and conclusion. This presented study used the similar approach for analysing the data.

Data reduction is performed by the codification, classification and conceptualisation of the collected data. Corbin and Strauss (2008) argued that the use of qualitative analysis tools enhances the capabilities of the researcher. In addition, the use of these tools allows for a much deeper and more reflective analysis of the qualitative material generated by the research (Chofreh, 2015). ATLAS.ti 6 was also used to help structure the qualitative data and allowed new insights and observations to be made about the data collected from the interviews.

Sekaran and Bougie (2010) declared that the analytic coding is the process to decrease, reorganise, and integrate the data for constructing a theory. Primarily, coding aims to draw a reasonable conclusion based on the obtained data. Selection of the coding unit is the initial step in the coding process. A word is considered the smallest unit in coding.

Categorisation is performed as another stage of data reduction following data coding. During this process, coding units are organised and classified properly (Sekaran and Bougie, 2010). According to the results presented by Boeijs (2002), a constant comparison is an essential element of the grounded theory, by which the researcher performs a detailed comparison of the data obtained from two different interviews. Upon the emergence of a new theory after constant comparison, data are compared based on the new theoretical ground. In a case of bad fits in the interview data, modification of the theories and categories and theories has to be considered until achieving a data fit.

The second main task in qualitative data analysis is data display. The organisation and condensation of the reduced data and their display themes are defined as the data display. In this process, patterns and associations are demonstrated in a constructed data diagram in order to facilitate the drawing of a conclusion.

The final stage in qualitative data analysis is drawing and verification of conclusion. Sekaran and Bougie (2010) concluded that it is crucial to data analysis since, at this point, the

research question is answered by the interviewed experts. As stated by Miles et al. (2014), confirmation, verification, and checking should be achieved in an early conclusion. The most common approaches for this purpose are the follow-up, if/then tests, triangulation and review of rival explanations. The follow-up method was adopted in the current study to confirm the conclusion. Details on data analysis and the obtained results are presented in the following section.

4. Evaluation of the Roadmap

As previously explained, the roadmap evaluation has two key procedures: data collection and data analysis. The phases of data collection include developing questions for interviews, conducting a pilot study, contacting the experts, performing the interviews and gaining the responses, and generating a transcription. The data analysis comprises three main steps including information data reduction, data display, and drawing/verifying conclusions. These steps are interconnected and iterative that arises before data collection, throughout data collection, and after data collection (Miles and Huberman, 1994).

4.1 Data Collection

The data collection was performed through a semi-structured interview. The experts were asked few leading questions as the main content of the interview. The adopted technique in the interview is good for getting the required answers while making the interviewees feel free to consider various arguments (MindTools, 2014). The mentioned approach proved to be useful

in providing the required data on the subject of interest in the current research (Sekaran and Bougie, 2010). Figure 6 illustrates the steps included in the data collection.

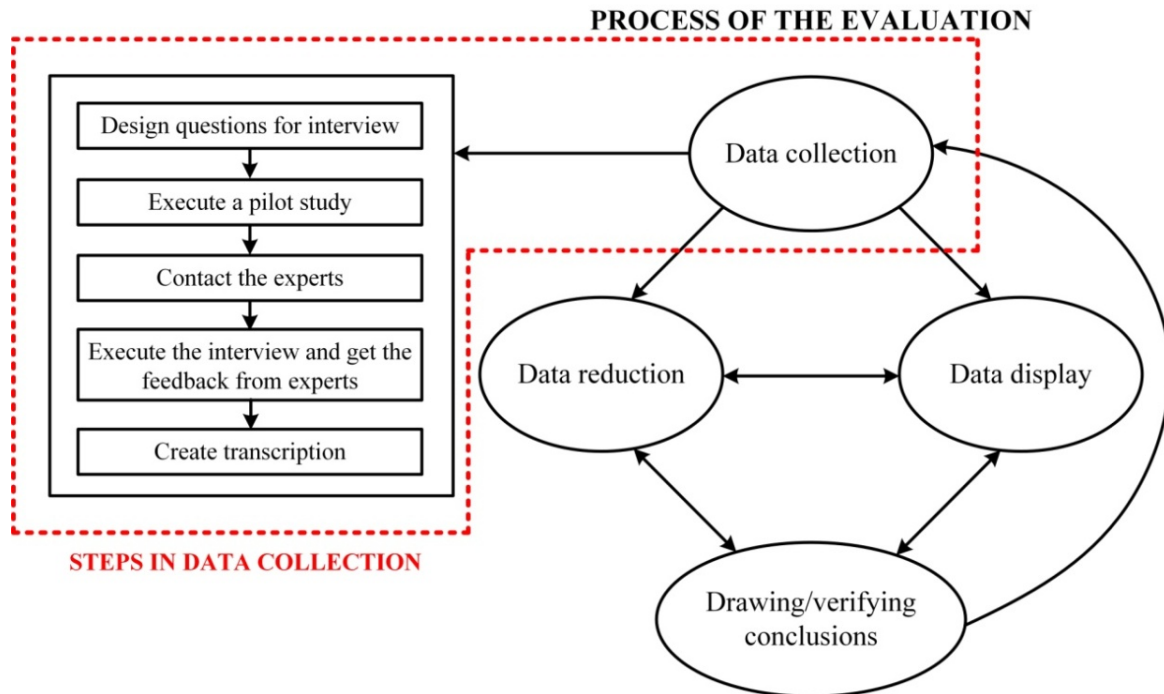


Figure 6. Steps in data collection. Process of the evaluation is adapted from Miles and Huberman (1994)

A literature review and the key elements of the study were the basis of designing the interview questions (Miles and Huberman, 1994). Open-ended questions were used, which illuminated the most significant concepts in the respondents' mind, as well as the best response to the questions with numerous possible answers. To discover potential problems and ensure the accuracy and clarity of the questions, the questionnaire was initially assessed by three interviewees. The questions were sent to the experts through email, and there was no time constraint for the respondents to perform the pilot study.

The final interview questions were sent to 12 experts. During the interview, ten experts agreed to record the conversation, however, two experts did not permit the recording. These

two experts provided the answers in writing and in the discussion report. Table 3 presents the summary of each expert with their information.

Table 3. Summary of experts

EXPERT	POSITION	SELECTION CRITERIA	DATA SOLICIT	METHOD	DURATION
Expert 1	Professor, University of Pannonia, Hungary.	1, 2, 3	Email	Online interview	00:15:57
Expert 2	Head of Sustainable Strategy and Integrated Reporting, SAP	3	Email	Online interview	00:45:59
Expert 3	Sales Specialist for LoB Sustainability EMEA, SAP Italy.	3	Email	Online interview	00:46:06
Expert 4	Sustainability Solution Engineer, SAP USA.	3	Email	Online interview	00:16:24
Expert 5	Senior Facilities Manager and Sustainability Expert, IFMA Board	3	Email	Online interview	00:20:13
Expert 6	Vice President, SAP Germany.	3	Email	Online interview	It was not allowed to be recorded
Expert 7	Health, Safety, Security, Environment & Sustainability Consultant, IBM USA.	3	Email	Online interview	00:31:51
Expert 8	Enterprise Business Principle, SAP Japan.	3	Email	Online interview	It was not allowed to be recorded
Expert 9	Executive Director at Sustainable Silicon Valley.	3	Email	Online interview	00:47:34

Expert 10	Sustainability Business Architect and Principal at Edward James Consulting Ltd.	3	Email	Online interview	02:02:31
Expert 11	Chief Operating Officer and Senior Vice President, Global Ecosystem and Channels and Global Head of OEM Sales, SAP Germany.	3	Email	Online interview	00:17:15
Expert 12	SAP India	3	Email	Online interview	00:37:36

4.2 Data Reduction

Data reduction is the first step in data analysis. A deductive logic approach was applied for the analysis of the transcribed interviews, while data coding, categorisation and conceptualisation were carried out as well in order to facilitate conclusion drawing and verification (Miles and Huberman, 1994). The deductive logic approach performs from general to specific by beginning with considering a theory related to the topic then narrow down into the theory confirmation (Miles et al., 2014). Figure 6 shows the steps included in the data reduction.

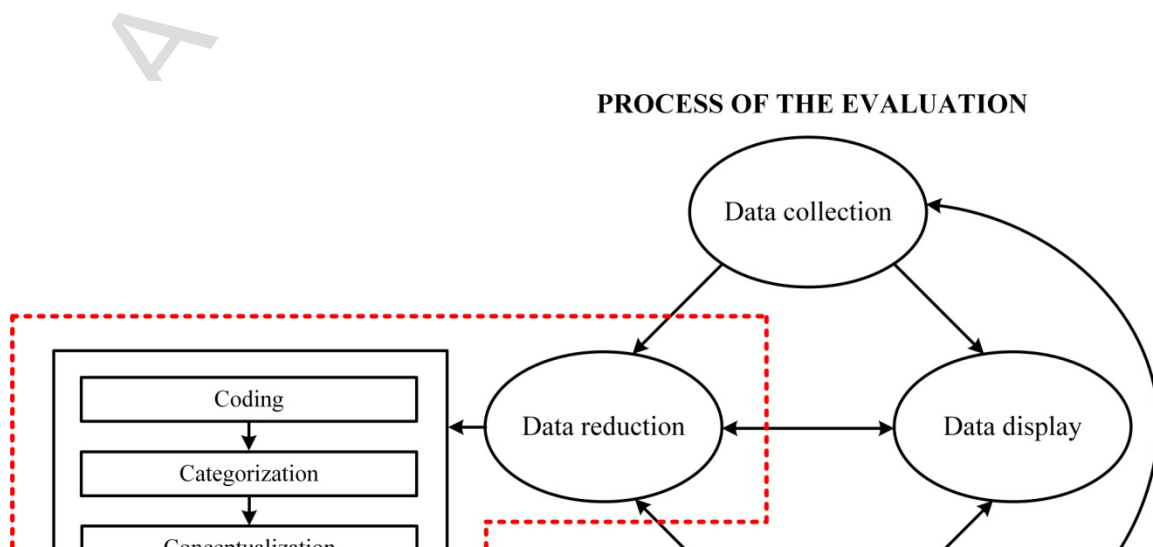


Figure 7. Steps in data reduction. Process of the evaluation is adapted from Miles and Huberman (1994) and the steps in data reduction are adapted from Silverman (2011)

1. Coding

Coding is the first step in data reduction. Coding is an analytic process to qualitatively reduce, rearrange, and integrate the data to form a theory. The coding was designed and inserted into ATLAS.ti 6 software. As a result, the network view of codes was designed automatically in the software.

2. Categorisation

Categorising is the first step to abstracting and creating a theory. All qualitative research contributions involve coding and coding always require categorising (Morse and Richards, 2012). The codes that have been made should be attached into the selected quotations on the data (interview transcription).

3. Conceptualisation

Conceptualising includes the process get up more general, higher-level, and more abstract constructs (Morse and Richards, 2012). This study sought ways of moving from categories to

concepts and then of building structures of ideas that guide or illustrate the topics of study. According to Morse and Richards (2012), conceptualisation has three main steps including writing initial memos, sorting memos, and integrating memos. The step in writing initial memos is to give a description for codes (Silverman, 2011). To do this, this presented study provided an abstract of comments from the experts.

The next step is constructing the initial memos by simplifying and listing the memo based on its code. The initial memos are the comments from the experts that need to be considered in the final roadmap. However, the supportive comments were excluded in the initial memos because they had been considered in the initial roadmap.

Sorting memo is the process during which the data with the same categories are arranged together (Silverman, 2011). Core variable, important phases and processes, and key issues in a research are normally identified by the review of accumulated memos and their sorting. The memos were sorted into appropriate code. Similar memos in the same category (roadmap) were merged in order to avoid data redundancy.

The next step is analysing the memos based on theory and logic. In the present study, theoretical sensitivity was applied for the comparison of data with other settings, while the related concepts and dimensions were sought as well to recognise the grounded theory in the data and the core category.

The next step is integrating the memos. The previous step, analysing the memos, helps to prepare for their subsequent integration. By integrating the memos, the researcher revealed the relationships between categories (Silverman, 2011). The process of integrating memos is given in Figure

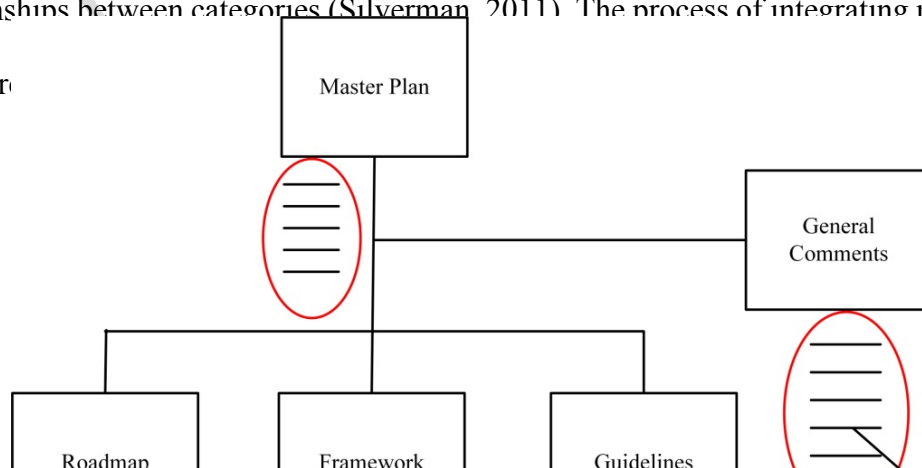


Figure 8. Process of integrating memos

In this process, the applied memos are mapped into related categories, such as master plan, roadmap, framework, guidelines, or general comments. The result of this process is the integrated codes.

4.3 Data Display

After data reduction, further analysis of the data continuous by compressed data display, which primarily aims to enhance comprehension, facilitate conclusion verification or take further action as needed (Morse and Richards, 2012). In the presented research, data display involved the integration of codes in the final roadmap and applying the comments of the experts into the final version of the roadmap.

4.4 Drawing/Verifying Conclusions

As the final stage of data analysis, conclusion drawing/verification involved discovering a specific significance for each piece of the analysed data. Furthermore, explanations,

propositions and causal flows were determined, and the emerged patterns were noted as well (Miles and Huberman, 1994). It is notable that the main technique for the confirmation, checking, and verification of the conclusion was the follow-up method in the present study. The preliminary results were re-sent to the experts until an agreement was achieved. The final roadmap is shown respectively in Figures 9, 10, 11, and 12.



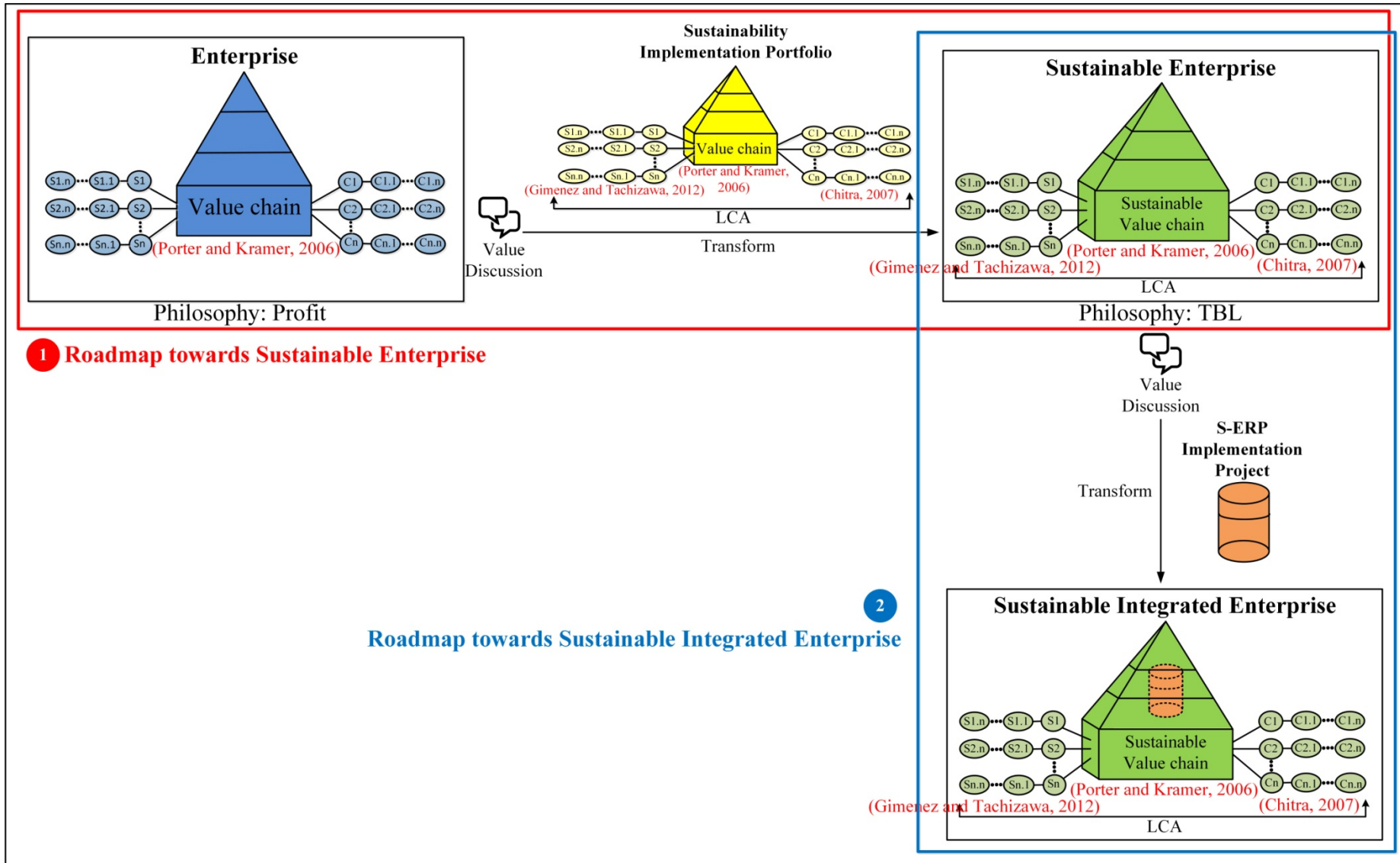


Figure 9. General overview of the S-ERP roadmap

The purpose of Figure 9 is to show the general overview of the S-ERP roadmap. As shown in the roadmap, the organisations initially need to embed sustainability into their value chain through sustainability implementation portfolio. This process is given in Figure 9, number 1: Roadmap towards sustainable enterprise. As the next step, the organisations require integrating all sustainable business functions through S-ERP implementation project. This process is given in Figure 9, number 2: Roadmap towards sustainable integrated enterprise.

For initiating the transformation process, the experts argued that the organisations require executing a value discussion with the stakeholders regarding the significant value of being a sustainable organisation and a sustainably integrated organisation. This notion can be seen from the following statement from Expert 6.

"I think a part of that is you know you have to have those understood well defined and you have a grain with the company that it makes sense economically, because people are going to implement you know that type of solution just because they want to or just because they want to build good they only gonna do it if they think significant value, economic value, if they see at the top of it that's great. But it is gonna be at the economic aspects that consider as well."

The organisations need to consider having a value discussion prior to transforming their business strategies into practice. A value discussion mostly revolves around team consultations regarding the strategies of a company to embed sustainability into value chain and incorporate sustainable business functions into a single database. This could be accomplished by the regular knowledge measurement of a certain strategy and its capability to be practised. According to the Fountain Park (2014), one of the leading consultant companies in leadership, the value discussion can be performed as follows.

1. The stakeholders are invited to contribute in a team meeting. It is a continuous discussion between top level management and the rest of the organisation. In this

meeting, everyone expresses the ideas and views of a predetermined topic including change resistance.

2. Different sentences are given to the participants to get the ideas and views of the topic.
3. The ideas and views of all participants are then evaluated according to the most or the least important in order to find the general agreement.
4. The company get analysed information of the views and ideas with suggestions on action plans based on the results.

The final S-ERP roadmap, which consists of two parts: roadmap towards sustainable enterprise and roadmap towards sustainable integrated enterprise, is then specified into several phases. These phases are illustrated in Figure 10.



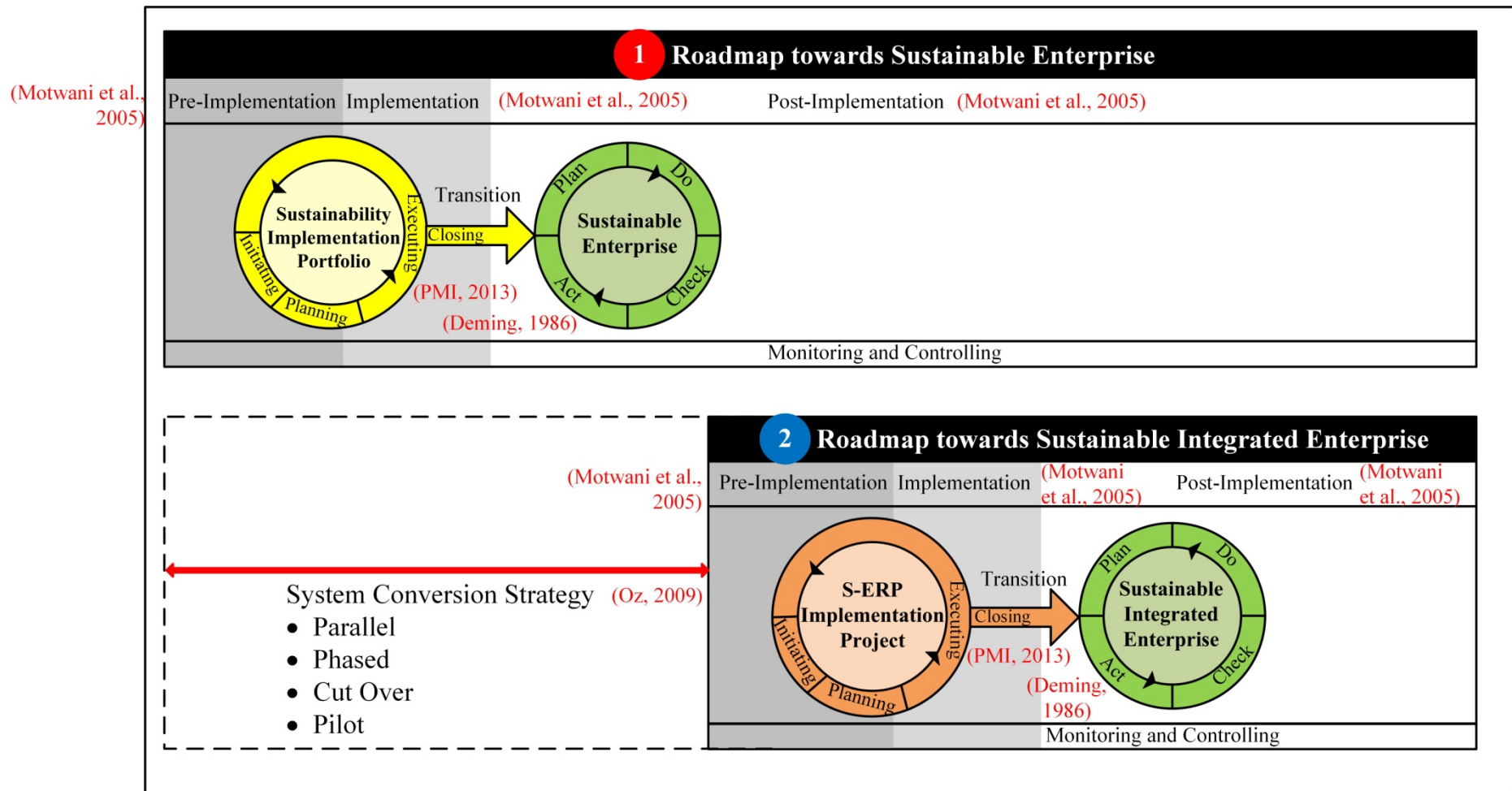


Figure 10. Specific features of the S-ERP roadmap

A

The purpose of Figure 10 is to show the specific features of the roadmap. In transforming the organisations towards the sustainable integrated enterprise, the organisations need to define multiple sustainability programs and projects, which were called sustainability implementation portfolio. In addition, they need to define a single project, which is S-ERP implementation project, to integrate all sustainable business functions. The organisations can choose their system conversion methods to implement the projects. Oz (2009) presented four recognised system conversion methods including cut-over conversion, pilot conversion, phased conversion, and parallel conversion. The method selection depends on the strategy of decision makers in an organisation.

As depicted in Figure 10, the sustainability portfolio and S-ERP project have three main phases including pre-implementation, implementation and post-implementation. Figures 11 and 12 depict the main purpose of each phase. The pre-implementation and implementation phases comprise of several stages including initiation, planning, execution, and closing of the system. The post-implementation phase comprises of PDCA (plan, do, check, and act) with a cyclical process (loop and feedback). The performance analysis of an organisation in each of the three phases could be attained through proper monitoring and control. The description of all phases and stages is provided in Figures 11 and 12.

<p>1 Roadmap towards Sustainable Enterprise <i>The purpose of this roadmap is to show the stages for transforming the enterprise from profit based to Triple Bottom Line.</i></p>	
<p>Sustainability Implementation Portfolio <i>The purpose of this process is to show the stages for the implementation of sustainability portfolio into value chains.</i></p> <p>Pre-implementation <i>The purpose of this phase is to encapsulate all necessary preparatory activities.</i></p> <p>Stage 1: Initiating <i>The purpose of this stage is to encapsulate processes performed to define new activities to start the implementation of the sustainability portfolio. The main objective of this stage is to align stakeholders' expectations with the implementation objective.</i></p> <p>Stage 2: Planning <i>The purpose of this stage is to initiate the plan by ascertaining the scope of project, to describe and improve the objectives.</i></p> <p>Implementation <i>The purpose of this phase is to encapsulate all activities for implementing the sustainability portfolio.</i></p> <p>Stage 2: Planning <i>The purpose of this stage is to define the compulsory actions to achieve the objectives defined.</i></p> <p>Stage 3: Executing <i>The purpose of this stage is to encapsulate processes to complete the work that has described in the planning stage according to the project qualifications.</i></p> <p>Stage 4: Closing <i>The purpose of this stage is conclude all activities in all stages to formally complete the sustainability implementation portfolio and contractual obligations.</i></p>	<p>Stage 6: Monitoring and Controlling <i>The purpose of this stage is to track, review, and orchestrate the progress and performance of every stage in</i></p>
<p>Sustainable Enterprise <i>The purpose of this process is to provide the process of ongoing services and post-implementation supports after the sustainability implementation portfolio.</i></p> <p>Post-implementation <i>The purpose of this phase is to encapsulate all activities for maintaining and enhancing the sustainable enterprise to meet ongoing needs of the user community.</i></p> <p>Stage 5: Plan <i>The purpose of this stage is to set goals and prepare action plan for all activities in post-implementation phase.</i></p> <p>Stage 6: Do <i>The purpose of this stage is to implement the action plan in order to achieve the goals.</i></p> <p>Stage 4: Check <i>The purpose of this stage is to check the implementation and to ensure the goals are fulfilled.</i></p> <p>Stage 5: Act <i>The purpose of this stage is to monitor the solution and perform continues improvement.</i></p>	<p><i>pre-implementation, implementation, and post-implementation phase.</i></p>

Figure 11. Purpose of the roadmap towards sustainable enterprise

A

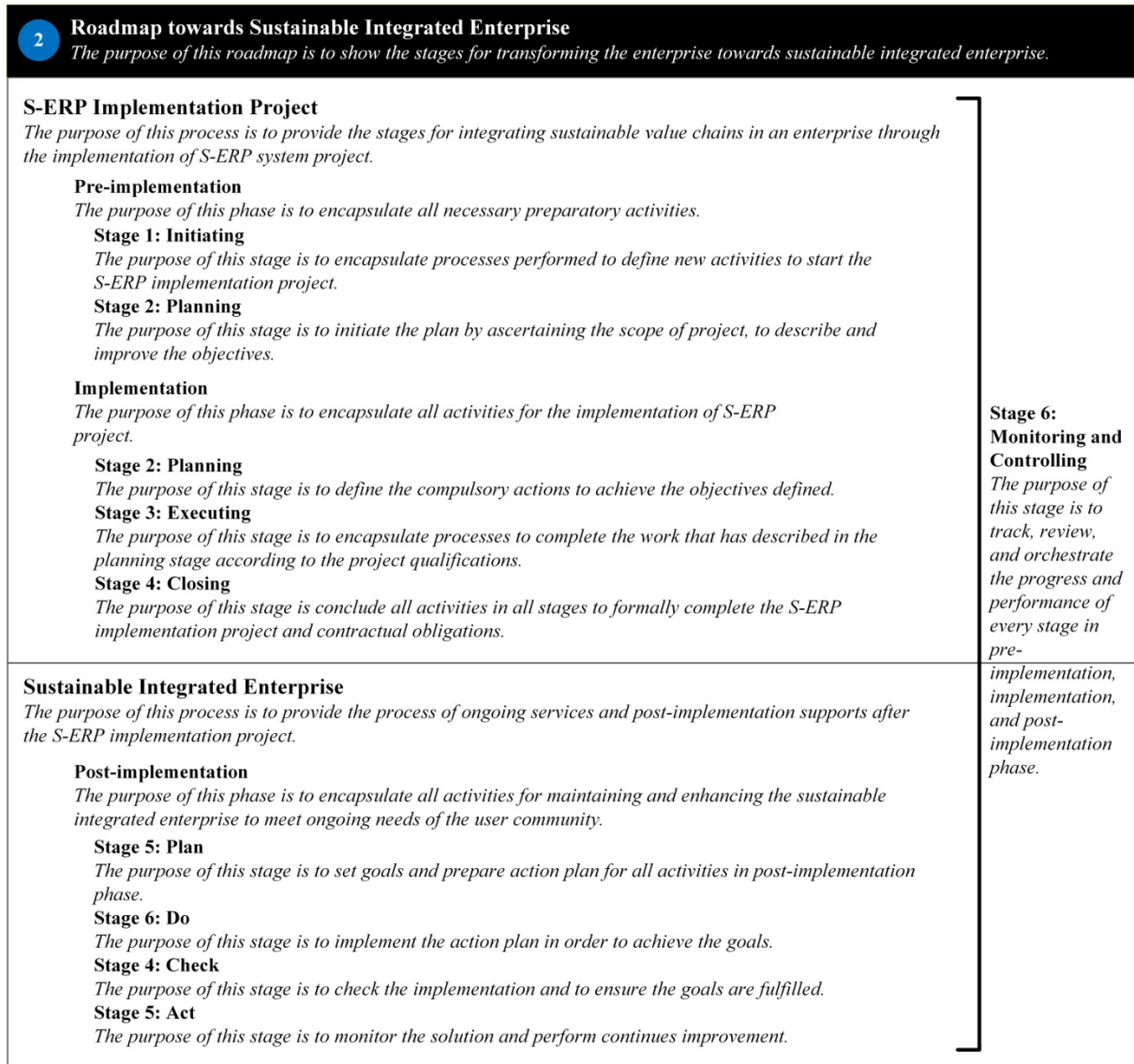


Figure 12. Purpose of the roadmap towards sustainable integrated enterprise

5. Discussion of the Results

The S-ERP roadmap has been designed to demonstrate the transformation stage of an organisation in becoming a sustainable integrated enterprise. According to the experts' comments, the initial version of the roadmap required to be divided into two parts: a roadmap towards a sustainable organisation and a roadmap towards sustainable integrated enterprise. Figure 13 illustrates the modification flow of the initial S-ERP roadmap towards the final S-ERP roadmap.

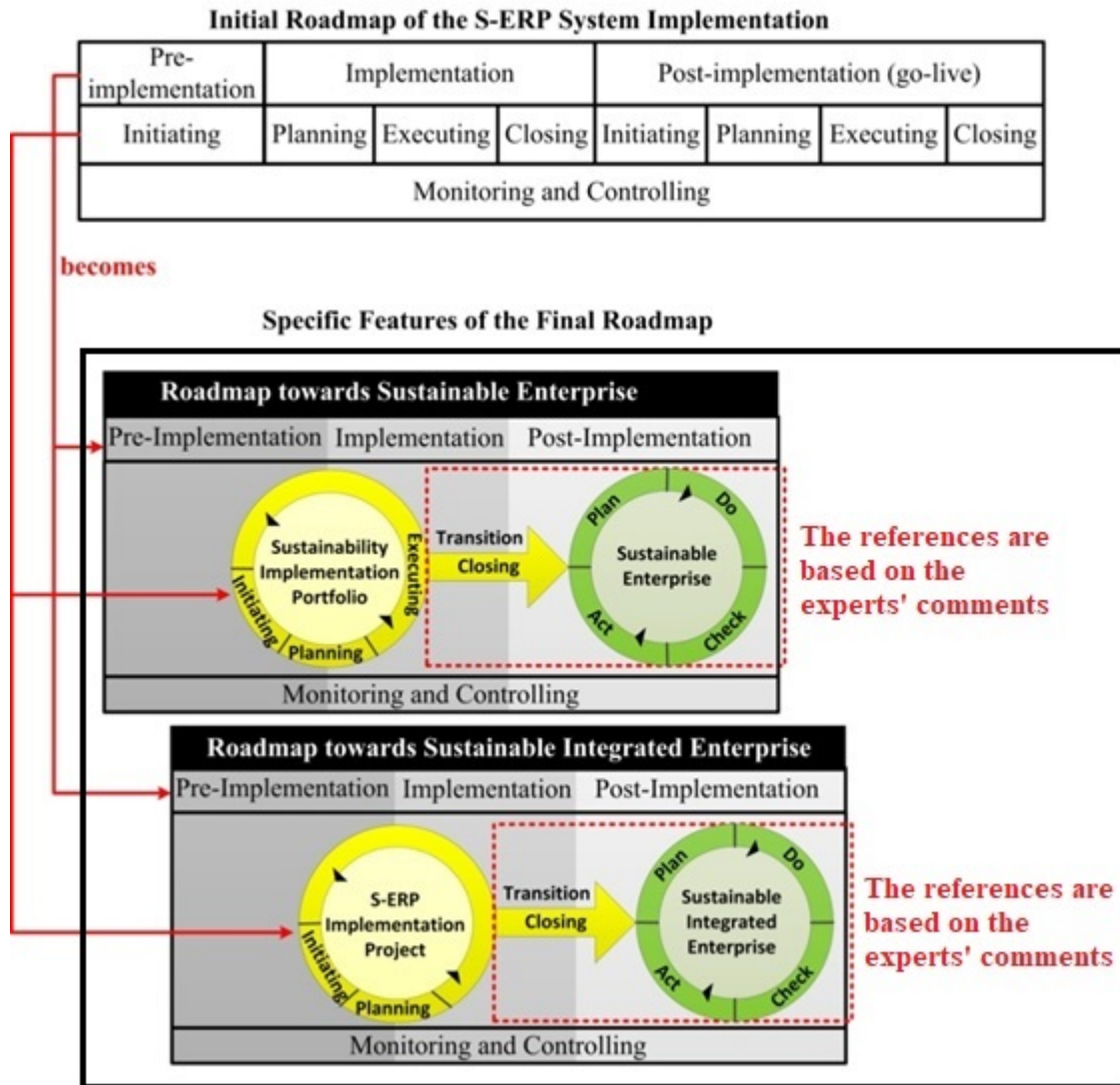


Figure 13. Modification flow of the initial roadmap towards the final roadmap

According to Expert 2, a value discussion needs to be included in the transformation process of the roadmap. This process is significant for an organisation to see what are the values of being a sustainable enterprise and a sustainable integrated enterprise. Another modification was related to the formation of the stages in the initial roadmap that should be adjusted. A planning stage needs to be included in pre-implementation, implementation, and post-implementation phases. This idea was summarised from the speech of Expert 7, who stated that:

“I guess traditionally, I think more pre-implementation your planning normally occurs in your pre-implementation. In my experience planning usually what you do in pre-implementation,

implementation, and post-implementation. And then your first step of implementation will be definition, and sometimes even selection process. If you have not defined, you know particularly when I am doing now usually it is a selection process. We have to select the vendors, select the software, and select the hard disk. So normally planning will be in those three stages and normally it has the selection, definition, and then execution implementation.”

An iteration of the initiation, planning, and execution stages is necessary. Another recommended modification was the addition of a new stage, namely transition stage, to elucidate the transition process between the two main phases of implementation and post-implementation. The iteration of the post-implementation phase was required to be replaced with the Plan, Do Check, Act (PDCA) management method. Expert 2 mentioned that:

"Your roadmap is pre-implementation, implementation, and post-implementation. When I come out with post-implementation, it is more than just go-live and post-implementation is done not have really close. Most of the time what I am seeing, what I am advising to the people is you really following more management system approach which is a plan, do, check, act. And it continues with the loop with feedback, you have a linear process. I think in some perspective it can be linear but it never ends. Because solution has to be managed, supported, and maintained and it has to evolve over the time ..."

In addition, Expert 6 stated that:

"The initiating, planning, executing, and closing stages in post-implementation phase are not theoretically wrong, however, it is difficult to be executed".

According to these statements, therefore, the PDCA approach was applied in the post-implementation phase to show the operational or routine activities.

Another modification was the transition stage that needs to be added in the implementation and post-implementation phases, as suggested by Experts 7 and 8.

Expert 7 stated that:

“...I do not think the closing of implementation, I think it is a transition from implementation to post implementation and I do not think it is closing in post-implementation I think it is a transition into ongoing and ongoing services and supports module.”

Expert 8 stated that:

“The transition from one to other implementation stages should consist of handover and lessons learned sessions & communications.”

According to Expert 7, the roadmap should consider loop with feedback. This idea can be summarised from the following statement.

“...and it continues with a loop with feedback, you have a linear process. I think in some perspective it can be linear but it never ends. Because solution has to be manage, support, and maintain and it has to evolve over the time the business changes.”

Monitoring and controlling stage need to be included in pre-implementation, implementation, and post-implementation phases. Expert 10 discussed that:

“I would not see monitoring and controlling as a separated vertical, it should be horizontal on the all of these.”

The modifications made, which were suggested by the experts, has improved the quality of the S-ERP roadmap. All 12 experts have contributed to the roadmap evaluation process and the final S-ERP roadmap has been formed according to their suggestions. By following the

proposed S-ERP roadmap, the practitioners hopefully would be able to implement the S-ERP system with higher clarity and accuracy.

6. Conclusions

S-ERP system implementation is advantageous for organisations to advance their sustainable business practices. To implement this system, they need a master plan, which comprises of a roadmap, framework, and guidelines, to provide a holistic picture of the S-ERP system. Chofreh et al. (2016b) had developed the initial S-ERP roadmap to complete the structure of the S-ERP master plan. However, the developed roadmap needs to be reviewed by a number of experts to improve its quality and usability. Therefore, the objective of the present study is to evaluate the S-ERP roadmap, which involved the evaluation and improvement of the S-ERP system implementation through peer review.

The investigation of results in subjects that have been scarcely studied could be effective through the peer review method. In doing so, this study involved 12 experts from academia and practice to further enhance the initial S-ERP roadmap. Data collection and data analysis are the main procedures of the evaluation process. The data collection was performed using semi-structured interviews among 12 experts and the conversations were subsequently recorded and transcribed. The data analysis was performed in three stages including data reduction, data display, and drawing/verification of conclusion. Consequently, the initial S-ERP roadmap needs to be divided into two segments including a roadmap towards sustainable enterprise and a roadmap towards sustainable integrated enterprise.

This study is significant both from the theoretical and practical standpoints. From the theoretical standpoint, the present study would advance the research on S-ERP system as this research topic is still in its infancy. According to the research findings, the present study has improved the structure of the initial S-ERP roadmap. The experts confirmed that the final S-

ERP roadmap is practically ready to be used in organisations. This study is significant from the methodological aspect. There is a limited number of studies that apply the peer review method to evaluate the research findings. However, this method is appropriate and useful for a topic of study that is still rare, such as the S-ERP system, to get the experts' opinion regarding the subject under investigated.

From the practical standpoint, the proposed roadmap can be as a guide for practitioners to implement the S-ERP system in their organisations. Having the S-ERP roadmap, which provides a general plan to implement the S-ERP system, can prevent increasing time, costs, resources, and risks of the S-ERP project implementation. In addition, this study represents an effort to show that implementing the S-ERP system in organisations will benefit the organisations since the system helps them to integrate all sustainable business functions in an organisation.

There are several potential areas to advance the study of S-ERP systems. Further investigation is recommended concerning the development and evaluation of an S-ERP framework and guidelines for the completion of the master plan to implement the S-ERP system. The implementation of this system would contribute to the improvement of cleaner production practices, especially to the sustainability performance assessment. A case study to evaluate the applicability of the S-ERP roadmap in an organisation would be advantageous for practitioners as it provides a deep analysis of the similar problems and circumstances. The results of the case study would be a lesson learned for the practitioners to avoid some problems during the S-ERP system implementation. Another potential area is a study on the critical success factors of the S-ERP system implementation. The outcome of this research provides the most important factors that need to be considered to implement the successful S-ERP system. This study would be valuable for organisations that attempt to integrate all their sustainable business functions.

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References

- Ahmed, M.D., Sundaram, D., 2012. sustainability modelling and reporting: From roadmap to implementation. *Decision Support Systems*. 53, 611-624.
- Arena, M., Chiaroni, D., 2014. Roadmapping for sustainability: Evidence from an Italian-based multinational firm. *International Journal of Business Science and Applied Management*. 9(2), 1-15.
- Boeije, H., 2002. A purposeful approach to the constant comparative method in the analysis of qualitative interviews. *Quality and Quantity*. 36, 391-409.
- Brundtland, G.H., 1987. World Commission on Environment and Development. *Our Common Future*, Oxford University Press, Oxford, UK.
- Brook, J.W., Pagnanelli, F., 2014. integrating sustainability into innovation project portfolio management - A strategic perspective. *Journal of Engineering and Technology Management*. 34, 46-62.
- Bryde, D., Broquetas, M., Volm, J.M., 2013. The project benefits of building information modelling (BIM). *International Journal of Project Management*. 31(7), 971-980.
- Chen, C.C., Law, C., Yang, S.C., 2009. Managing ERP implementation failure: A project management perspective. *IEEE Transactions on Engineering Management*. 56, 157-170.

Chofreh, A.G., 2015. A Master Plan for the Implementation of Sustainable Enterprise Resource Planning System. PhD Thesis. Universiti Teknologi Malaysia, Johor Bahru, Malaysia.

Chofreh, A.G., Goni, F.A., 2017. Review of frameworks for sustainability implementation. *Sustainable Development*. 25(3), 180-188.

Chofreh, A.G., Goni, F.A., Ismail, S., Shaharoun, A.M., Klemeš, J.J., Zeinalnezhad, M., 2016a. A master plan for the implementation of sustainable enterprise resource planning systems (Part I): Concept and methodology. *Journal of Cleaner Production*. 136, Part B, 176-182.

Chofreh, A.G., Goni, F.A., Jofreh, M.G., 2011. Enterprise Resource Planning (ERP) implementation process: Project management perspective. *Advanced Materials Research*. 338, 152-155.

Chofreh, A.G., Goni, F.A., Klemeš, J.J., 2016b. A master plan for the implementation of sustainable enterprise resource planning systems (Part II): Development of a roadmap. *Chemical Engineering Transactions*. 52, 1099-1104.

Chofreh, A.G., Goni, F.A., Klemeš, J.J., 2016c. A master plan for the implementation of sustainable enterprise resource planning systems (Part III): Evaluation of a roadmap. *Chemical Engineering Transactions*. 52, 1105-1110

Chofreh, A.G., Goni, F.A., Shaharoun, A.M., Ismail, S., Klemeš, J.J., 2014a. Sustainable enterprise resource planning: Imperatives and research directions. *Journal of Cleaner Production*. 71, 139-147.

Chofreh, A.G., Goni, F.A., Shaharoun, A.M., Ismail, S., 2014b. Review on enterprise resource planning implementation roadmap: Project management perspective. *Sains Humanika*. 2, 135-138.

Chofreh, A.G., Goni, F.A., Shaharoun, A.M., Ismail, S., 2015. A review on sustainability transformation roadmaps using project management methodology. *Advanced Science Letters*. 21(2), 133-136.

- Chuang, M.-L., Shaw, W.H., 2005. A roadmap for e-business implementation. *Engineering Management Journal*. 17, 3-13.
- Could, C., Wallbank, C., 2007. Sustainability Roadmap: An Occupier's Journey. Jones LangLaSalle. <www.gbca.org.au/docs/Sustainability%20Roadmap%20An%20Occupiers%20Journey%20JLL.pdf> (accessed 31.07.2017)
- Corbin, J., Strauss, A., 2008. *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*, third ed. Sage Publications, Inc., Thousand Oaks, California, USA.
- Duarte, A.P., Martins, P., Alexandre, J., 2008. Pro-active behaviour induction by integration of sustainability in business strategic management: INOVE project case study. *Journal of Cleaner Production*. 16, 1127-1132.
- Edum-Fotwe, F.T., Price, A.D., 2009. A social ontology for appraising sustainability of construction projects and developments. *International Journal of Project Management*. 27(4), 313-322.
- Elkington, J., 2004. Enter the triple bottom line, in: Henriques, A., Richardson, J. (Eds.), *The Triple Bottom Line: Does it All Add Up*. Earthscan, London, UK, 1-16.
- Esteban, J., Morelli, M., Rohner, D., 2015. Strategic mass killings. *Journal of Political Economy*. 123(5), 1087-1132.
- Fernández-Sánchez, G., Rodríguez-López, F., 2010. A methodology to identify sustainability indicators in construction project management - Application to infrastructure projects in Spain. *Ecological Indicators*. 10, 1193-1201.
- FountainPark, 2014. *Cocreation with the Virtual Brainstorming Method*. Fountain Park, USA <www.fountainpark.fi/en/services/> (accessed 13.01.2017)
- Given, L.M., 2008. *The Sage Encyclopedia of Qualitative Research Methods*. Sage Publications, Inc., Thousand Oaks, California, USA.

- Goni, F.A., Chofreh, A.G., Sahran, S., 2011. Critical success factors for enterprise resource planning system implementation: A case study in Malaysian SME. *International Journal on Advanced Science, Engineering and Information Technology*. 1, 200-205.
- Goni, F.A., Chofreh, A.G., Mukhtar, M., Sahran, S., Abdul Shukor, S., 2012. Segments and elements influenced on ERP system implementation. *Australian Journal of Basic and Applied Sciences*. 6, 209-221.
- Goni, F.A., Chofreh, A.G., Sahran, S., Mukhtar, M., Abdul Shukor, S., 2013a. Small to medium enterprises perspective in integrating business processes and functions. *Journal of Applied Science and Agriculture*. 8, 474-489.
- Goni, F.A., Mukhtar, M., Sahran, S., Shukor, S.A., Chofreh, A.G., 2013b. Aligning an information system strategy with sustainability strategy towards sustainable campus. *International Conference on Research and Innovation in Information Systems (ICRIIS)*. 245-250. Doi: 10.1109/ICRIIS.2013.671.
- Goni, F.A., Shukor, S.A., Mukhtar, M., Sahran, S., 2015. Environmental sustainability: Research growth and trends. *Advanced Science Letters*. 21(2), 192-195.
- Hurt, M., Thomas, J.L., 2009. Building value through sustainable project management offices. *Project Management Journal*. 40(1), 55-72.
- Hwang, S., 2008. Utilizing qualitative data analysis software: A review of Atlas.ti. *Social Science Computer Review*. 26(4), 519-527.
- Lubin, D.A., Esty, D.C., 2010. The sustainability imperative. *Harvard Business Review*. 88, 42-50.
- Marcelino-Sádaba, S., González-Jaen, L.F., Pérez-Ezcurdia, A., 2015. Using project management as a way to sustainability. From a comprehensive review to a framework definition. *Journal of Cleaner Production*. 99, 1-16.

- Mason, M., 2010. Sample size and saturation in PhD studies using qualitative interviews. *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research*. <www.qualitative-research.net/index.php/fqs/article/view/1428/3027.%20%20%20%20%5B> (accessed 03.07.2016)
- Mcginnis, T.C., Huang, Z., 2007. Rethinking ERP success: A new perspective from knowledge management and continuous improvement. *Information and Management*. 44, 626-634.
- Miles, M.B., Huberman, A.M., 1994. *Qualitative Data Analysis: An Expanded Sourcebook*. Sage Publications, Inc., Thousand Oaks, California, USA.
- Miles, M.B., Huberman, A.M., Saldaña, J., 2014. *Qualitative Data Analysis: A Methods Sourcebook*. Sage Publications, Inc., Thousand Oaks, California, USA.
- MindTools, 2014. *Questioning Techniques: Asking Questions Effectively*. <www.mindtools.com/pages/article/newTMC_88.htm> (accessed 14.05.2016)
- Morse, J.M., Richards, L., 2012. *Readme First for a User's Guide to Qualitative Methods*. Sage Publications, Inc., Thousand Oaks, California, USA.
- Motwani, J., Subramanian, R., Gopalakrishna, P., 2005. Critical factors for successful ERP implementation: Exploratory findings from four case studies. *Computers in Industry*. 56, 529-544.
- Ngai, E.W.T., Chuck C.H.L., Francis K.T.W., 2008. Examining the critical success factors in the adoption of enterprise resource planning. *Computers in Industry*. 59, 548-564.
- Nidumolu, R., Prahalad, C.K., Rangaswami, M.R., 2009. Why sustainability is now the key driver of innovation. *Harvard Business Review*. 87, 56-64.
- Oz, E., 2009. *Management Information Systems*. Thomson Course Technology, Great Valley, New York, USA.
- Pitic, L., Popescu, S., Pitic, D., 2014. Roadmap for ERP evaluation and selection. *Procedia Economics and Finance*. 15, 1374-1382.

- Project Management Institute, 2013. A Guide to the Project Management Body of Knowledge. PMBOK® - Fifth Edition. Project Management Institute, Inc., Pennsylvania, USA.
- Sadrzadehrafiei, S., Chofreh, A.G., Hosseini, N.K., Sulaiman, R., 2013. The benefits of Enterprise Resource Planning (ERP) system implementation in dry food packaging industry. *Procedia Technology*. 11, 220-226.
- Sahran, S., Goni, F.A., Mukhtar, M., 2010. ERP implementation challenges in small and medium enterprise: A framework and case Study. *Advanced Materials Research*. 139-141, 1636-1639.
- Samaranayake, P., Abeysinghe, D., 2011. Conceptual Framework for ERP System Implementation using Pre-Implementation Roadmap. 9th ANZAM Operations, Supply Chain and Services Management Symposium. Deakin University and ANZAM, Geelong, Australia, pp. 266-279.
- Sánchez, M.A., 2015. Integrating sustainability issues into project management. *Journal of Cleaner Production*. 96, 319-330.
- Sekaran, U., Bougie, R., 2010. *Research Methods for Business: A Skill Building Approach*. John Wiley and Sons Ltd., West Sussex, UK.
- Silvius, A.J., Schipper, R.P., 2014. Sustainability in project management: A literature review and impact analysis. *Social Business*. 4(1), 63-96.
- Silverman, D., 2011. *Interpreting Qualitative Data: A Guide to the Principles of Qualitative Research*. Sage Publications, Inc., London, UK.
- Strong, D.M., Volkoff, O., 2004. A roadmap for enterprise system implementation. *Computer*. 37, 22-29.
- Tavakoli, H., 2012. *A Dictionary of Research Methodology and Statistics in Applied Linguistics*. Rahnama Press, Tehran, Iran.

van Herpen, E., Fischer, A.R., van Trijp, H.C., 2015. How to position ‘mildly sustainable’ products: The joint impact of assortment display and price setting. *Food Quality and Preference*. 46, 26-32.

Verville, J., Palanisamy, R., Bernadas, C., Halingten, A., 2007. ERP acquisition planning: A critical dimension for making the right choice. *Long Range Planning*. 40, 45-63.

Waage, S.A., 2007. Re-considering product design: A practical “road-map” for integration of sustainability issues. *Journal of Cleaner Production*. 15, 638-649.

William, G., Graves, P.R., Bernas, R.S., 2001. Evaluation guidelines for multimedia courseware. *Journal of Research on Technology in Education*. 34, 2-17.

Yilmaz, Y., Ozcan, G., 2011. Implementing ERP-systems with accelerated ERP more efficient and quickly-a best practice. *Journal of Systems Integration*. 2(3), 28-37.