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ERP adoption
cost factors identification
and classification:
a study in SMEs

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ERP systems:
aspects of selection,
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An Enterprise 2.0
project management
approach to facilitate
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transparency, and
communication

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The mission of the IJISPM - International Journal of Information Systems and Project Management - is the dissemination of new scientific knowledge on information systems management and project management, encouraging further progress in theory and practice.

The IJISPM publishes leading scholarly and practical research articles that aim to advance the information systems management and project management fields of knowledge, featuring state-of-the-art research, theories, approaches, methodologies, techniques, and applications.

The journal serves academics, practitioners, chief information officers, project managers, consultants, and senior executives of organizations, establishing an effective communication channel between them.

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IJISPM



Editorial

It is our great pleasure to bring you the second number of the IJISPM - International Journal of Information Systems and Project Management.

The mission of the IJISPM is the dissemination of new scientific knowledge on information systems management and project management, encouraging further progress in theory and practice.

In this issue, readers will find important contributions on ERP adoption and enterprise 2.0 project management, by several internationally renowned and experienced researchers.

As Moutaz Haddara and Ahmed Elragal state in their article “ERP adoption cost factors identification and classification: a study in SMEs”, Enterprise resource planning (ERP) systems adoptions require substantial resources and investments. While focusing on the SME-context, this article aims to identify potential costs that could occur in ERP adoptions. The article provides a list of cost factors and their classifications that could aid adopting organizations to better estimate their needed ERP project budgets. In particular, it explores the direct and indirect cost factors that occur in ERP adoptions in SMEs. Also, it investigates the influence of some SME-specific contextual factors on costs. Moreover, the article provides a ranking of cost factors according to their impact on total adoption costs.

The second article “ERP systems: aspects of selection, implementation and sustainable operations” is co-authored by Torsten Munkelt and Sven Völker. This article gives recommendations for selecting, implementing and sustainably operating ERP systems. The article particularly addresses practitioners who are responsible for ERP systems, namely IT and project managers. The structure of the article matches the three main phases of an ERP system’s lifecycle within an enterprise: selection, implementation and operations. General process models are given for selection and implementation of ERP systems. While other publications give rather general advice, recommendations in this article are selected to be use-oriented and easy to apply.

The use of current interactive and collaborative Web 2.0 concepts and technologies has great potential for flexible, loosely-coupled integration and ad-hoc information exchange within and between organizations. However, stakeholders’ readiness, willingness and ability to participate need to be continuously factored in. The successful implementation of common strategies, systems and processes in the course of Enterprise 2.0 projects is crucial. To increase the probability of success and to enhance the intensity of cooperation and trust in such projects, the constructs of transparency, communication and participation need to be addressed through an integrated project methodology. To bridge the gap between existing scientific models and requirements for Enterprise 2.0 projects, Andreas Auinger, Dietmar Nedbal and Alexander Hochmeier propose, in their paper “An Enterprise 2.0 project management approach to facilitate participation, transparency, and communication”, a project methodology to support the main objectives for Enterprise 2.0 implementations. Selected results from two pilot projects are presented and matched with critical success factors, which are derived from the literature. These provide elaborative insights into key characteristics of certain Enterprise 2.0 tools and project management for Enterprise 2.0 projects.



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We would like to take this opportunity to express our gratitude to the distinguished members of the Editorial Board, for their commitment and for sharing their knowledge and experience in supporting the IJISPM.

Finally, we would like to express our gratitude to all the authors who submitted their work, for their insightful visions and valuable contributions.

We hope that you, the readers, find the International Journal of Information Systems and Project Management an interesting and valuable source of information for your continued work.

The Editor-in-Chief,

João Varajão

University of Trás-os-Montes e Alto Douro

Portugal



João Varajão is a professor of Information Systems Management, Project Management and Software Engineering at the *University of Trás-os-Montes e Alto Douro* and a visiting professor at the *University of Porto Business School*. He is also a researcher of the *Centro Algoritmi* at the *University of Minho*. Born and raised in Portugal, he attended the *University of Minho*, earning his Undergraduate (1995), Masters (1997) and Doctorate (2003) degrees in Technologies and Information Systems. In 2012, he received his Habilitation degree from the *University of Trás-os-Montes e Alto Douro*. His current main research interests are in Information Systems Management and Project Management. Before joining academia, he worked as an IT/IS consultant, project manager, information systems analyst and software developer, for private companies and public institutions. He has supervised more than 50 Masters and Doctoral dissertations in the Information Systems field. He has published over 250 works, including refereed publications, authored books, edited books, as well as book chapters and communications at international conferences. He serves as editor-in-chief, associate editor and member of the editorial board for international journals and has served in numerous committees of international conferences and workshops. He is co-founder of CENTERIS - Conference on ENTERprise Information Systems.

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ERP adoption cost factors identification and classification: a study in SMEs

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ERP adoption cost factors identification and classification: a study in SMEs

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Abstract:

Enterprise resource planning (ERP) systems adoptions require substantial resources and investments. The majority of businesses around the globe can be considered to be small and medium sized enterprises (SMEs). Thus, SMEs are seen to be typical companies that are the cornerstone of most economies. Compared with large enterprises, an SME-context contains several characteristics, and scarcity of resources is among the top of them. For SMEs, unplanned costs escalation could pose a serious threat to their stability and survival in the market. Frequently, ERP projects have crossed their estimated budgets and schedules. Researchers and practitioners state that a prevailing number of ERP adoption projects fail due to inaccurate or to too optimistic budgets/schedules. In addition, many organizations face difficulties in identifying the potential cost factors that could occur during their ERP adoption lifecycle. While focusing on the SME-context, this research attempts to identify potential costs that could occur in ERP adoptions. The research method employed in this study targeted diverse stakeholders and experts involved in ERP projects in Egypt. This research provides a list of cost factors and their classifications that could aid adopting organizations to better estimate their needed ERP project budgets. In particular, this research explores the direct and indirect cost factors that occur in ERP adoptions in Egyptian SMEs. Also, this study investigates the influence of some SME-specific contextual factors on costs. Moreover, the paper provides a ranking of cost factors according to their impact on total adoption costs.

Keywords:

ERP; cost identification; SME; expert panel.

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1. Introduction

Enterprise resource planning (ERP) systems are used to unify organizations through the maintenance of a large database that stores, shares, and disseminates data in different business functions. ERP systems focus on the technical integration of different business functions such as accounting and finance, manufacturing and production, human resources, procurement, and distribution. ERP systems are modular integrated systems, in contrast with legacy systems that are usually operating within organizations prior to ERP systems adoption. ERP projects may vary in size and structure, each requiring careful management decisions to be taken during the whole adoption process and stages [1].

This research addresses cost-related issues. In particular, it explores the following main question: what are the cost factors that occur in ERP adoptions in Egyptian small and medium-sized enterprises (SMEs)? Subsequently, this research investigates the unpredicted indirect costs that usually appear or escalate during the adoption process. In addition, the influence of some contextual factors on other cost factors is also explored. Moreover, the ranking of cost factors in comparison to the total ERP adoption costs is surveyed. This would eventually lead to the development of a list of potential cost factors and to the identification of their impacts on total ERP adoption costs. This list would aid organizations to benefit from previous experiences and be able to have a more realistic estimation of the costs that would occur in their ERP adoption projects. The term 'adoption' varies in ERP literature. In some cases, it refers to a final phase during which the users accept and use the system; in other cases, it is used as a more general term to refer to the decision taken by the organization to acquire an ERP system, passing through the ERP lifecycle phases [2]. In this research, the latter definition is adopted.

The motivation for this research has both scientific and practical roots, as explained in the following sections.

SMEs are considering ERP systems because of the increasing number of alliances, value-webs, data flows, and complex operations. Most SMEs have several silo information systems prior to their ERP adoptions, which makes very complex and costly to use, store, and consolidate data from the various business functions. Hence, when SMEs adopt ERP systems, they do so in the belief that it is a step towards process standardization and cost effectiveness [3]. In short, they see it as a way to improve the organization's performance and to survive strong market competition [4]. Business complexity is not exclusive to large enterprises. Although some SMEs are not "large" in terms of employee numbers, they still face business complexities, and high coordination and communications demands, all of which require complex technologies [2]. In the case of Egypt, around 75% of total employment falls within SMEs that are involved in a broad range of economic activities [5]. Thus, SMEs in particular are potential candidates for future growth in the Egyptian economy.

SMEs are known for having scarce financial and human resources, limited information systems (IS) knowledge, and a lack of information technology (IT) competence [6, 7]. These limitations mean that IT investment is a critical endeavor for SMEs. A faulty IT investment decision could have a huge impact on the enterprise's business operations, which could be more difficult for SMEs to overcome than is the case for large enterprises [7, 8]. This applies particularly to ERP systems adoptions, as they are considered one of the biggest projects launched by an organization [9]. Given the complexity and high cost of ERP systems, when organizations take the first step towards acquiring an ERP system, they need to think about many things; foremost among them is cost of adoption [7, 10]. In this study, costs are defined as the required overall budget spending for the attainment of the ERP adoption goal.

There is an obvious gap in ERP cost management and estimation research [11, 12]. In addition, the adequacy of current financial and cost estimation models in ERP settings is questionable [10, 11]. Hence, with the shortage of proper identification and estimation methods to determine cost factors, organizations face considerable challenges in estimating costs, size, time, effort, productivity and other cost factors when embarking on ERP systems adoption projects [3, 12, 13]. Furthermore, costs could exceed their estimated budgets, as many organizations overlook potential increases in direct costs, as well as the projection of indirect costs [14]. Such a situation may be critical for an SME with limited resources.

In general, costs can be classified as either direct or indirect costs. Direct costs are normally predicted and known costs; however, they may escalate because of an unpredicted need for additional hardware and its installation, human resources, and customization. Indirect costs are usually organizational costs that evolve due to a move from old to new work practices; for example, business process re-engineering (BPR) and organization restructuring [15]. In this research, any unpredicted direct and indirect cost factors or cost escalations are regarded as hidden costs.

The size and structure of organizations that implement ERP systems are not the only variables within ERP projects. Organizations' contextual factors, legacy software reuse, and the adoption of a specific ERP implementation methodology could also be important determinants [16]. In contrast with large enterprises, SMEs do not possess similar amounts of resources; thus, their practices in managing their investments are often challenged by this lack of resources. In addition, limited financial resources could make SMEs more cost-sensitive [17]. Consequently, any rise in costs or project delays could seriously affect an SME's survival in the market [9]. Even some large enterprises have filed bankruptcy because of a faulty ERP adoption project [10].

At first glance, cost estimations for ERP adoption projects in SMEs may appear trivial because of the size of the enterprises; however, our review of literature and published reports indicate that cost overruns still frequently occur. Moreover, the literature suggests that smaller firms are less likely to have successful system implementations. Nonetheless, ERP adoption within SMEs is still growing; thus researchers need to scrutinize and identify the basic drivers that influence ERP adoption decisions, especially ERP adoption costs [10].

In order to be able to identify the different cost categories and factors that could occur when SMEs adopt ERP systems, the authors conducted an expert panel in order to collect relevant views on cost factors from different stakeholders. The experts' panel employed a mixture of focus groups, nominal group technique (NGT), and Delphi techniques; thus, the paper contributes both to research into ERP costs, and the domain of research methods. The data collection targeted diverse stakeholders and experts involved in ERP projects in Egypt. The panel's participants had an extensive national and international expertise in enterprise systems and ERP adoptions. The inclusion of mind mapping, rankings, group discussions, and group interviewing techniques enabled participants to recommend and identify a list of potential cost factors that may occur in ERP adoptions. Over the course of two rounds, the participants also ranked the cost factors according to their influence on total costs, and identified relationships among several contextual and cost factors.

Finally, according to the European Commission [18], enterprises can be classified as SMEs class when they have more than 10 employees but less than 250 employees, together with an annual turnover of less than 50 million euro or 43 million euro on the balance sheet. While conducting this study, however, we had difficulty in classifying Egyptian enterprises according to these standard classifications and characteristics. For example, in Egypt, employees' salaries and wages are generally not high in typical SMEs. As a result, Egyptian SMEs might employ more employees in comparison with, for example, European companies. Even though some Egyptian organizations are labor intensive, they are still recognized as small or medium in their markets and industrial sectors. According to Egyptian government reports [19, 20], the classification of SMEs in Egypt is still neither clear nor standardized, especially across industrial sectors. Thus, the current classification, which takes into account the number of employees and fixed assets, is not adequate [20]. This led the researchers to ask the informants to classify their organizations or clients according to how they are perceived in their respective markets.

The remainder of the paper is organized as follows: Section 2 presents the related literature, followed by the research background and scope in section 3. Section 4 illustrates the research methodology and elaborates on the experts' panel conducted in this research. In section 5, a presentation and discussion of the research findings are provided. Finally, conclusion and future research insights are presented in section 6.

2. Related literature

2.1 ERP implementations

The main focus of ERP research has largely been on large organizations. However, in recent years, research into ERP adoptions in SMEs has also become more common [12, 21]. ERP adoption projects vary in scale and arrangement; careful and timely management decisions must be made during each lifecycle phase of ERP projects [1]. The term ‘implementation’ refers to the introduction and installation of the actual system, which corresponds with the implementation phase within the ERP lifecycle. The ERP system implementation process requires dedication, commitment, a significant amount of resources, and organizational changes. Many variables affect implementation complexity and scheduling. For example, variables may be related to the adopting organization’s structure, size, and technological status. They may, however, be related to external factors, such as the vendor’s implementation methodology and market-specific contextual factors.

A relatively large number of studies have focused on the implementation phase. It should be noted, however, that ERP implementation methodologies and lifecycle phases could vary in name, number of stages, and level of detail in the literature. ERP lifecycle models usually include several analogous phases, e.g., adoption, selection, implementation, go-live, use and maintenance, and evolution. Some researchers have extended these models to include a retirement phase [22]. The retirement phase is the point when an ERP system is replaced with another ERP or any other information system [22], presented in Fig. 1. In practice, most major ERP vendors have their own implementation methodologies, e.g., SAP follows the ASAP methodology, Oracle ERP follows the AIM methodology, and several other open source ERP systems follow their own methodologies.

Sometimes they are used interchangeably; however, some researchers and practitioners differentiate between an implementation methodology and an implementation strategy. The latter term describes the process of how and when the system will go-live. ERP implementation strategies can include: a) phased rollout, b) pilot study, c) parallel adoption, and d) big bang or direct cutover. Each of these strategies has its own advantages, disadvantages, and associated costs and risks. Some organizations prefer to combine strategies during the implementation process.

Several of the critical challenges faced by organizations when adopting ERP systems are related to the degree of business process re-engineering (BPR), customization, and change management required to best fit with their adopted ERP system. On the other hand, some organizations adopt a vanilla implementation, which could be the least risky implementation approach [23]. A vanilla implementation usually keeps the degree of BPR to a minimum; it follows core ERP functionalities and process models instead of customizing the ERP to accommodate and fit the unique processes of the enterprise. The fit typically needs a two-way approach to be achieved through combining BPR with system customization in order to accommodate business needs and core unique competencies in some corners, and following standard ERP best practices in others.

Whether they involve a vanilla or a complex implementation, a small or a large organization, ERP implementations require careful project management and a committed team. In addition, organizations usually pass through a “shakedown” phase, during which they face challenges at the same time as they have to adapt to the newly reengineered processes [1]. This might result in business disruptions or reduced productivity for a certain period of time. Moreover, organization-specific characteristics and contexts have been important research aspects throughout, prompting researchers to investigate their implications on the ERP implementation process [12].

2.2 Cost factors identification and estimation

In general, the cost estimation process is perceived by organizations to be an important phase. However, the accuracy of these estimations is challenging. ERP adoption cost estimation is a complex task that requires attentive analysis in terms of direct and indirect costs. Both underestimates and overestimates can have dramatic consequences on IS projects [24]. According to Scheer and Habermann [25], Baan, Peoplesoft and SAP have all stated that the purchase of the software

license is not the biggest portion of the budget. In fact, ERP customers could spend around three to seven times more money on the implementation and complementary services than on buying the initial software license. This substantial escalation of costs often occurs because of unanticipated hidden costs [10]. For example, many organizations overlook an expected rise in human resources costs both during and after ERP implementation. In addition, unplanned system customizations and requirements can significantly increase total adoption costs. Although ERP systems adoptions are increasing in the market, however, professional reports show that budget and time schedule overruns frequently happen. In their 2013 ERP report [26], Panorama Consulting Group has stated that from 172 companies surveyed, 53% of the projects have already crossed their estimated budgets (see Table 1). Some of those companies are not yet finished with their ERP implementations. Also, the report show that 61% of the companies have crossed their estimated project schedules, which is also has a significant impact on project costs. Several vendors claim that organizations tend to ask for several changes and “nice to have” features during the implementation phase [10]. These features were not previously agreed upon in the signed contract, and consequently were not financially estimated beforehand. On the other hand, extra customization costs could also occur because of changes in business requirements [27]. Furthermore, poor system requirements analysis and system design processes could also increase the adoption costs dramatically. This mainly occurs when key employees are not fully engaged during these two phases [8]. Hence, close attention should be paid to ERP cost estimation effort by the beneficiaries (clients), vendors, and third party consultants if any. Indeed, the vendors’ cost estimates alone could omit some customer-specific costs, such as search and vendor selection, human resources, business engagement, and other managerial costs. Moreover, in some reported cases, vendors and implementation partners may give excessively low cost estimations in order to win deals [10, 27]. A number of studies have stated that failures could also occur because of unrealistic project deadlines, deliverables, and budget estimations [28].

Table 1. Investments in ERP Systems. Adapted from Panorama Consulting Group [26]

Year	Cost	% of cost overruns	Duration	% of duration overruns
2012	\$7.1MM	53%	17.8 months	61%
2011	\$10.5MM	56%	16 months	54%
2010	\$5.5MM	74%	14.3 months	61%
2009	\$6.2MM	51%	18.4 months	36%

Based on the literature review, there is a considerable gap in the area of ERP adoption cost estimation, because the established and widely used software cost estimation models, such as COCOMO II [29], are not appropriate within an ERP setting [10, 11].

A shortage of proper representation for cost factors, and inadequate cost estimation methods, particularly for SMEs, means that ERP systems adoption projects face challenges in identifying and estimating costs, size, human resources, effort, productivity and other cost factors [13]. Furthermore, when ERP adopters exceed their estimated budgets, this could be critical if they are an SME with limited resources. Thus, despite the future potential benefits an ERP could offer, the current rise in costs may be critical.

In general, IS and ERP implementation costs can be divided into those that are direct and those that are indirect. Direct costs is expenditure that is directly associated with the implementation and acquisition of new technology or systems [30]. Clear examples of ERP direct costs include license and IT infrastructure costs. On the other hand, indirect costs include human and organizational-related costs that usually occur during the adoption process [14], such as business process re-engineering, Human Resources (HR) costs, and project schedule delays. Moreover, most of the informants interviewed in this research study, viewed unanticipated costs that lead to overspend on the estimated plan and budget as an indirect or hidden cost, even if it was a marginal increase on a direct cost. Estimating the direct and indirect costs of ERP adoption is a problematic process. Thus, there is a considerable opening in IS research to focus on cost factor identification and classification [14].

3. Research background and scope

3.1 The ERP adoption process

The ERP lifecycle framework developed by Esteves and Pastor [22] and presented in Fig. 1, was adopted in this research. It was used as a general guide to organize and frame the data collection efforts according to the ERP lifecycle phases. Specifically, the ERP adoption term used in this research refers to the first five phases of the ERP lifecycle framework, which denote the ERP introduction process. This process moves from the “adoption decision” through to go-live and maintenance, and evolution; however, it excludes the retirement phase. This framework has aided the panel’s participants to logically organize the cost factors according to each phase during the lifecycle of their projects.

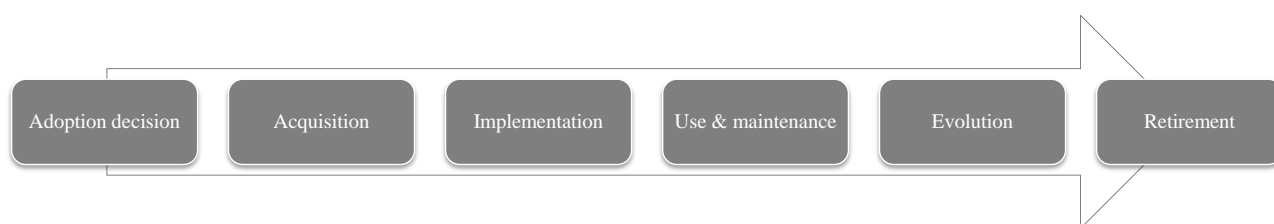


Fig. 1. ERP Lifecycle framework. Adapted from [22]

3.2 The SME context and environment

Context is considered as a scoping tool for researchers. Indeed, the IS literature has accentuated the importance of context in research endeavors [31]. Context is a broad term, however, which may refer to an organization or its environment; it may even cross enterprise borders on a national or international scale [31]. The prime focus of early research in IS literature was mainly on intra-organizational IT innovation and contextual factors in organizations, (e.g., [32]). However, some early research papers did shed light on the importance of an organization’s external environment [33]. Ives et al. [33] developed an illustrative model of information systems in organizations, showing their internal and external environments. The model intended to suggest and pave the way for a research roadmap, as well as stress the importance of internal and external environments as variables. Ives et al. identified five main information system environments, as illustrated in Fig. 2. The external environment includes social, political, legal, cultural, economic, educational, resource and industry/trade variables, while the organizational environment variables are its goals, structure, tasks, management style, and volatility [33].

In the last decade, researchers have considered the pressures of the external environment on large enterprises, and within SMEs contexts. For example, Kuan and Chau [34] noted that SMEs’ external pressures are their competitors, business partners, governments, and markets. In addition, some researchers have crossed the national environment and context to include international dimensions [35]. The external environment does not only provide pressures; it also offers opportunities. For example, the Egyptian Ministry of Industry Modernization has offered 50% funding to SMEs to help them acquire IT and IS technologies.

As well as taking an internal SME context stance in this study, other external factors were considered. The study used the Technology-Organization-Environment framework for SMEs’ adoption of enterprise systems (TOEES) developed by Ramdani et al. [36] (see Fig. 3).

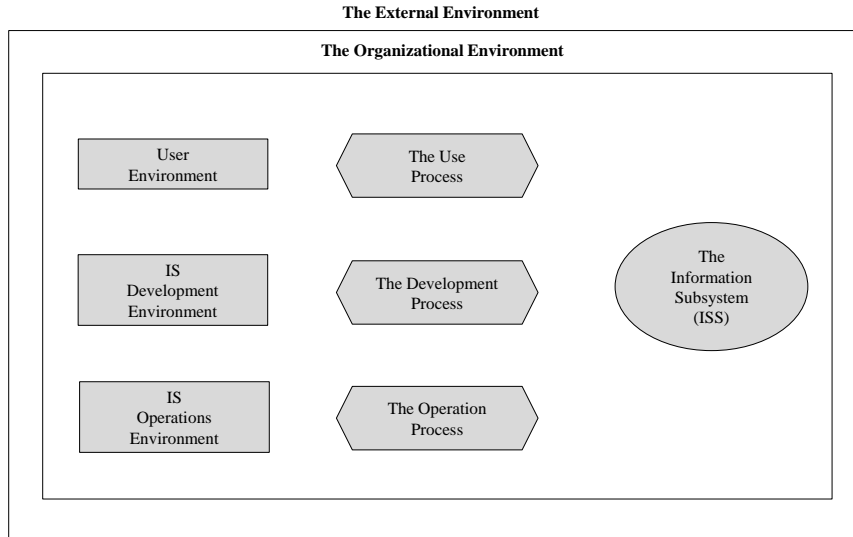


Fig. 2. A model for IS research. Adopted from [33]

The framework is used as a tool to identify the potential technological, organizational and external environmental factors that need to be investigated. TOEES is based on the Technology-Organization-Environment framework (TOE) developed by Tornatzky et al. [37]. The framework features three general aspects of a firm’s context that influence the adoption and implementation of the technological innovation process: organizational context, technological context, and environmental context. The three dimensions are also consistent with the innovation diffusion theory, which highlights technological characteristics, and both the internal and external characteristics of organizations as drivers for technology dispersion.

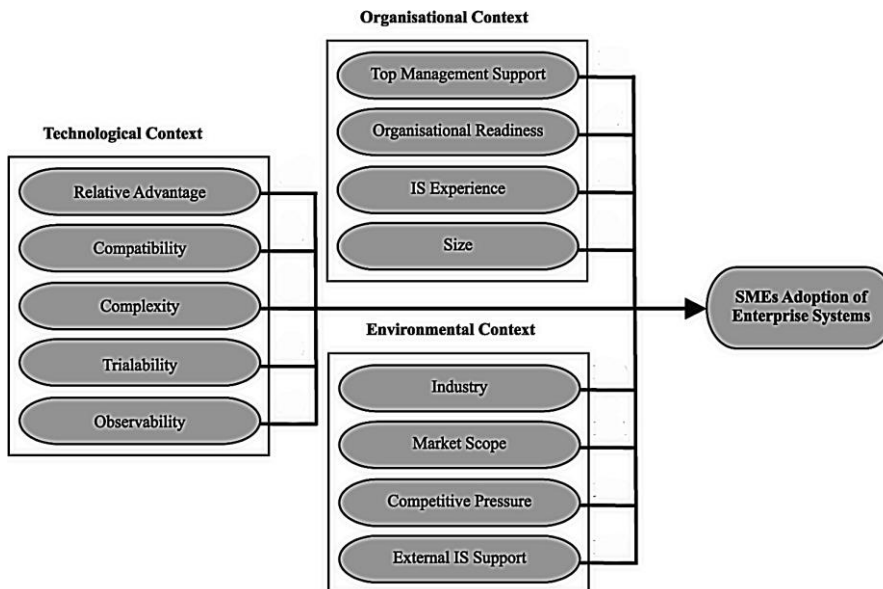


Fig. 3. Technology-Organization-Environment framework of SMEs adoption of Enterprise Systems (TOEES). Adopted from [36]

The TOE framework was adopted and adapted from several research studies in the IT and IS domains. For example, Kuan and Chau [34] adopted the TOE framework in order to study the potential for electronic data interchange (EDI) adoption among small-sized firms in Hong Kong. Others have used TOE and its variations to investigate the impact of trust in the vendor, ERP system, and consultants have on ERP implementation success [7]. In addition, within both domains of ERP adoption and SMEs' contextual factors, several studies have used the framework and reported on its relevance as a tool for studying enterprise systems adoption in SMEs [36].

The successful application of the TOE framework and its variations in existing research led to the adoption of the TOEES framework in this research.

4. Research design and methodology

Research design is a roadmap with a logical sequence that relates the empirical data to the initial questions under investigation, and eventually connects it to the study's conclusions [38]. A clear research design minimizes the risk of collecting and analyzing irrelevant data that does not satisfy the research questions [38]. Thus, the data collection efforts were shaped by the adoption of the TOEES and the ERP lifecycle frameworks. The collected data was based on the participants' knowledge and experience from completed ERP projects in SMEs. Fig. 4 presents the research design, which was employed in this research.

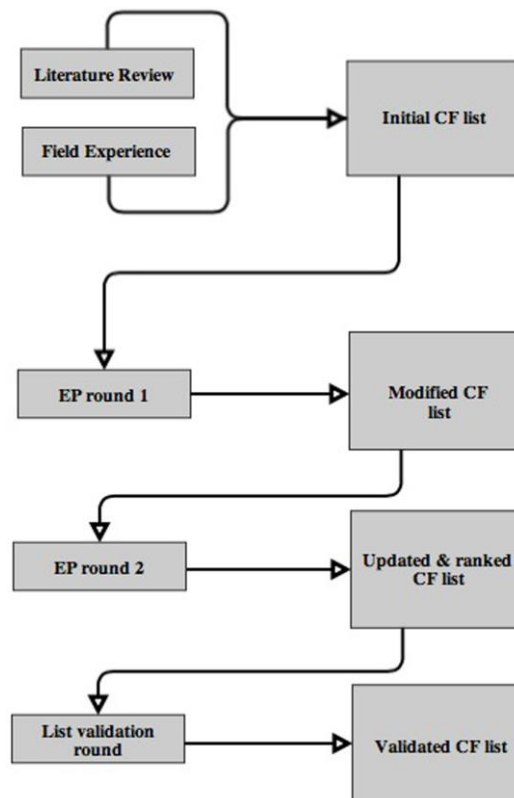


Fig. 4. Overall research design

In order to inductively elicit data from the most relevant context in practice, an experts' panel (EP) of practitioners was convened in this study. The EP was used as a mean of eliciting knowledge from ERP experts in Egypt. The EP served as an initial research catalyst and ensured the mapping and alignment of the research issues and problems in practice. The EP method was based on a combination of Delphi, nominal and focus group techniques. It incorporated face-to-face group discussions and interviews supervised by two moderators. In addition, the panel included anonymous electronic surveys and rankings. Mind-mapping tools and techniques [39] were also used. Face-to-face group techniques could be fruitful when investigating a certain phenomenon in the early exploratory stages of research [40]. A number of researchers have also pointed out that group brainstorming and discussions can generate comments that are more consequential than is the case in one-to-one interviews [40]. As recommended by Willis and Miertschin [39], dynamic mind maps were used as a tool for representing the cost factors of ERP as a graphical list. In addition, mind maps were useful in cases that require problem solving, group understanding and brainstorming, information delivery, and the evaluation of participants' beliefs [39]. This stimulated the participants to engage with the content and provide modifications and rankings for the initial mind map of cost factors.

One of the main objectives of the panel was to identify and rank the direct and indirect cost factors that could occur in ERP adoption projects in SMEs, in order to be able to create a cost factors list. The list could consequently aid in creating a cost estimation model that predicts potential ERP costs, and can be used by both adopting companies and vendors. The EP's recommendations and insights were invaluable to this research. Indeed, the experts provided rich inputs that helped the authors to better understand the phenomena and refine the problem under investigation.

The panel was composed of key persons involved in ERP adoptions in Egypt. Ten potential participants were contacted by phone and via e-mail; eight experts responded and participated. The participants were ERP consultants, vendors, implementation partners' representatives and implementation project managers in SMEs. The participants' expertise represents a wide knowledge of a broad range of international companies and industrial sectors. The panel included vendor consultants from SAP, Oracle, JD Edwards, Focus ERP, independent ERP consultants, and project champions and managers from different industrial SME beneficiaries. A wide variety of experts were selected in order to ensure that the research captures different views and perspectives on ERP costs. In addition to the identification and ranking of cost factors, the experts identified the potential influence of contextual variables on several cost factors. After two rounds, a list of potential cost factors, costs rankings, variables influencing costs, and discussions were collected. Subsequently, a final round was held in order for all eight participants to validate the results and make sure that they represent their interpretations. A detailed description of the panel is provided in the following section.

4.1 The briefing and pre-panel discussion

Prior to the actual panel conduction, a research briefing was sent by email to participating experts. It contained all the information about the research, the panel setting, the research objectives, as well as the expected implications for research and practice.

On the first meeting, a reminder concerning the specific research objectives was provided. A set of presentations took place to elaborate on the research objectives, and what is needed from them in order to develop a model or list that could aid in estimating costs within the ERP adoption phases. Additionally, we illustrated the importance and need for such a model by beneficiaries, consultants, and vendors. Moreover, a less formal discussion was held at the beginning of the panel regarding their experiences with ERP projects in SMEs. Participants were asked predefined questions centered on the features of ERP adoption cost identification and estimations within SMEs in Egypt, and its success rate of finishing projects at hand within budgets. Moreover, they were asked about the challenges facing implementers and costs' impact on ERP adoptions in SMEs. Some participants from major ERP vendors mentioned that they use their own cost estimation models to estimate budgets needed from beneficiaries to cover their part of costs, but they said that these models are not accurate, nor give a realistic view to beneficiaries about all the dimensions of costs needed for the whole ERP adoption project. One major note from several experts was that organizations regularly do not face cost problems in selection nor post-adoption phases, the majority of ERP problems and costs pop-up during the implementation phase, and that the research should focus on these costs.

4.2 EP - first round

In the first panel round, the participants were provided with an initial cost factors list (mind map). The initial mind map (fig. 5) was a visualization of CF gathered through literature and researchers' own experience with previous ERP adoption projects. The visualizing of cost factors in a mind map (tree-like) format is believed to enhance the participants' insights and interpretations.

While the mind map was presented to the participants, group discussions took place and were managed by two moderators. One moderator's role was to ensure that the session advances smoothly, and the other's role was to ensure that all the topics are covered. Both of them were taking notes. The moderator had predefined list of questions for group interviewing, and these questions evoked the discussion and brainstorming among participants. The discussions were about which cost categories and factors should be merged or split, alter their naming, approximate weight on total costs, and their priority pertaining to SMEs, etc.

Although some debates on some specific factors' importance took place, the moderator reminded the group about the focus of discussion, and that they should adopt an ERP adoption costs within an SME setting, and this minimized the level of debates between them. From our point of view, the discussion between participants was very fruitful, as it initially consolidated their views, and made the participants brainstorm together and start to provide valuable suggestions and remarks. Further, each participant was provided with a questionnaire in a table format that contained the compiled ERP costs. The questionnaire was a combination of open and closed ended questions. The open-ended questions were sought to aid the experts to provide their insights, recommendations or suggestions about which additional cost factors to include, exclude, combine, or split. The main initial cost factors were vendors, change management, business process reengineering, project management, hardware, software, and human resources costs.

The participants' feedback helped in further developing cost categories, adding new factors, merging some factors, decomposing some factors to include important sub-factors, and identifying influencing cost drivers that can influence other cost factors. This brought us to a better understanding of cost factors that could affect an ERP adoption process.

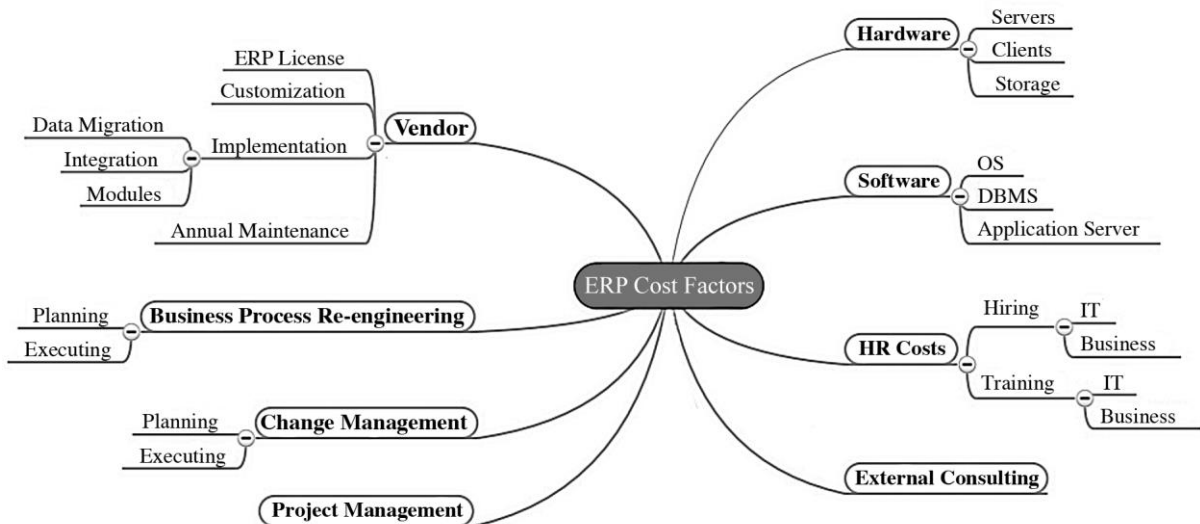


Fig. 5. Initial cost factors list

4.3 EP - second round

In the second round, an updated list of cost factors was presented to participants. The list contained the new updated cost factors identified during the first round's questionnaire, interviews, and discussions. The updated list was presented in a table format as well as a mind map. The moderator initiated a discussion about the comprehensiveness of this list, and this simulated group discussions and interactions. During this round, the participants made some modifications to the cost factors, and the list was directly updated accordingly.

At the end of this round, the participants were provided with a questionnaire. The questionnaire included three main sections: 1) A list of updated cost factors; 2) A column space to independently state any contextual variables that could influence these cost factors; 3) A column to independently rank cost factors according to impact on SMEs' ERP adoption projects total costs. Their task was to independently rank the costs and to make sure that all the presented costs and our interpretations are complying with their suggestions and recommendations. The provided rankings of cost factors were: very high, high, medium, low, and very low. The participants were alerted that cost factors should be ranked according to their impact on total project costs during the adoption process within SMEs (see table 2).

The data was analyzed and the updated and consolidated cost factors list and rankings were sent electronically to the participants in order to confirm the validity of the results.

5. Research findings

During the group discussions, many important issues were raised. Each participant wanted to share his/her own experiences related to cost issues. These experiences helped the authors to gain an understanding of ERP projects and the challenges related to the cost management of ERP adoptions. One of the important outcomes of the experts' panel was an updated cost factors list. The list was comprehensive and included the major cost nodes that organizations should think about and expect prior to their ERP adoptions. The experts made many modifications to the initial costs list by combining some costs, and adding new factors and sub factors. The experts' identified factors included: quality management, services, and machinery. In addition, the sub factors included: business engagement under HR costs; hosting and VPN under services and planning; and execution under BPR.

The experts also identified associations between costs and their main influencing drivers. For example, the group stated that business engagement would directly influence quality assurance costs. Likewise, buying or leasing hardware and business requirements would have a direct influence on hardware costs. In addition, many ERP research papers have argued that vendor costs are not the largest part of ERP projects; however, the experts thought differently. They ranked vendor-related costs as the top cost factor in ERP adoptions in Egyptian SMEs. Finally, the experts concluded that the cost factors and their influence on total costs are subject to individual case scenarios.

5.1 Cost factors identification

As mentioned above, in order to better understand cost related issues, an essential phase in the research was to explore the potential cost factors within ERP adoptions in SMEs. Several participants from adopting organizations stated that they had had difficulties in predicting the potential cost factors during their own implementations. Through collecting data from various experts and stakeholders in the ERP area in Egypt, the study identified a list of potential direct and indirect cost factors that usually occur within ERP adoptions in Egyptian SMEs. The cost list is presented in Fig. 6. Guided by the ERP lifecycle and TOEES frameworks, the experts were asked to suggest a list of potential cost factors that could occur within ERP adoptions in an SME context. The panel identified 10 main cost factors and a total of 32 sub factors that are distributed among these cost factors. One frequently overlooked cost factor is business engagement. The participants classified business engagement under HR costs. Business engagement refers to the amount of time and money the business team has invested in the project. For example, when the business team has a half-day training session or, for example, a procurement workshop, the business teams put aside their day-to-day work and devote their time (which is also a cost) to project activities. The experts recommended that companies should take this into

consideration when calculating the costs of the project; however, one should note here that, in some cases, it is difficult to quantify the cost of time in monetary terms.

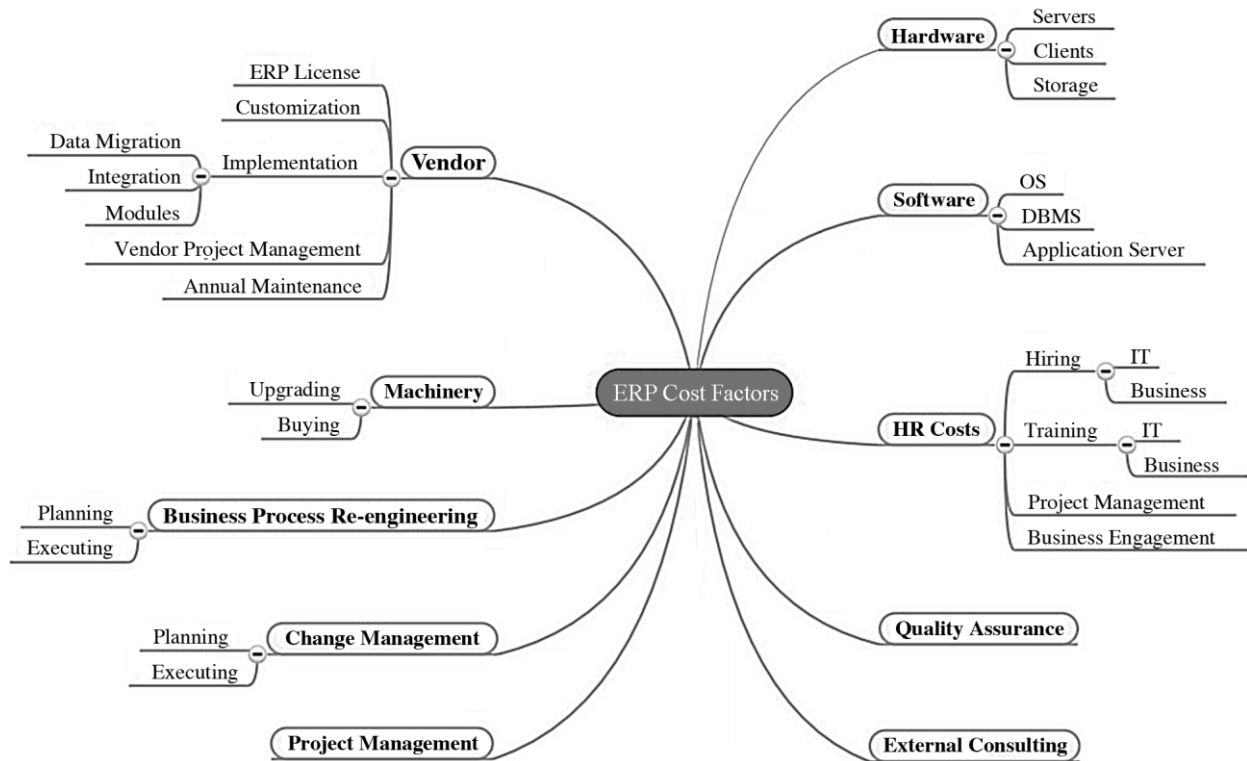


Fig. 6. Updated cost factors list

It is worth noting that the participants went through several cycles of discussions and debates before reaching a consensus on the prime cost factors and their sub factors. Their identification of cost factors could aid organizations that are planning a future adoption process by allowing them to visualize any potential direct and indirect costs.

5.2 Cost factors rankings and relationships

After a list of cost factors had been put together, the experts anonymously ranked the impact of each cost factor on the total cost of the adoption project during the lifecycle phases. The rankings ranged from very low (cost share) to very high. Table 2 provides an average of the cost rankings. Significantly, some of the results disagree with many of the findings presented in the literature. Mainstream ERP literature has argued that vendor-related costs make up a small portion of the total adoption costs [25]. According to the participants' rankings, this is not the case in the Egyptian context, as vendor-related costs are considered the highest cost during the project's lifecycle. In addition, BPR-related costs are significant in ERP projects [41]. Although many Egyptian SMEs adopt a vanilla implementation, which requires a high rate of BPR, the data show that BPR is ranked as a low cost. This can be partially explained which state that SMEs usually have less complex business processes than large enterprises [42]. Moreover, external consultancy costs are ranked as 'very low', making up a small portion of total costs, which might not be the case in other contexts and countries.

Table 2. Influencing factors and cost factors rankings

Cost factor	Very High (5)	High (4)	Medium (3)	Low (2)	Very Low (1)	Influencing factor(s)
Vendor	X					Responsibility matrix; implementation method, experience; project size; licensing; product performance
BPR				X		Nature of business (multinational, local, public organization); Local/international ERP vendor International or local implementation; ERP scope/generic
External Consultants					X	Scope of acts; business complexity; type of business; experience
Hardware			X			Buy or lease; business requirements
Software					X	Open source Vs. licensed/proprietary
HR & project management			X			Business engagement
Change management			X			Company size
Quality assurance					X	Business engagement
Logistics					X	Business size, distribution and distance of facilities & inlets/outlets
Services (Hosting & VPN)					X	
Machinery					X	Type of business (e.g., manufacturing); scope

Guided by the TOEES framework and their ERP field experience, the experts also considered the influence of some variables on cost factors, as seen in table 2. For each cost factor, they identified the relationships between some SME contextual characteristics, the environment within which SMEs work, and other variables. For example, the experts stated that there is a positive relationship between ‘business complexity’ and the cost of bringing in ‘external consultants’, which includes the time they spend on the project. This also applies to the influence of ‘company size’ on ‘change management’-related costs. Moreover, the participants stated that these rankings are debatable. In particular, they are subjective in that they present their own personal experiences, which might not apply to other cases.

6. Conclusions

This paper is an attempt to identify the various cost categories and factors that could occur when Egyptian SMEs adopt ERP systems. A mixture of focus groups, NGT, and Delphi techniques were used; thus, the paper contributes both to research into ERP costs in SMEs, and the domain of research methods. In order to gather different perspectives regarding this matter, the data collection method has included stakeholders and experts involved in ERP projects in Egypt. The stakeholders group consisted of eight ERP experts. The panel’s participants had an extensive national and international expertise in enterprise systems and ERP adoptions. The inclusion of mind mapping, rankings, group discussions, and group interviewing techniques enabled participants to recommend and identify a list of potential cost factors that may occur in ERP adoptions. Over the course of two rounds, the experts provided a list of potential cost

factors. In addition, they ranked the cost factors according to their influence on total costs. The list also included frequently overlooked potential indirect cost factors. In total, 10 main cost factors and 32 sub-factors were identified and ranked. Moreover, associations between organizational contextual characteristics and their influence on cost factors have been also identified. The outcomes of the panel helped us to pinpoint cost-related issues in ERP adoptions, and helped in the identification and visualization of the cost factors that may occur during ERP adoptions. The results of this research are relevant for practice and research. The study's outcomes also designated a potential spectrum of issues for further investigation.

The study also contributes to cost estimation research by demonstrating the cost factors, relationships, and their impact on total costs. In addition, another important outcome of this study is the confirmation of the suitability and validity of the TOEES and Esteves and Pastor's lifecycle frameworks for application in the context of Egyptian SMEs. Moreover, the list of cost factors could support organizations in more accurately estimating their budgets through the visualization of potential direct and indirect ERP costs that could escalate their investments. Finally, the findings of this research could help adopting organizations and vendors to avoid any pitfalls during the several phases of the ERP system adoption process, and have a more realistic view of the potential cost escalations.

The results presented in this study have the potential to be extended in future research. The presented cost factors model can be further validated in other settings in order to test its comprehensiveness and adequacy in other SME contexts. The validation of these cost factors, and their associations and rankings presented in this research, justify the further development of a suitable cost estimation model for ERP in SMEs. Future research into ERP systems could examine the applicability of the provided cost factors by testing their validity in other organizations of different sizes; for example, in large enterprises. Finally, this research questions the current formal budgeting and cost estimation methods, and calls for the need for suitable methods to accommodate ERP adoption environments.

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ERP systems: aspects of selection, implementation and sustainable operations

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ERP systems: aspects of selection, implementation and sustainable operations

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Abstract:

This paper gives recommendations for selecting, implementing and sustainably operating ERP systems. We indicate special aspects which are important from our point of view. The paper addresses practitioners who are responsible for ERP systems, especially IT and project managers. The structure of the paper matches the three main phases of an ERP system's lifecycle within an enterprise: selection, implementation and operations. General process models are given for selection and implementation of ERP systems. Our suggestions stretch from project management, business process reengineering, system selection criteria, reporting and customizing to choosing key users, data migration, and user training. Operations of ERP systems are commented according to the views defined by the ARIS concept. We are focusing on organizational issues, but give also remarks on business process maintenance, exploitation of ERP functions, and data management. While other publications give rather general advice, recommendations in this paper are selected to be use-oriented and easy to apply. The recommendations do not depend on any particular ERP system.

Keywords:

ERP system selection; ERP implementation; ERP system operations; ERP system maintenance.

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1. Introduction

Enterprise Resource Planning (ERP) comprises management, planning, documentation, and control of all business processes and resources of an enterprise (see [1]). Though ERP is based on an integrated information system, it is much more than just information technology since it affects all parts of an enterprise and is usually subject of Business Process Reengineering (see [2] and [3]). Today, most European companies of a certain size use ERP systems. However, they may wish to update their ERP system or migrate to another system in order to take advantage of new software functionality (e.g. Business Intelligence or Customer Relationship Management) or simply because their old ERP system runs out of maintenance. Others might just wish to operate their ERP system properly or more efficiently.

Despite decades of experience in selecting, implementing, and operating ERP systems, a considerable percentage of corresponding projects fails or exceeds time and budget, and existing ERP systems do not meet management expectations and are plagued with low user satisfaction (see [4] and [5]). This holds true not only for large enterprises but also for medium-sized companies with fewer users and less complex IT infrastructure.

Several lists of “Dos and Don’ts” as well as useful hints regarding ERP selection, implementation, and operations have been published, mainly on the internet and – in some cases – in scientific papers (see [6], [7], and [8]). However, some of these recommendations are generic to the level of common sense. Others are very specific, e.g. Reed [7] relates specifically to upgrading to SAP ERP 6.0. This paper summarizes our recommendations on ERP system selection, introduction, and operations. At first, selection of ERP systems is discussed. Later on, implementation projects are examined. Finally, several aspects of operating and maintaining ERP systems are discussed.

Our personal experience results mostly from selecting, implementing, maintaining, and operating a number of ERP and other enterprise-level information systems. We both led or took part in several corresponding projects in large or medium-sized companies of the automotive industry and the machine and plant engineering and construction industry, mostly in Germany but also in other European countries. Furthermore, we carefully summarize case reports and technical literature on ERP and other business information systems.

This contribution is a revised and extended version of [9]. It does not focus on any particular ERP system. Most recommendations are applicable not only to implementing an ERP system from scratch, but also to the migration from one ERP system to another as well as to major upgrades and to keeping an ERP system up-to-date.

2. Selection of an ERP system

2.1 Phases of ERP system selection

Deciding which ERP system should be implemented and choosing an appropriate implementation partner, is the foundation of a successful first-time implementation of ERP or of an evolution of ERP within an enterprise. Selecting a system and a vendor is a complex decision problem that requires a structured approach and represents a project of its own. Several process models for software selection have been proposed, e.g. [10], [11], and [12]. All these models cover the five phases shown in Fig. 1 which we will use to structure our remarks. The picture shows a simplified model. Some phases may be performed concurrently, and some may require feedback.



Fig. 1. Phases of ERP system selection

2.2 *Project setup*

The most important task of project setup is project planning. A first scenario for a follow-up system implementation project should be developed, in order to prognosticate, when a new system may become available. The latter is necessary for keeping management expectations at bay. Additionally, a first budget for ERP implementation should be estimated right from the start. It is important to verify the intention and the ability to invest into a large infrastructure project. Otherwise, there is a risk that the software selection project will be prolonged due to a lack of budget for signing a contract with a software vendor.

High visibility of the ERP project helps to staff the right project team. It is important to include at least one representative of every business department into the team. Managers of business departments show a tendency to delegate the less qualified – and therefore rather expendable – employees to the ERP project. Contrary to this habit, the best trained and most experienced business experts with the ability of strategic thinking should contribute to the ERP project. Only they are able to identify the best way to exploit the potentials of the new ERP system. Their limited availability for daily business during the project will pay off later by increased efficiency of optimized business processes.

2.3 *As-is analysis*

ERP implementation projects lead to long-term consequences for business execution and are typically combined with business process reengineering. The as-is processes are usually historically evolved and only partially documented. Consequently, the functional requirements for a new ERP system are vague in the beginning. Therefore, a thorough as-is analysis is necessary.

In addition to merely describing the as-is processes, they have to be assessed according to their appropriateness, and weaknesses have to be identified. The analysis indicates which business processes have to be redesigned and allows the qualification and – partially – quantification of improvements that can be achieved by the new ERP system. Quality of business processes should be quantified if possible. Assessing business processes is not a simple task. Good business processes have an explicit goal, are effective, efficient, process capable, flexible and compliant. These criteria are not measurable directly and therefore the degrees of fulfillment have to be assessed by experts using methods like model inspection, simulation and prototyping (see [13]). However, there are at least a few general metrics for measuring business process quality: Good business processes require a short cycle time that varies only slightly. They have few interfaces to other business processes, do not alternate repeatedly between two departments and distinguish between a few cases only. Failures that require a complete or partial repetition of the business process occur seldom. In addition to these general metrics, specialized metrics for certain business domains may be used, of course. For instance, the SCOR model (see [14] and [15]) provides metrics for measuring the performance of business processes in supply chains.

2.4 *Business process design*

There is a strong interdependence between ERP system implementation and Business Process (Re-)Engineering (see [16]). ERP system implementation provides a chance to improve business process efficiency. In our opinion, the major part of business process (re-)design should not be deferred to the actual ERP implementation project. It should be done in the system selection project already. Business processes that do not fit on the conceptual level will not become efficient when transferred to an ERP system. Furthermore, the to-be processes determine the criteria for system selection.

The main task of business process design is the development of a to-be concept for all business processes. Weaknesses and issues identified in the course of the as-is analysis indicate that processes need to be redesigned. These processes should represent a desired state. Possibly limited functionality of specific ERP systems should not limit the design of to-be processes. Functional requirements, their priorities and quantitative parameters like the number of concurrent users and the amount of data to handle have to be derived from the designed to-be processes. If the requirements would have

been solely derived from the as-is business processes, the opportunity would be missed to optimize business processes and capitalize on the capabilities of modern ERP systems. It is usually not ambitious enough to just automate the as-is processes since it would increase efficiency only slightly.

The business experts should contribute most to the definition of new business processes. Different opinions should be discussed until an agreement is reached. The business experts will advocate the new system more convinced and more convincingly if they have participated in its selection and configuration.

2.5 System evaluation

Identification, analysis and assessment of viable software systems are done in the system selection phase. This phase is structured into four steps:

1. As many viable systems as possible have to be identified. Only systems that appear on this list may be selected later on. Therefore, a thorough screening of the vendor market is required. The list of viable systems may contain more than 100 items. Internet research and trade magazines are the first and easiest source of information. Up-to-date market overviews are published regularly (e.g. [17]). Additional information may be collected at industry fairs, from industrial federations, and from specialized consultants. If an ERP system is distributed by value added resellers (e.g. Sage ERP X3), not only the system but also the reseller has to be identified.
2. Since it is not possible to analyze every system in detail, a pre-selection has to be performed. The pre-selection is based on formal, easy-to-check criteria and uses publicly available documents as well as self-reports from software vendors. Selection of a system and a vendor is usually based on three aspects: suitability, sustainability, and cost.

Suitability is checked on the level of business modules (e.g. material management, production planning, and financial accounting). The focus should be on differentiating criteria, i.e. requirements that are specific for the enterprise, that are not shared by most other companies of the same branch of industry, and that are not met by almost every ERP system.

Sustainability is checked based on the system architecture and on the vendor's financial stability. Over the past two decades, there has been a clear tendency towards fewer and larger software companies. Smaller vendors have been acquired by larger ones (e.g. JD Edwards by PeopleSoft, PeopleSoft and Siebel Systems by Oracle, and Damgaard and Navision by Microsoft). This trend is still going on. Therefore, the chosen software vendor may be acquired in a few years. In the worst case, the acquiring vendor may cease further development and try moving its new customer base to its own ERP system.

Cost estimation should be based on the Total Cost of Ownership (TCO) (see [18]). Investment cost covers license price, hardware cost, customization, consulting, initial training and deployment. Ongoing cost contains maintenance fee, system administration and regular user trainings.

Considering suitability, sustainability and cost of each viable system, pre-selection should reduce the original list to approximately five to ten systems.

3. The remaining systems have to be assessed based on the detailed requirements list. Information about the fulfillment of requirements originates from presentations, visits to reference sites, and workshops during which the main to-be business processes are tested. Software demonstrations should follow a script compiled by the project team, not the software vendor. The script should contain the most important business processes with an emphasis of company specifics. Such demonstrations and workshops have to be prepared very carefully, both by the project team and the vendor. We recommend to use company specific data instead of generic demo data and to include a "Hands-on" session. The evaluation of the alternative ERP systems should reduce their number down to two – perhaps with a definite preference. A main result of the evaluation is the degree to which the previously defined to-be processes can be realized, which amount of customization is necessary, and which business processes have to be adapted in order to match the system's functionality.

4. Finally, the contract is negotiated with the software vendor or value added reseller. The first aspect is the price, i.e. license price and maintenance fee. External maintenance and support cause annual costs ranging between 15% and 25% of the license price. In software business, price models are often complicated and list prices are usually negotiable. The more licenses a customer buys, the higher the rebate he can achieve. Special attention has to be paid to the exact terms: Deliverables (just installation, or complete implementation), service level agreements (guaranteed system availability and response times to inquiries), as well as license type (named user, node locked or floating) and license scope (site specific or worldwide) have to be clearly defined. We recommend involving a consultant experienced in negotiating software contracts.

The first two out of these four steps may partially be performed in concurrence with the business process design phase.

2.6 System selection

ERP system installations are surprisingly persistent. A company that has chosen and implemented an ERP system will usually use it until there is no alternative to a change. Therefore, system selection may easily effect the next ten or twenty years. Hence, this decision should be made with care. When choosing an ERP system, the recommendation of consultants and certified public accountants should be heard but it should not overrule other important aspects of the choice – especially applicable business logic and functionality.

System selection actually covers two main choices: selection of a software system and selection of an implementation partner. As mentioned above, the main decision criteria for system selection are suitability, sustainability and cost. Suitability is the most important of these criteria. Since there will be no perfectly fitting solution available, system selection should be based on the fulfillment of key requirements as well as an open technology and a positive outlook on future developments. Due to the long-lasting effect of ERP system selection, a TCO calculation is mandatory. Maintenance fees and operating costs are important factors.

For a successful implementation, choosing the right implementation and service partner is almost as important as choosing the right system. If the implementation partner lacks experience, competence, and/or capacity, the implementation project will be bound to run into problems.

3. Implementation or upgrade of an ERP system

3.1 Phases of ERP system implementation

There is a wide variety of process models for ERP implementation, and some of these models are augmented with tools and utilities like checklists and calculation sheets. Several process models are specific for certain ERP systems, e.g. On-Target for Microsoft Dynamics NAV (see [19]). Other process models are maintained by consultancies and IT service providers, e.g. the Accenture Delivery Methods (see [20]), and some are derived from generic software development models, e.g. from the Unified Process (see [21]), Model Driven Architecture (see [22]), and even Extreme Programming (see [23]). The various process models differ in their approach to manage interdependencies between project phases, the handling of changes, the availability of supporting tools, and the consideration of software specifics. It is necessary to carefully select an appropriate process model and to adopt it to the specific needs of the implementation project in question.

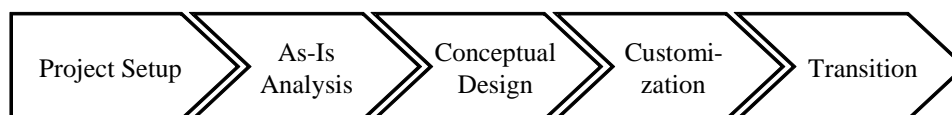


Fig. 2. Generic process model of an ERP implementation project

All process models cover the major phases shown in Fig. 2. This general model resembles the traditional waterfall model of software development. Despite its simplicity, the model structures our remarks on ERP implementation well.

3.2 *Project setup*

Considering an ERP implementation as just another IT project is the first step to failure. Top management support is a key factor for success. A first-time implementation project is usually initiated by top management. Thus, management awareness can be assumed. However, this is not true for major upgrades. In some cases, the project is initiated and driven by only one of several business units that dominate the configuration of the ERP system consecutively. Experience shows that all relevant organizational units should be represented equally. The members of the project team responsible for system selection should also take part in system implementation.

A crucial aspect during ERP implementation is change management: ERP implementation is a socio-technical change process that requires management. Change management deals with all aspects of organizational changes. This includes advertising the project, managing employee education, and managing the transition to ERP based business processes company-wide (see [24]). A change management agent should be announced. Neither the IT department nor the project manager should take on this role. Instead, a manager of a business department or an external consultant should be assigned to this task.

3.3 *As-is analysis*

The implementation project requires a detailed as-is analysis. In the case of a major upgrade of an ERP system, the as-is analysis is important as well: It has to be checked whether the as-is business processes match the previously defined to-be processes. Experience shows that usually not all implemented business processes are executed as they were designed (see [25]). Especially if the handling of the ERP system is not user-friendly and if the objective of a business process can be achieved without the ERP system, some users will tend to escape the ERP based business process. This behavior leads to issues like island solutions, media discontinuities, redundancies, incomplete or wrong information, delays in business process execution, etc. Therefore, deviations between to-be and as-is processes have to be identified as well as functional gaps and weaknesses of the ERP installation and the IT landscape in general. Furthermore, environmental changes that require a change of business processes have to be identified and analyzed.

3.4 *Conceptual design*

To a certain extent, all ERP systems can be configured to cover a variety of business processes. However, this flexibility is limited. Thus, the question of customer specific development arises. We agree with [26] on avoiding the development of specific applications as much as possible. In most cases, it should be preferred to adopt the previously defined "ideal" to-be business process to the ERP system over extending the ERP system.

Conceptual design also initially determines the users' access rights: They should never be granted on the level of single users, but on group level only. User groups may be derived from the company's organizational structure. No "anonymous" users (e.g. "sales" or "trainee") should be created, since it would not be possible to trace the distinct person who has edited data. In multi-tenant environments, it has to be carefully considered which user is granted which access right in which tenant (e.g. for avoiding the editing of data in a tenant erroneously chosen).

ERP systems never stand alone. Thus, conceptual design also deals with integration of external systems, e.g. Advanced Planning Systems, Data Warehouses, B2B platforms, B2C web frontends, Computer Aided Quality Assurance systems, (offline) Customer Relationship Management systems, and smartphone applications. They will not all be coupled in the beginning, but communication with any of them has to be considered during conceptual design.

Conceptual design deals not only with software, but also with the hardware of the IT infrastructure. This includes an emergency and backup concept. We suggest mirroring the ERP servers. The backup hardware should be identical to the live system, and the backup system should always be kept up-to-date: Firstly, the software installed should be the same

and equally parameterized as the software installed on the live system, and secondly, the data from the live system should be replicated at least every ten to twenty minutes to keep the data loss at a minimum in case the live system fails. The switch from the live system to the backup system should be tested at least once a year to make sure the backup system is available in case of emergency.

3.5 Customization

Once the utilization concept for the new ERP system is defined, it has to be configured and integrated into the IT landscape of the enterprise. From a technical perspective, there are typically three different types of customization in an ERP system's implementation:

1. **Codeless configuration:** This type of configuration requires a thorough understanding of the ERP system and the future business processes, but it does not require writing source code. Instead, codeless configuration is done in an integrated and often graphical environment provided by many modern ERP systems. Even model based customizing (see [27]) is applied sometimes. Alternatively, global control parameters are set. Codeless configuration should be done by in-house IT specialists supported by external consultants.
2. **Application development:** It might be necessary to fill functional gaps with specific applications. These applications should be developed by external partners. It usually does not pay off to establish the necessary expertise in-house. As mentioned in the previous section, customized applications should be avoided if possible. Interfaces to other software systems occupy an exceptional position in application development: An effective integration of the ERP system into the IT landscape of the company is a key success factor. In most cases, interfaces to Product Data Management systems, Manufacturing Execution Systems and Warehouse Management Systems are needed.
3. **Key performance indicators and reports:** ERP implementation projects always have to deal with reporting: Standard reports provided by the ERP system must be reconciled with company specific reports already in use. This reconciliation has to be done with care. Otherwise, inconsistencies and misinterpretation will arise which lead to dissatisfaction, repeated "incidence reports", long explanations, and thus additional effort. Reports should not overlap with regard to their content. If this occurs nonetheless, they will have to follow the identical definition and to be executed over exactly the same set of data. The expertise for report development should be gathered in-house – in contrast to application development. Key users should be provided with training and appropriate tools to create reports. Most ERP systems provide these tools or support the application of external business intelligence software.

Testing the customized system is an important task. The test should not be limited to the parts of the software directly affected by customization: Even an out-of-the-box ERP system should not be expected to work error free. At least one successful trial run of each business process is highly recommended. However, testing the main processes could be enough because they cover the majority of the business transactions. Test scenarios and test processes should be defined prior to the test. Tests should be documented with text, screenshots and diagrams. The documentation may then be applied as (a basis for) a user's guide. We recommend testing in small teams of two up to four key users. If the teams are larger, there will be too much idle time, a waste of resources, and no efficient testing. If the teams are smaller, there will be no synergy and tests will possibly be biased.

3.6 Transition

ERP system transition may be done either with a "Big Bang" or in a phased approach (where phases are based either on modules or business units). The phased approach seems to be more secure at a first glance, but is significantly more complicated to realize due to the complex interdependencies between modules and business units (see [28]). Therefore, we recommend a Big Bang transition at least for key modules. Transition comprises data migration, system activation and user training. The change of fiscal or calendar year is the best occasion to activate the new ERP system: The year-end closing will be performed in the legacy system, and all transactions of the new year will be executed in the new ERP system.

Data migration from the legacy to the new system is an important part of the transition. While the migration of master data is rather easy, it is hard to transfer transaction data, since transaction data structures are more complicated and intertwined. Beyond that, the structure of transaction data differs from one ERP system to another. Therefore, the mapping and conversion of record fields do not suffice, but structural transformation is needed. The effort to migrate transaction data should not be underestimated.

When starting the final data transfer, data must not be changed in the legacy system anymore. Hence, business activities have to be suspended until the new system is activated. The time needed for performing the data migration is determined by trial runs. Two days up to one week for data migration may be considered normal.

The activation of the ERP system and its performance should be successfully tested in trial runs several times. Shortly after activating the new ERP system, there is no way back to the legacy system because the data in the new ERP system evolve whereas the data in the legacy system do not. Often, the data in the new ERP system are more detailed than in the legacy system. Thus, data migration back into the legacy system is impossible or at least causes data loss. After the activation of the new ERP system, the legacy system may stay available for some users in read-only mode for plausibility checks.

User training and providing a company specific user guide is another important aspect of the transition phase: The first training involves key users and IT personnel only, takes place immediately after the ERP system is chosen, and is conducted by the vendor of the ERP system. The training of the key users should take place away from the office in order to avoid distractions. It is important to teach the interrelations between all relevant modules (sales, material management, production, accounting etc.).

After all business processes are defined and the system is customized, the key users train the remaining users. The training should not start earlier, because it could be confusing if preliminary versions of the processes were taught. If too much time elapses between training and operating the ERP system, many already trained procedures will be forgotten.

ERP systems are not widely applied in Asia yet. Therefore, most Asian employees are not yet experienced in operating ERP systems (see [29]). Thus, training them is even more important. Since Asian employees often do not give direct negative feedback, it is imperative for them to perform prepared exercises and answer compiled control questions. Thus, their understanding can be assessed and deepened if necessary.

4. Operations and maintenance of ERP systems

4.1 ERP systems as integrated information systems

Once the transition phase is completed, the ERP system is used on a daily basis and is essential for keeping up business activity. Each ERP system is an integrated information system and can be seen as a socio-technical subsystem of an enterprise. Therefore, the ARIS model (see [30]) can be applied to ERP systems. This model is based on the following idea: Each enterprise is structured into organizational units which are performing business processes while the company is operating. The business processes control the execution of functions which evaluate, manipulate, and create data (see Fig. 3). While operating, companies produce products and provide services to their customers according to the purpose of the company. These aspects have to be considered when developing or optimizing an ERP system, as well as operating and maintaining it sustainably. We will discuss some aspects of organization, business processes, functions, and data in the following sections.

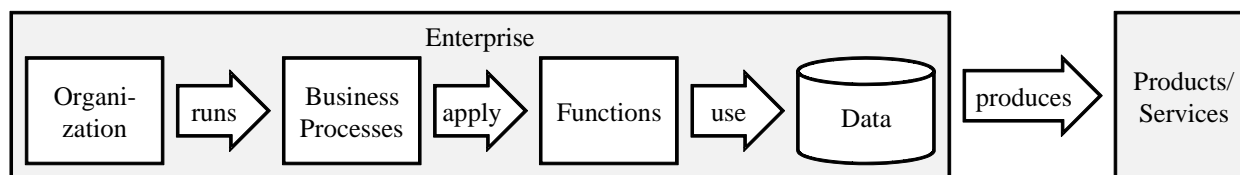


Fig. 3. Aspects of integrated information systems

4.2 Organizational view

The organization describes the static structure of a company. It consists of organizational units, e.g. divisions, departments, and employees, which are related to each other. Despite their static nature, organizational units and their relations are subject to change: Organizational units and their relations arise, evolve, shrink, split up, merge, or cease to exist. Every organizational change has to be reflected in the ERP system. The simplest cases are the introduction of a new employee who needs to be established as a user of the ERP system and granted the appropriate access privileges, and the resignation of an employee who must be disabled as user of the ERP system. Changes on the level of departments and business units are more complicated, since these changes typically require adaptations of business processes and workflows (see section 4.3). Another issue is that year-on-year comparisons of key performance indicators of the effected organizational units become complicated or even impossible.

Over time, the organization accumulates much knowledge about operating and maintaining the ERP system. This knowledge should always be shared by at least two people and be recorded as text, diagrams, screenshots, or videos. A document management system (see [31]) could be a good place for storing knowledge about operating and maintaining an ERP system sustainably. In case a specialist retires, s/he should pass on her/his knowledge duly.

Regular training should not be neglected even if ERP is running smoothly already. It prevents mistakes in operating the ERP system and deviations from business processes. Regular training should take place on the level of departments, carried out by the key user of the respective department and be customized to exactly the business processes and functions relevant for the department. Although this approach requires a thorough preparation by the key user, it is usually more efficient than giving every user the same unspecific five-days overall standard training.

The support team of the ERP system is part of the company's organization. As a rule of thumb, the number of IT specialists needed for internal maintenance and support should equal the number of users divided by 100 and rounded up. A lack of manpower for maintenance and support reduces efficiency of ERP, strategic issues are neglected, and significant costs are induced. We recommend employing two teams of equal size: one for operative tasks, the other for long-term tasks. Members of one team should be able to act as substitutes for members of the other – especially if there are two “teams” consisting of only one person respectively. We recommend two levels of in-house support: key users as first level internal support and ERP system advisors as second level internal support. Initial support requests should never address second level internal support directly but always address first level internal support first. Only second level internal support should request external support from the system vendor.

Even skilled internal personnel will not know every technical detail of the ERP system. Hence, external maintenance and support are needed. If the system operates more than twelve hours per day, extended external maintenance and support is recommended, even if costs increase progressively. The procedure of incident management has to be settled with the vendor during the design phase already. The most important criterion for good maintenance and support is a guaranteed response time relative to inquiries. Incident classification and initial support as well as investigation and diagnosis should be provided within 24 hours. Resolutions should be achieved within two work days for 85% of the issues.

Costs for external maintenance and support seem to be high but a good service guarantees the ERP system running smoothly. In case the ERP system crashed, business activities could not be maintained. That would cause financial

damage much higher than the costs for external maintenance and support. Costs for external maintenance and support should be weighed up against losses caused by a potential outage of the ERP system.

Hardware is an essential part of an ERP system instance. A few years ago, most hardware for ERP systems was kept in-house, and ERP system software was running directly on the hardware. Nowadays, most ERP system software and even its databases may be running on scalable virtual machines. This simplifies backups, and it is easy to migrate from one piece of hardware to another. Hence, we recommend virtualization. Keeping the hardware in-house, renting dedicated servers out-house, or putting the software and especially the data into the cloud is a matter of trust and costs, and we dare not yet to give a recommendation in this field.

4.3 Business process view

Organizational units run business processes. A business process is a set of activities which are related to each other and are performed by organizational units in order to achieve certain goals (see [31]). ERP systems are the stone the business processes are carved in. In some cases, this is a positive, since IT based workflows stabilize business processes and prevent undesired changes of these processes which may be caused e.g. by the carelessness of personnel or by the replacement of employees. On the other hand, it is essential to change business processes over time. Necessary changes are triggered by organizational changes, new products, new services, new production technology, upgrades of the ERP system, business process reengineering and so on. These changes have to be implemented in the ERP system in a well-defined manner.

Changing a business process is a special business process itself (see [33]) and should be executed event-controlled. Many activities in this special process address changing the process model in the ERP system which defines the workflows. If these special processes are not yet established, there will a risk arise that changes of business processes will not be correctly reproduced in the ERP system. To minimize this risk, the physical business processes of the company and the logical business processes executed in the ERP system have to be aligned time-controlled at least quarterly. In order to ensure that the business processes are appropriate, their efficiency should be measured at least once a year using suitable key performance indicators (KPIs) (see section 2.3).

4.4 Functional view

Many activities of business processes apply business functions of the ERP system or are supported by them. Some activities could apply business functions of the ERP system but either the ERP system does not provide these functions yet, or these functions have not been prepared to be applied by these activities yet. Typical examples are functions related to return material authorization (RMA), service order or service contract functions, finite capacity planning functions, functions of electronic document management, to-bin and from-bin strategies for chaotic material management, or functions of continuous inventory taking. The ERP system advisor should be aware of all functions relevant for the company but not yet applied. If this is not the case, these functions will have to be identified during the regular business process review (see section 4.3). Potentially useful functions should be assessed regarding their importance, their expected benefit and their costs of implementation. The best fitting functions should be implemented as soon as capacity, budget or a new version of the ERP system become available.

The implementation of each function is a project that consists of at least the following steps: requirements analysis, business process design, customizing (if necessary), test, training, and activation. The functions to be implemented should always be viewed in the context of the business processes applying them. As previously mentioned, extending the functionality of the ERP system via application development should be avoided if possible.

Experience shows that ERP systems tend to grow and the number of implemented functions and supported business processes increases. However, sometimes single functions or even whole business processes become obsolete. These functions should be identified, put out of service or even dismantled actively. Discarding these functions saves costs for (external) support, maintenance, testing and updates. Furthermore, unintended use of these functions and subsequent errors are prevented, and operating the ERP system becomes easier for the end-user.

Some important functions are not intended to be provided by the ERP system itself. These functions are not in the focus of ERP but are subject to other business information systems like Data Warehouses, Advanced Planning Systems and Product Lifecycle Management systems. Introduction, implementation and upgrades of these systems are managed separately. However, these systems are typically tightly linked to the ERP system via business processes and interfaces. In order to ensure the successful execution of business processes across system boundaries, the collaboration of these systems with the ERP system has to be carefully monitored and special emphasis should be put in maintaining the interfaces.

4.5 Data view

Functions of ERP systems store and manage large amounts of data that can be classified into master data and transaction data (see [34]). Master data describe persistent business objects the company has to cope with, e.g. customers, suppliers, products, bills of materials, and task lists. Transaction data reflect the ongoing business and its related documents, e.g. sales orders, purchase orders, delivery notes, invoices, material movements, and production orders. Data of ERP systems are created, read, updated, and sometimes deleted – typically in an underlying relational database. Although the basic structure of this database is predefined by the system's vendor, there are some degrees of freedom how to model business data: Often different types of one kind of master data have to be managed by one ERP system. For instance, piece goods and bulk goods are both materials with common attributes like material number and name, but there are also type specific properties like length, width, and height for piece goods and angle of repose for bulk goods. In order to provide type specific edit forms, properties, default values, ranges of values, and mandatory fields, so called "class lists of characteristics" should be applied. However, maintaining these lists (by adding, editing or removing properties or changing inheritance relations) requires much effort, since existing data have to be migrated. Therefore, reasonable care has to be exercised when defining class lists of characteristics.

Ensuring data quality is essential for achieving the objectives of ERP. This holds true for both master and transaction data. In order to avoid duplicate entries, as few users as possible should be allowed to create master data. To a certain extent, wrong or contradictory values can be prevented by defining explicit constraints and plausibility checks. Correctness and up-to-dateness of master data should be checked regularly. If the data are flawed, the extract, transform, and load (ETL) procedure, borrowed from data warehousing, will be applicable. First, the data are extracted from the database. Second, the data are analyzed and transformed into a consistent state. Third, the data are reloaded into the database.

The amount of active master data should be kept constant. For this purpose, obsolete master data should be purged from the ERP database together with the related transaction data. However, these data should be archived in a Data Warehouse for long-term analyses.

High quality of transaction data is as important as quality of master data. Especially dates (time points), durations, amounts of money, quantities of goods/services, and relations to master data have to be entered correctly. Another aspect of data quality is timeliness, i.e. transaction data should be entered at the point in time when the according business event happens. Sales orders should be entered when placed, material movements should be booked when the material is moved physically, progress towards production order completion should be confirmed when it happens, etc. As a consequence, back flushing (automatic goods receipt) should be avoided. If data were not entered correctly at the right time, the ERP system and its users would come to false conclusions while planning, and subsequent purchase or production actions would be faulty as well.

It is not possible to completely prevent entry errors – despite automatic checks and automated data capture via barcode scanners or similar tools. Periodic user training helps to keep the amount of wrongly entered data at bay. In order to identify wrongly entered data, all data should be analyzed periodically – best daily and at least weekly. The analysis should work automatically and identify suspicious data based on plausibility rules. Identified mistakes have to be corrected manually and immediately because some mistakes are irreversible after a certain amount of time. Furthermore, most mistakes result in subsequent faults which will become increasingly difficult to eliminate. Data Warehousing and Data Mining methods may support data management: When transforming data, filtering and

analyzing them, or loading them into a Data Warehouse, many inconsistencies could be found and subsequently eliminated in the source (ERP) system.

5. Conclusion and future work

Nowadays many companies use ERP systems. Although there is comprehensive know-how about selecting, implementing and operating ERP systems, many implementation projects face serious issues, exceed schedule and budget, and the goals of ERP implementation are only partially achieved when operating the ERP system afterwards. This contribution presented a collection of “Dos and Don’ts” for successful selection, implementation, operations, and maintenance of ERP systems.

In order to gain maximal benefit from ERP, the appropriate ERP system has to be selected. Therefore, the ERP system selection project has to be planned and conducted carefully. The selective list of viable systems should be long in the beginning and not be shortened too quickly. Instead, all viable systems have to be assessed according to suitability, sustainability and cost in a thorough pre-selection process in order to create a shortlist. The ERP systems on the shortlist have to be evaluated meticulously. The same care should be taken when choosing an implementation partner and negotiating the contract.

ERP system selection creates the basis for system implementation. From our point of view, key success factors for a successful implementation are top management support, involvement of all business departments and a well-considered project plan which takes the company’s specifics into account and is carried out thoroughly.

Once the ERP system is implemented and in use, it must not be neglected. Instead, it has to be maintained and should undergo a continuous improvement process that covers both business processes and ERP system installation. Special emphasis has to be placed on evolving business processes and keeping a high data quality.

As already mentioned, there are many process models covering selection, implementation, operations, and maintenance of ERP systems, e.g. [35]. When developing these models further, our recommendations should be considered. Current trends let us expect that ERP projects will become even more complex in the future. The extension of ERP clients from classical PC based terminals to mobile devices and cyber-physical systems will bring new challenges in developing and maintaining ERP infrastructures. In order to achieve the real-time enterprise (RTE) [36], the need of change in organization and business processes should be detected automatically by means of enterprise service buses (ESB) [37] in connection with complex event processing (CEP) [38]. ESB and CEP might even offer a chance of adapting and testing business processes semi-automatically. But the latter options are topics of future work and research.

Although our suggestions address every phase of selecting, implementing and operating ERP systems, they are far from complete. Nevertheless, they may help practitioners to avoid pitfalls and common mistakes when selecting, implementing and operating the next generation of ERP systems in their companies.

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An Enterprise 2.0 project management approach to facilitate participation, transparency, and communication

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Abstract:

The use of current interactive and collaborative Web 2.0 concepts and technologies has great potential for flexible, loosely-coupled integration and ad-hoc information exchange within and between organizations. However, stakeholders' readiness, willingness and ability to participate need to be continuously factored in. The successful implementation of common strategies, systems and processes in the course of Enterprise 2.0 projects is crucial. To increase the probability of success and to enhance the intensity of cooperation and trust in such projects, the constructs of transparency, communication and participation need to be addressed through an integrated project methodology. To bridge the gap between existing scientific models and requirements for Enterprise 2.0 projects, this paper proposes and describes a project methodology to support the main objectives for Enterprise 2.0 implementations. Selected results from two pilot projects within Austrian companies are presented and matched with critical success factors, which are derived from the literature. These provide elaborative insights into key characteristics of certain Enterprise 2.0 tools and project management for Enterprise 2.0 projects.

Keywords:

social enterprise; enterprise 2.0; project management methodology.

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1. Introduction

The outsourcing of business processes and services has led to increased complexity and less transparency across organizational structures, activities and processes [1, 2]. As a consequence, the effective identification, generation and utilization of information and knowledge has become a top priority for organizations and has established itself as a unique selling proposition to secure competitive advantage, continuous growth and prosperity for them and all their partners [3]. Traditional concepts, methods and systems, are increasingly incapable of meeting these demands. Information technology (IT), as a crucial enabler, can help to move companies with hierarchical structures and enterprise-centric value chains to a decentralized and synchronized electronically connected global network [4]. Modern thinking organizations have realized the potential arising from flexible, loosely-coupled integration and ad-hoc information exchange by the use of current interactive and collaborative Web 2.0 concepts and technologies within and between enterprises, also defined as Enterprise 2.0 [5].

The paper focuses on *participation*, *transparency* and *communication* as the main objectives for the results of Enterprise 2.0 projects within organizations, as well as linking several organizational partners that share relevant information to increase the intensity of *cooperation* and *trust*. Project management is crucial for building trust in organizations, because without stakeholders that are willing and have the ability to cooperate, no common strategies, systems or processes can be successfully introduced [6]. Therefore, we see project management as an essential factor within such projects to enhance participation, transparency and communication that needs to be integrated into an overall project methodology.

The scope of this paper is to find evidence that certain Enterprise 2.0 tools support the improvement of communication among participants, the participation of users and positively influence the interaction transparency, which in turn enables trust and cooperation capabilities. The corresponding research question guiding this research was: What are the key methods in project management of Enterprise 2.0 projects and which Enterprise 2.0 tools tend to have a positive impact on transparency, communication and participation in these projects? The remainder of the paper is organized to answer the research question as follows: Section 2 strengthens the paper's theoretical background by defining the central terms and factors used in this paper and introduces the research methodology. Section 3 summarizes the overall project methodology created and used within a three-year research project. Section 4 provides insight into how the key aspects of the research methodology are addressed within the project methodology. Furthermore, the main results of two pilot projects to evaluate the methodology are presented and subsequently matched with the main objectives of the research methodology. Finally, Section 5 discusses the contribution of the findings, their limitations and avenues for future research.

2. Background and research methodology

2.1 Theoretical background and definition of central terms

The literature of the last two decades discusses successful project management from the viewpoint of different fields, including 'Organizational Development' [7], '(IT) Project Management' [8], and especially 'Enterprise 2.0' [9–11]. Kim and Pan [12] and Sirkin [13] indicate that two out of three such projects fail. Relevant barriers that were identified in the literature range from technical, organizational, and environmental barriers. Technical barriers, for example, include usability issues that lead to the rejection of the new system [14]. A lack of commitment from the executives, inappropriate specification of requirements, misalignment of project goals and enterprise goals, unrealistic milestones, insufficient resources, time or money resulting from concurrent projects, or volatility in customer requirements are examples of organizational barriers [13, 15–18]. The so-called "Not Invented Here" syndrome, the fear of the unknown, or apathy, are additional examples of barriers in the context of the organizational culture [19]. Environmental barriers result from the various actors involved in cross-organizational projects, like legal issues arising from governments [20].

Sutanto et al. [21] reviewed and consolidated relevant published studies dealing with change management's critical success factors for intra-organizational IT projects. They identified the following six common critical success factors (CSF): CSF1 "Need for Change and Feasibility Analysis of the New System", CSF2 "Top Management Support", CSF3 "Shared Vision for System-Related Change", CSF4 "Systematic Plan for Project and Change Management", CSF5 "Institutionalization of System-Related Change" and CSF6 "Energy for System-Related Change".

Another approach was introduced by Ibbs et al. [22] describing change management principles (CMP). These principles need to be addressed in the project methodology of change projects: CMP1 "Promote a Balanced Change Culture", CMP2 "Recognize Change", CMP3 "Evaluate Change", CMP4 "Implement Change" and CMP5 "Continuously Improve from Lessons Learned".

Enterprise 2.0 projects are different from common IT projects in their nature for the following reasons [11, 23, 24]:

- They always have a deep impact on organizational and cultural changes by enabling employees to pro-actively enlarge their own role;
- They mandatorily need a critical mass of user involvement;
- They are confronted with the fact that suitable best practices and reputation do not exist;
- They confront the users with unused ways of working with IT systems (e.g. the use of tagging, the syntax of enterprise wikis, etc.);
- They are not yet an established part of a company's state-of-the-art IT portfolio;
- Their value for organizations and their employees is - in contrast to an ERP system for example - still neither clear nor proven, but seems to address an increase of the enterprises' productivity by enabling the users to do their jobs more effectively and efficiently through better availability of resources including organizational knowledge.

A lot of scientific models and literature deal with these success factors and barriers mentioned above and provide strategies to succeed in project management (e.g. the DICE framework [13], Double Loop Learning [25], Scrum [26], XP [27], PRINCE2 [28], PMBoK [29], or the concept of Perpetual Beta). However, the discussion on how these factors and strategies can effectively be put into practice for Enterprise 2.0 projects is in its rather early stages and change approaches discussed in areas such as Organizational Development seem to underestimate the impact of many factors [7]. How to influence the barriers actively is addressed rather unspecifically [13]. Moreover, it is mentioned that it seems to be necessary to adapt existing frameworks to meet the requirements of organizations and projects [15] and pursue a best-of-breed approach taking advantage of lessons learned from traditional phase-oriented models and the agile world [30]. To meet the specific requirements of Enterprise 2.0 projects we need to identify strategies for successful Enterprise 2.0 implementations and match them with the project methodology. Compared to the project management disciplines mentioned, little literature discussing methods and strategies specifically for Enterprise 2.0 projects can be found. However, McAfee [9] described the following six organizational strategies of an Enterprise 2.0 roadmap to succeed in such projects (ERS): ERS1 "Determine Desired Results, Then Deploy Appropriate ESSPs" (emergent social software platforms), ERS2 "Prepare for the Long Haul", ERS3 "Communicate, Educate, and Evangelize", ERS4 "Move ESSPs into the Flow", ERS5 "Measure Progress, not ROI" and ERS6 "Show That Enterprise 2.0 Is Valued".

A project is broadly defined as "a unique process intended to achieve target outcomes" [31]. Specifically, an Enterprise 2.0 project in this context is defined as a process intended to achieve the target outcomes with the help of Web 2.0 concepts and technologies such as wikis for project documentation, blogs for top-down communication, tagging and rating of enterprise documents, or enterprise social networking within and across organizations. These concepts and technologies need to be integrated via a single interface to reach their full potential [32]. If Enterprise 2.0 projects are carried out without considering the aspects mentioned above, they often fail because of either lengthy implementation processes without delivering results accepted by the users, or concurrently realized projects of higher priority which consume available resources. To increase the success of Enterprise 2.0 projects, all the project's phases and tasks should be organization-driven to consider the increasing complexity of organizations. This includes a company's

organizational structure, its processes, its people and recent struggles and needs, as well as its organizational experience (e.g. projects that failed in the past). Consequently, Enterprise 2.0 projects, like any other strategic change project, are likely to affect the people, processes, structures, technologies, suppliers, and business partners that work both within and across these boundaries [16]. The so-called re-educational, normative approach discussed in the Organizational Development Theory substantiates this opinion by expressing the importance of the employees and their opinions, intrinsic values and cultural norms as well as general acceptance and personal advantage for the success of changes. Only if change projects alter knowledge structures as well as opinions, attitudes, values and norms, and educate employees to change from dependent to independent and responsible people, accepting the decentralized, participative decision, can such changes succeed [7].

However, transparency, information sharing and open communication require partners that trust each other. The importance of cooperation between different stakeholders and trust in partnerships have been identified in the literature as key factors for successful IT solutions involving several stakeholders [33–35]. However, cooperation and trust cannot be directly addressed; instead, it requires a self-reinforcing cycle of transparency, participation and communication [36]. In this research we follow this self-reinforcing cycle and define transparency, participation and communication as the three main objectives within our research methodology in order to stimulate trust and cooperation in Enterprise 2.0 projects.

Transparency is defined as publishing decentralized (structured) process and status information that can be used by other processes or to improve process controlling [6]. Providing real time information creates transparency across organizations and drops transaction costs, improves performance and speeds up metabolism [37]. This may include transparency regarding the actual situation within the organization and in the supply chain (e.g. inventory level or downtime), transparency regarding the relationships of stocks, lead times and cash ratios and transparency of responsibilities (e.g. who controls which process by which rules) [38]. Particularly in global business competition, greater transparency in supply chain operations is very important for success, because it brings accountability and responsibility [4]. Besides this, there is also pressure from other stakeholders, such as governments and consumers for more transparency [39]. The potential contribution of Web 2.0 concepts and technologies to enhance transparency across different stakeholders has been highlighted by several authors [40]. Therefore, we adopted transparency as one of the main objectives.

Web 2.0 concepts and technologies can be used to promote participation by opening a corporate dialog [40]. *Participation* hereby addresses cooperatively working on an issue and rating, commenting, changing or creating a business object or its attributes instead of only consuming content [41]. This involves updating purchase order lines, changing contact information as well as commenting and rating of innovative ideas. Integration into a user's daily workflow and streamlining the intra- and inter-organizational processes to avoid redundant work is important in this context [23]. Ferron et al. even denote user participation as one of the most important characteristics of Web 2.0 [42]. Hence, we consider this factor as highly relevant for this research.

Communication is used in this paper's context for vertically (top-down or bottom-up) and horizontally imparting, exchanging and seeking information [43]. Information systems across organizations are basically used to support communication and information exchange between partners as well as to coordinate certain activities [44]. This in turn enables cooperation within and between organizations [36, 44]. In the course of Web 2.0 concepts and technologies the term "collaboration" is currently often used instead of or as a synonym for "cooperation" [45]. In this paper, collaboration is considered as a special case of cooperation, in which certain activities on the same artifact are performed among distributed teams within and across organizations [46]. As a consequence, we see communication as another main objective that needs to be addressed, in order to benefit from it and increase cooperation as well as trust.

2.2 Research methodology

Fig. 1 condenses the research methodology and its elements. The identified CSFs, CMPs and ERSs are the prerequisites to be addressed by the developed project methodology. In two pilot projects the organizations were guided by the researchers in the process of diffusing Enterprise 2.0 concepts and technologies. The projects delivered Enterprise 2.0 tools that support the paper's main objectives. These main objectives (communication, participation and transparency) are said to positively influence the intensity of cooperation and trust across the project partners' which will ultimately lead to the projects' success.

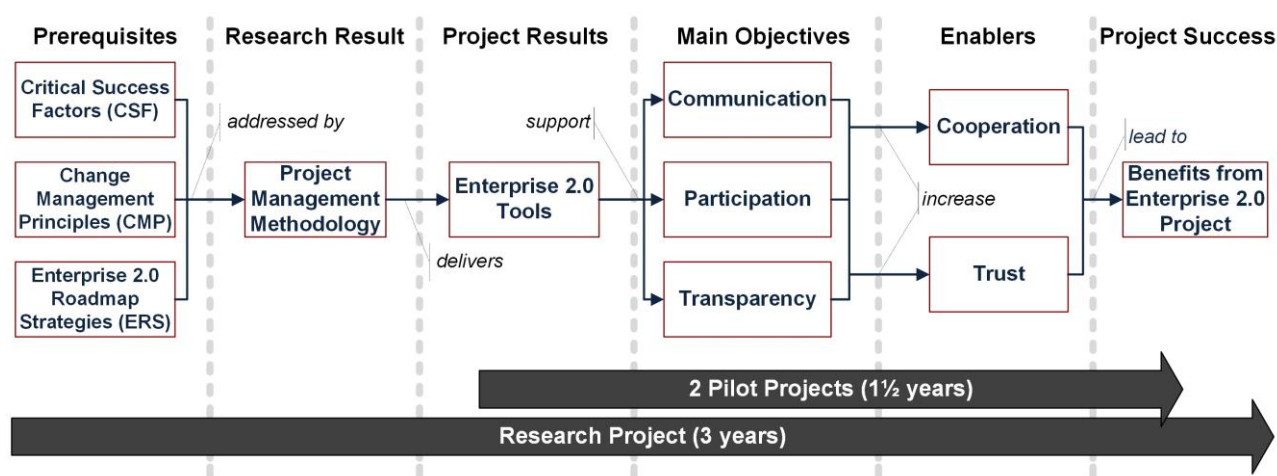


Fig. 1. Research Methodology

3. Project methodology overview

Literature can be found across different domains, dealing with proper methodology, processes and phases in project management. Following the analysis of Chroust [47] and Saha [48] in comparing phases of selected approaches in IT project management and software engineering, it can be stated that regardless of the domain, the process usually follows an: initialize ("whether"), analyze ("what"), design ("how"), implementation ("do"), deploy ("rollout") and operate ("support") sequence, comprising four to nine phases. In some models the first or last phases are not part of the process itself and other phases are split up or combined to emphasize certain issues in more or less detail. The phases do not necessarily follow a sequential order; they may overlap each other, may be fulfilled iteratively and usually have accompanying cross-phase activities like quality assurance, testing, documentation and project management.

In the course of a three year R&D project, the authors created a participative, evolutionary design especially for Enterprise 2.0 projects, which is a necessity for their success [11]. The methodology was practically evaluated in two separate projects with Austrian medium-sized companies. As already outlined in section 2, the first relevant success factors and strategies to increase the probability of success of Enterprise 2.0 projects were identified from the literature. After analyzing the key factors, a suitable methodology to address them within Enterprise 2.0 projects was developed. The resulting methodology is shown in Fig. 2. It includes the five phases: Assessment ("Whether to start the Enterprise 2.0 project"), Analysis ("What are the requirements?"), Design ("How can the requirements be realized?"), Realization ("Do the implementation and roll it out"), and Operation ("Support and evaluate the productive information system"). Within these IT projects, both common and well-established phases, the authors used specific methods to address the success factors especially within Enterprise 2.0 projects. An overview of the methods within the phases is given in the following subsections.

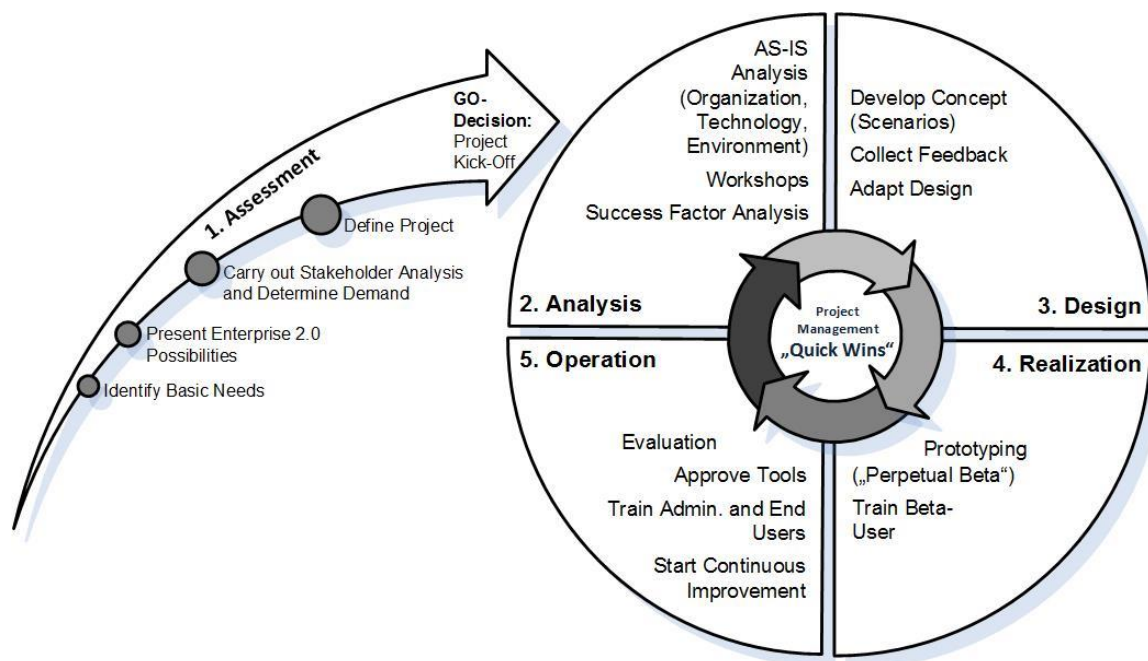


Fig. 2. Overview of the proposed project methodology

3.1 Phase 1: Assessment

The initial investigation to identify basic needs has to be done by the company itself. An internal project manager and promoter should present Enterprise 2.0 concepts and tools including possible scenarios where they could help to solve problems and make work more efficient for the top and middle management. The results of the discussions and feedback of the management team has to be aggregated to open issues that could be addressed by an Enterprise 2.0 project. Additionally, a stakeholder analysis should be carried out, as it helps to identify possible promoters and opponents of the project including their influence, power and possible reasons for their opinion towards the project. Via standardized questionnaires the basic needs and chances for supporting the company and its external partners with Enterprise 2.0 can be identified. These steps are important to find out the readiness and willingness for change, the underlying reasons and the urgency for the change [11, 16]. The identified promoters should be used as key players of the project and opponents should be persuaded of the benefits of the project.

The results of this first phase are taken as the basis for a project charter, containing the project's goals and vision, the resources, the milestones and the project methodology, and the negotiation of a contract. The last step of this phase is to decide whether to start the project or not (Go-Decision of the top management).

3.2 Phase 2: Analysis

After negotiating and signing the contract (Go-Decision), the project has to be set up and the as-is situation needs to be analyzed including the organizational setting, the involved business processes and the technical infrastructure. The first step is to form the project's core team (the top and middle management, the internal project manager and employees from the departments concerned e.g. R&D) and the process specific sub teams including external partners. The core team needs to agree on the project definition, the project plan and the project organization.

The stakeholder analysis carried out in the assessment phase is vital for the next step: conducting workshops in small groups (sub teams up to three people) using process cards to identify the most important process steps and getting more

insight via semi-structured interviews. Each workshop's aim is to identify and define one or two internal processes or processes involving external partners that can be supported by Enterprise 2.0 tools and concepts. It is essential to maintain an in depth focus on some important processes and not just on a broad overview of the entire company's processes. The workshops involve both the decision makers and the users, from the beginning. This is important because involvement of important influencers, decision makers and users is a necessity and enables one to identify the strategic drivers, goals, and critical success factors [16] but also increases the readiness for changes by procuring confidence [11].

Franken et al. [16] point out that organizations "have limited time and resources that they can devote to executing strategic change; hence, it is critical that change programs are prioritized. This requires an effective aligning and filtering process, as the number of suggested change programs is typically too great for an organization to pursue" [16]. To support this claim within the analysis, an additional questionnaire focusing on the priority of relevant processes and the recent satisfaction with its efficiency is issued. The completed questionnaires are the basis for an additional success factor analysis. To measure the success factors, techniques such as KnowMetrix [49], can be utilized. The aim of this step is to identify the most important processes and issues to be supported. According to the method, the average values of the two dimensions "performance" and "priority" arrange the matrix into four areas (quadrants). These resulting four clusters provide information on the need for action regarding the success factors:

- Quadrant I "Improve" has low performance and high priority;
- Quadrant II "Sub Relevant" has both medium-to-low priority and performance;
- Quadrant III "Well Done" has high performance and high priority;
- Quadrant IV "Exceeding Performance" has high performance and medium priority.

The main focus has to be laid on Quadrant I containing high priority factors that need to be examined in relation to the measures and whose performance has to be improved.

3.3 Phase 3: Design

The next step is to develop a concept for Enterprise 2.0 based tools for the important issues that have been identified during the analysis phase. Results from the workshops serve as a primary source for the design of tools. In addition, the results from the success factor analysis are useful in this phase especially for prioritization and the order of realization of tools.

Examples of tools to be designed are those such as "IdeaBoard" for innovation management, "CEO Blog" for top-down communication as well as project and team blogs for horizontal communication, "Market Factbook" wiki for product management, Social Networking functions including "Skills profile", etc. After presenting the concept to the project team, the feedback is collected and included in the concept.

3.4 Phase 4: Realization

The realization phase starts the implementation of the Enterprise 2.0 platform and its tools based upon the finalized concept in the way of perpetual beta implementation. In this rapid and agile software development method, the Enterprise 2.0 platform is rolled out ("beta release") and selected beta users are trained in an early phase. Feedback from the users is collected using a feedback blog and by conducting usability tests including eye tracking analysis and heuristic evaluation. Eye tracking is a reliable method in many studies [50] that has also been approved as appropriate in usability studies [51]. Furthermore, existing guidelines for usability need continuous reassessment with eye tracking technology [52] providing insights that would not have been possible with only one source of data [53]. Thus, eye tracking is useful as an additional method for evaluation in this multi-method approach.

The feedback and usability test results are essential input for continued improvement of each tool. Meeting the expectations of the users regarding functionality and usability is a key factor, considering the appraisal of IT systems [54]. The perpetual beta implementation method is a need because of the continuous change in organizations and the

possible on-going organizational and social structure's changes caused by the increasing use of the Enterprise 2.0 platform. Therefore, the solution might never be finished [11, 41]. Moreover, this process guarantees quick wins along with the active involvement of the users and is therefore a method that includes project marketing into the implementation process. These demonstrable improvements and realization of benefits are key for change projects [16]. Additionally, this method enables the project to quickly become part of daily work. This is an important success factor, as participatory technologies have the highest chance of success when incorporated into a user's daily workflow [23].

3.5 Phase 5: Operation

The project's aim is to get acceptance of each of the implemented tools and to start an on-going process of further improvement by the company itself. This is necessary because of on-going changes within a company and its environment [16]. To achieve this goal, admin users (e.g. system and platform administrators) have to be trained in addition to the conventional end user training. Involvement of the users including publication and rating of continuous feedback using a project blog is key for an Enterprise 2.0 project because it addresses the reputation and intrinsic motivation of the users and fosters participation [23].

4. Matching the methodology with the aspects of the research methodology

4.1 Addressing the prerequisites

This section shows how the proposed methodology meets the six critical success factors (CSF), the change management principles (CMP) and the Enterprise 2.0 roadmap's strategies (ERS) deduced from the literature in section 2. Addressing these aspects, the methodology shall increase the probability of success of projects applying it and therefore help to reach the projects' main objectives, which are transparency, communication and participation.

Table 1. Used methods and critical success factors (CSF)

	CSF1	CSF2	CSF3	CSF4	CSF5	CSF6
Initial Questionnaire / Presentation	X	X	X	X		
Stakeholder Analysis	X	X	X	X		
Workshops with semi-structured interviews	X	X	X	X		
Project Charter (Project definition, schedule, organization)		X	X	X	X	
Success factor analysis	X			X		X
Prototyping / Perpetual Beta				X	X	X
Training of beta-users, administrative department & end users				X	X	X
Usability evaluation using eye tracking	X	X		X		X
Heuristic usability evaluation	X	X		X		X
Collecting feedback with a blog	X			X	X	X

CSF1 - Need for Change and Feasibility Analysis of the New System | CSF2 - Top Management Support
 CSF3 - Shared Vision for System-Related Change | CSF4 - Systematic Plan for Project and Change Management
 CSF5 - Institutionalization of System-Related Change | CSF6 - Energy for System-Related Change

As shown in Table 1, the methodology provides different tools to identify the need for a change and the feasibility (CSF1). The initial questionnaires, the workshops, the success factor analysis, the usability tests and the feedback blog are used to collect requirements and identify problems to be solved. On top of this, the stakeholder analysis especially provides vital input for the feasibility of the project regarding readiness and willingness for change.

To ensure top management support (CSF2), the management team is involved from the beginning. They conduct or attend the first internal presentations, have to fill in the initial questionnaires, take part in the stakeholder analysis and in selected workshops. They also have to sign the project’s contract and are part of the project’s core team. The usability tests are used to measure and communicate progress to the users and the management team.

A shared vision and strategy (CSF3) are developed in the early stages of the project and are communicated directly in the project kick-off and mainly within the analysis phase. To be able to develop a systematic plan (CSF4) for the project and the change management, the input of all the aforementioned tools is used. To institutionalize the change (CSF5), the project team needs to be established; all users involved have to be trained and the feedback blog is used to enable all users to contribute to a process of continuous improvement.

To reach the necessary level of willingness and energy for a change (CSF6) and to keep this energy level high, it is important to identify the most critical issues using the success factor analysis. Moreover, the perpetual beta implementation enables the project to reach quick wins. Together with the training, it ensures that the project’s results can be put into practice as soon as possible. Collecting feedback by using the blog, the trainings and the usability tests and using these inputs for further improvement, keeps the energy at a high level.

Table 2. Used methods and change management principles (CMP)

	CMP1	CMP2	CMP3	CMP4	CMP5
Initial Questionnaire / Presentation	X	X			
Stakeholder Analysis	X	X			
Workshops with semi-structured interviews	X	X			
Project Charter (Project definition, schedule, organization)	X				
Success factor analysis	X	X	X		
Prototyping / Perpetual Beta	X			X	X
Training of beta-users, administrative department & end users	X			X	
Usability evaluation using eye tracking	X				X
Heuristic usability evaluation	X				X
Collecting feedback with a blog	X	X			X

CMP1 - Promote a Balanced Change Culture | CMP2 - Recognize Change | CMP3 - Evaluate Change
 CMP4 - Implement Change | CMP5 - Continuously Improve from Lessons Learned

Table 2 shows that the methodology's methods match the change management principles. Promoting a balanced change culture (CMP1) is supported by all of the methods used. Involving the management team right from the beginning, identifying the needs for change, developing a common vision and strategy and communicating them in workshops, blogs and trainings, supports this principle as well as collecting feedback and using it for further perpetual beta improvement.

The initial presentations and questionnaires, the stakeholder analysis, the workshops and the success factor analysis are valuable tools in recognizing the need for change (CMP2). The success factor analysis also helps to evaluate the change (CMP3) by identifying the priorities of the requested change issues.

To implement the change (CMP4) we use the concept of perpetual beta and the training of the different user groups. Perpetual beta, the feedback from the blogs and trainings and the results of the usability test ensure the collection of input for continuous improvement (CMP5).

Table 3. Used methods and Enterprise 2.0 roadmap strategies (ERS)

	ERS1	ERS2	ERS3	ERS4	ERS5	ERS6
Initial Questionnaire / Presentation	X	X	X			
Stakeholder Analysis	X	X				
Workshops with semi-structured interviews	X	X	X			
Project Charter (Project definition, schedule, organization)		X	X			
Success factor analysis	X	X	X			
Prototyping / Perpetual Beta			X	X	X	X
Training of beta-users, administrative department & end users			X	X	X	
Usability evaluation using eye tracking			X		X	
Heuristic usability evaluation			X		X	
Collecting feedback with a blog			X		X	X

ERS1 - Determine Desired Results, Then Deploy Appropriate ESSPs | ERS2 - Prepare for the Long Haul

ERS3 - Communicate, Educate, and Evangelize | ERS4 - Move ESSPs into the Flow

ERS5 - Measure Progress, not ROI | ERS6 - Show That Enterprise 2.0 Is Valued

Table 3 clarifies that the proposed methodology is aligned with McAfee's roadmap for Enterprise 2.0 projects (ERS). Before implementing a system, the determined results using different tools and methods are identified (ERS1). Timelines were prepared and communicated, right from the beginning. Change management was explicitly included in the methodology to accommodate the complexity and long duration of change projects (ERS2) within Enterprise 2.0 projects. The need to communicate, educate and evangelize (ERS3) is addressed by using methods involving the management team and the user actively right from the beginning to the end of the project. The perpetual beta implementation and the training concept enable the moving of the tools into the flow as soon as possible (ERS4). This implementation method and the continuous collecting of feedback and evaluating the usability, facilitates progress measurement (ERS5) and assesses the solution to see if it is valued (ERS6).

4.2 Addressing the main objectives

This section initially provides insights into the main results of two pilot projects. These key results are presented because of their relevance to the main objective of the paper: to address transparency, communication and participation via Enterprise 2.0 tools with the help of a multi-method approach in project management. Pilot project 1 was carried out from January to December 2010 with an organization that is working with three key technologies in three strategic divisions: wire rope, fibre rope and fibres & plastics, exporting over 90% of its products. With 750 employees in total, the company operates production facilities in five locations in three countries (Austria, the Czech Republic, and the USA). Pilot project 2 was undertaken with a manufacturer of premium bearings with about 200 employees, main suppliers in China and India, and worldwide customers from April 2010 to May 2011. In the following, core consolidated implementation results (“Enterprise 2.0 tools”) from both pilot projects are presented.

Having identified communication (pilot project 1 + 2), innovation (pilot project 1), sharing of real time enterprise resource planning data (ERP) and Warehouse Management System data (pilot project 2) and knowledge management (pilot project 1 + 2) as the main areas of interest, the authors designed specific tools to support these areas. The tools were prioritized and implemented on the basis of Microsoft Sharepoint Server 2010 in an evolutionary prototyping process – related to Web 2.0 projects usually referenced as perpetual beta [55]. In accordance with McAfee [9] and related work of on-going projects like the EU funded project OrganiK [56], the SLATES criteria (Search, Links, Authoring, Tags, Extensions, Signals) were utilized to indicate the technical features of an Enterprise 2.0 platform. Despite these technical features, the specific tools need to address the main objectives of the research methodology: transparency, communication and/or participation and support and/or improvement of existing processes.

To improve knowledge management activities, enterprise wikis, document libraries, and enterprise search were used. The so called “Market Factbook” serves as a knowledge database wiki for the product management, the IT Docs (the user and system manual of the Enterprise 2.0 platform) are in use by the IT department, and the R&D departments use a wiki to manage their external contacts. In addition, we implemented an enterprise search to locate relevant information across the whole platform. A special people search (our so-called Skills Database) is in place to find contact information as well as to locate personal expertise, former employees and qualifications of other people.

Regarding communication, blogs are used to communicate interactive top-down information from the CEO (including information on innovation goals and strategy), cross-departmental communication (R&D blogs) and project-specific communication (such as a feedback blog for the Enterprise 2.0 project itself).

IdeaBoards are applied to improve innovation management. They use blogs with additional fields (e.g. the expected benefit of the idea) needed for the generation and evaluation of innovative ideas. This increases the transparency of the innovation process across the organization by making ideas explicit. Fig. 3 shows that information provided is always explicitly associated with the author and is transparent, including a picture, which is clickable and redirects to his/her user profile.

Providing relevant real-time information for customers and suppliers is an important functionality addressed by the Enterprise 2.0 platform. Sharing real time stock information taken from the ERP or warehouse management system with selected customers increases the order processing efficiency, because customers can immediately order goods in stock instead of asking for the availability of goods. To improve the collaboration with suppliers open inquiries, data and purchase orders taken from the in-house ERP system are published on the platform. This enables suppliers to get access to all inquiries and orders that are still not confirmed. Furthermore, status information can be shared and communication for a specific inquiry or order (e.g. negotiating delivery terms, prices, etc.) can be centralized on the platform, thus substituting email communication. The main advantage of this tool is that information is not dependent on individual employees, but it is transparent for all involved stakeholders.

Additional Enterprise 2.0 functions for tagging, rating and commenting are available for all relevant tools – for example, the rating of an idea in the IdeaBoard, tagging a blog post of the CEO with the predefined “I like it”-tag or individual tags, but also commenting on a wiki page. RSS feeds can be subscribed to for new blog posts, wiki pages, comments, and search results.

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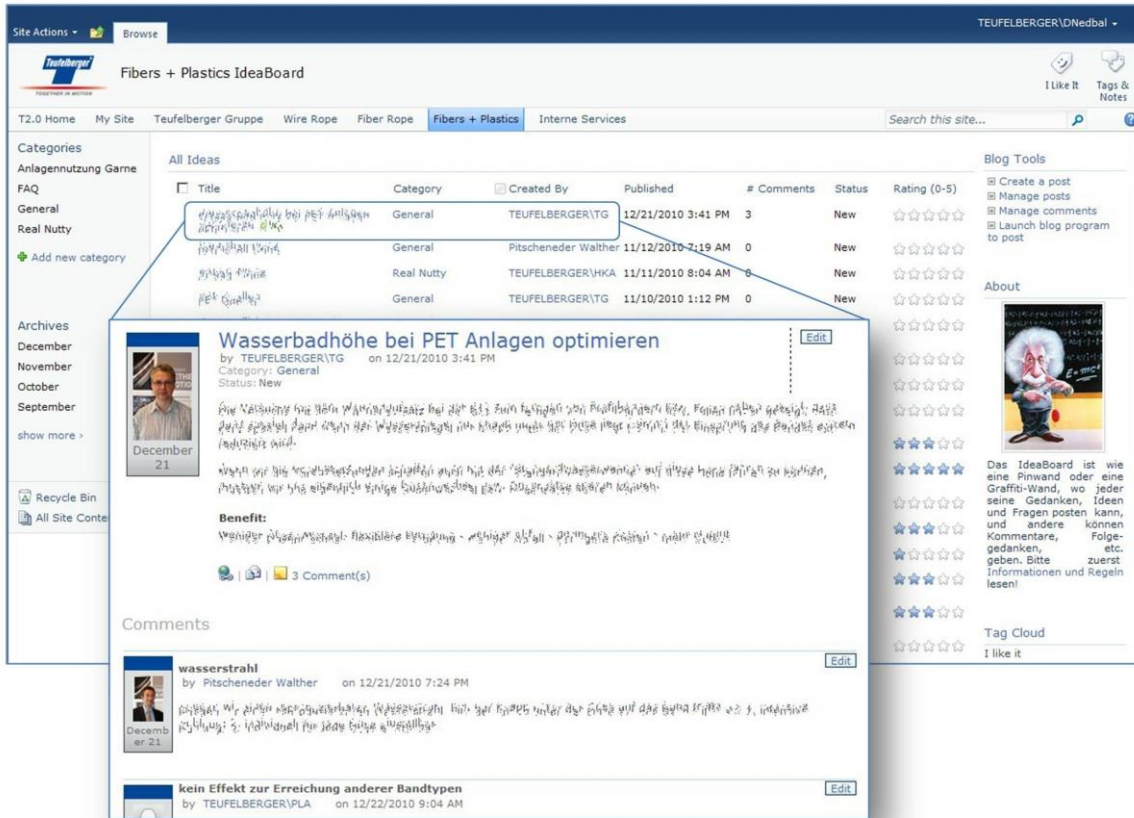


Fig. 3. Enterprise 2.0 platform: IdeaBoard overview and detail page

Table 4 contains a summary of all tools implemented using the introduced methodology and whether they contribute to the main objectives of transparency, communication and participation. The whole process was actively guided and methodologically supported by three researchers. The researchers were responsible for the overall project management including analysis, design, implementation and evaluation of the Enterprise 2.0 tools. After rollout of the tools, each of them was analyzed by the same three researchers as to whether it publishes decentralized process and status information (“transparency”), enables vertical and horizontal information exchange (“communication”), or supports cooperatively working on a business object (“participation”). Given the fact that three researchers were actively involved in the process, the opinions were based on the experiences from the project (including feedback from beta users, administrators, and end users from interviews, workshops and trainings according to the project methodology). Only if mutual agreement between the three researchers was achieved, does the table show a cross for the respective main objective. Enterprise Search, for example, lets users seek structured and unstructured information, therefore addressing transparency and communication.

Table 4. Implemented tools and their contribution to the main objectives

Tool	Transparency	Communication	Participation
Enterprise Search	X	X	
Skills Database	X		
Market Factbook Wiki		X	X
(IT) Documents Library (Wiki)		X	
External Contacts Wiki	X		X
IdeaBoard (Blog)	X	X	X
Blogs (R&D, CEO, Project)	X	X	X
Real Time Stock Information	X		
Supplier Inquiry & Purchase Order Portal	X		X
Customer Order Portal	X	X	X
Orders and Order Lines Negotiation Forum		X	
Order Status Tracking	X		
Engineering Drawings Exchange & Negotiation	X	X	X
Price List Information	X		
Delivery Date Update			X
Contracts and Supplier Agreements Library		X	
Document and Specification Library		X	
Tagging		X	
Rating		X	X
Commenting		X	X

5. Conclusion

The main contribution of this paper is to reflect the performed project management methodology to implement Enterprise 2.0 platforms with a special focus on the methods, activities and key results of the conducted phases. Furthermore, they are matched with the previously mentioned aspects deduced from the literature consolidated within the research methodology. Tables 1 to 3 in section 4 show how the proposed project methodology supports the requirements of change management and Enterprise 2.0 projects. Moreover, Table 4 in section 4 shows how specific Enterprise 2.0 tools were able to increase communication, participation and transparency in the pilot projects. The proposed structured and systematic approach targets both researchers and practitioners and allows itself to be applied to different, individual business contexts.

Utilizing the project methodology in the two pilot projects revealed several managerial implications. It was shown that the strength of Enterprise 2.0 resides in its ability to link well-defined processes and standardized information flows with unstructured communication and collaboration processes that have high priority but are insufficiently supported by existing enterprise solutions. The following examples underpin this claim:

- Blogs proved appropriate for different issues such as project marketing, team communication, as well as idea creation and selection;
- Wikis were useful for knowledge dissemination and project documentation;
- The integration of third party enterprise business solutions was easy to handle and enhanced the transparency of relevant information.

The main drawback in both pilot projects was a priority shift to focus on other issues with a higher contribution to business goals. This shift resulted in insufficient resources caused by daily business problems and strategic decisions. The social dimension and corporate culture in general are one of the biggest challenges within an Enterprise 2.0 project. This is why these challenges are addressed within the proposed methodology right from the beginning. This starts with the identification and motivation of key users and promoters that support and promote the project. Within the analysis phase the additional success factor analysis proved very helpful, as the results were made transparent in a participative way. The success factors were taken directly from the involved departments and the top-management was aware of the difficulties that came from the staff. The need for training and familiarization with the prototype was demonstrated by the comparison of the before and after results of this eye tracking study. Furthermore, during the beta test, additional usability flaws were discovered which confirmed the need for feedback and short improvement cycles via perpetual beta during the evaluation. In general, achieving quick wins and short-term effects to overcome internal and external barriers and building an “Enterprise 2.0 enabling” corporate culture is crucial.

As current research is limited to the pilot projects described, future research is needed to steadily consolidate the methodology and to elaborate it in further Enterprise 2.0 projects. The qualitative approach with the described pilot cases and experiences can only show preliminary examples of successful project outcomes. One specific challenge that needs to be better covered within the methodology is the priority shift of Enterprise 2.0 in favor of other business issues. To strengthen the validation of the research methodology, additional external experts should be involved. By reaching a statistically adequate number of projects, the methodology could be validated by established scientific empirical analysis techniques and methods. Currently there are three more projects with different organizations in progress. Experiences from these projects will be incorporated into the proposed methodology once they have been completed.

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CENTERIS '2013 Portugal

Conference on ENTERprise Information Systems

Already in its fifth edition, CENTERIS - Conference on ENTERprise Information Systems - aligning technology, organizations and people, will be held in Lisbon, Portugal, from 23 to 25 October 2013. The conference intends to attract original, pertinent and relevant contributions on the technological, organizational and social dimensions of Enterprise Information Systems, including ERP, CRM, SCM, e-business, etc.

Researchers are invited to submit their manuscript electronically at the conference webpage until April 15, 2013.

- General Chairs:** Maria Manuela Cruz Cunha, Polytechnic Institute of Cávado and Ave, Portugal
João Eduardo Quintela Varajão, University of Trás-os-Montes e Alto Douro, Portugal
- Program Chair:** Helmut Krcmar, Technische Universität München, Germany
- Organization Chair:** Vitor Fernandes, Polytechnic Institute of Leiria, Portugal

Detailed information available at: centeris.eiswatch.org

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ProjMAN '2013 Portugal

International Conference on Project MANagement

ProjMAN 2013 - International Conference on Project MANagement, is a CENTERIS 2013 co-located conference, to be held in Lisbon, Portugal, from 23 to 25 October, 2013. ProjMAN is a forum for academics, managers and solution providers, which brings together researchers and practitioners from all over the world, promoting opportunities to share experiences, debate ideas, identify tendencies, and introduce the latest developments in the largely multidisciplinary field of Project Management.

Researchers are invited to submit their manuscript electronically at the conference webpage until May 10, 2013.

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- Program Chair:** Maria Cunha, Polytechnic Institute of Cávado and Ave, Portugal
- Organization Chair:** Rui Rijo, Polytechnic Institute of Leiria, Portugal

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HCist 2013
Lisbon, Portugal

**Conference on Health and Social Care
Information Systems and Technologies**

HCist2013 - International Conference on Health and Social Care Information Systems and Technologies, intends to gather Healthcare Information Systems and Technologies professionals and academics to share and discuss current challenges, developments, case studies, integrated and practical solutions, as well as new products, findings and approaches to leverage the use of Information Systems and Technologies in healthcare.

Researchers are invited to submit their manuscript electronically at the conference webpage until May 15, 2013.

General Chairs: Ricardo Martinho, Polytechnic Institute Leiria, Portugal

Rui Rijo, Polytechnic Institute Leiria, Portugal

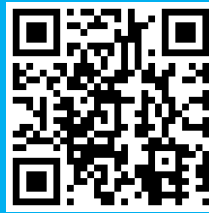
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