Business Process Management Journal, Volume 24 Issue 1, pp. 266-294
DOI:10.1108/BPMJ-11-2015-0162

Business Process Management Journal

# ERP Benefits Capability Framework: Orchestration Theory Perspective

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## Abstract

ERP benefits can be classified as automation, planning and innovation benefits. This research aims to answer two research questions: (1) what are the ERP resources and organizational complementary resources (OCRs) required to achieve each group of benefits? and (2) on the basis of its resources, when should an organization invest more in ERP resources and/or OCRs so that the potential value of its ERP is realised? Evidence from studying 12 organizations in different countries and validating the results with 8 consultants has been drawn upon to develop the ERP Benefits Realisation Capability Framework, showing (1) that each group of benefits requires ERP resources (classified into features, attached technologies and IT department competences) and OCRs (classified into practices, attitudes, culture, skills and organizational characteristics) and (2) that leaping ahead to gain innovation benefits before being mature enough in realising a firm's planning and automation capabilities could be a waste of time and effort. This research can be used as a benchmark for designing the various blueprints required to achieve different groups of benefits from ERP investments.

***Keywords***: ERP, Orchestration Theory, Capability Theory, Benefits Management, IT Business Value

## 1. Introduction

Although at the end of the twentieth century there was some debate about the impact of investing in IT on organizational performance (Carr 2003), it is now axiomatic that IT creates value for organizations (Kohli, Grover 2008) by affecting the process of organizational performance (Schryen 2013) and the organization as a whole (Nevo, Wade 2011). Although we know how to create this value, the financial performance of firms is still uncorrelated with investment in IT (Ho-Chang Chae, Koh & Prybutok 2014). Indeed, although the value of IT investments are divided into costs, benefits and risks (Badewi, Shehab 2013), the main component of the value creation comes because the benefits outweigh the costs of implementation (Tiernan, Peppard 2004).

Although the Benefits Management approach was widely believed to be critical for realising success (Ward, Daniel 2006, Ward, Taylor & Bond 1996, Baccarini, Bateup 2008), some writers argue against this (Breese 2012, Haddara, Paivarinta 2011) and empirical research led to



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The final published version (version of record) is available online at DOI:10.1108/BPMJ-11-2015-0162. Please refer to any applicable publisher terms of use.

disappointing findings compared to those of the project management approach (Badewi 2016, Badewi 2014, Badewi, Shehab 2016). However, combining benefits management practices with project management practices in a single project benefits governance framework enhances the value of IT investments more significantly than project management frameworks alone do (Badewi 2015). Moreover, studying the connection between project management and benefits management can lead to new and fruitful ways of overcoming the current failing rates of IT investments. According to Badewi (2016), the main connection point between project management and benefits management is the "blueprint", or future snapshot of what an organization will look like after implementation, including the processes, information, culture and attitudes toward the IT artefact. This blueprint (the To-Be state) aims at delivering the kind of organizational capability at the end of the day that realises the benefits (Ward, Daniel 2006, Axelos 2011, Serra, Kunc 2015).

The Resource Based Theory (RBT) lens has been found useful for understanding the relationship between the organization's differential benefits (competitive advantage) and the emergent capability from the new blueprint which comes from integrating IT into organizational processes. This emergent capability can be the source of competitive advantage when it is valuable, rare, inimitable and non-substitutable (VRIN) (Seddon 2014). But investment either in technology or IT department competences, on its own, will never be rare nor non-substitutable if it is merely expended; rather, it becomes irreplaceable through the complementary resources (OCRs) of the organization (Melville, Kraemer & Gurbaxani 2004, Schryen 2013). For instance, IT department competences are not a source of competitive advantage regardless of their rareness or non-reproducibility unless they are mediated with organizational agility (Chen et al. 2013). Consequently, synergizing both IT resources (e.g. Hardware, Software, IT department competences) and organizational complementary resources (e.g. organizational culture, structure) is believed to be an inevitable source of competitive advantage because it creates unique capabilities (Nevo, Wade 2010). In order to realise the benefits from Information Technology (IT) projects, Melville et al (2004) developed a business value model for doing so. According to this model, IT resources (Technological IT Resources (TIR) and Human IT Resources (HIR)) can achieve the expected benefits so long as organizational complementary resources (OCR) exist, such as non-IT organizational structure and culture. The ERP System subjects it to a special and critical look because it requires (and leads to) a radical change in the organizational culture, structure and power (Morton, Hu 2008, Ke, Wei 2008), besides making it



Business Process Management Journal

possible to integrate various information systems and technologies into a single harmonised system.

ERP benefits are heterogeneous in the mechanism of their realisation and the required organizational characteristics: these benefits can be classified into operational, managerial, strategic, IT infrastructure and organizational benefits (Shang, Seddon 2000, Shang, Seddon 2002). However, this research adopts Zuboff's framework (Zuboff 1985), classifying them into automation, planning and transformation benefits, as used by (Uwizeyemungu, Raymond 2009) for ERP systems. The rationale for using this classification is that it classifies ERP benefits into three groups only, each group requiring its own capabilities (Uwizeyemungu, Raymond 2012) and thus a special blueprint (detailing ERP resources and OCRs). Given this framework, the first research question is:

***RQ1: what are the ERP resources and Organizational Complementary Resources (OCRs) required to achieve the different kinds of ERP benefits?***

At the same time, the sustainability of a certain resource (or capability) as an enduring source of competitive advantage can be questioned (Makadok 2001, Teece 2007). In other words, each organizational capability may have a limited lifecycle (Helfat, Peteraf 2003) . In this case, the ability of the CIO (Peppard, Galliers & Thorogood 2014) or CEO (Chadwick, Super & Kwon 2015) to design, develop, expand and retire the portfolio of resources/capabilities would be the source of sustainable competitive advantage.

Resource orchestration theory in general gives us very general guidelines for the role of management in orchestrating (e.g. expanding, building, etc.) the organizational resources in such a way as to optimize performance (Sirmon et al. 2011). The root of this theory comes from contingency theory (Sirmmon and Hitt, 2009). In contingency theory, superior performance is an output of the "fit" between different organizational factors, different assets and/or different capabilities (Keller 1994, Drazin, Van de Ven, Andrew H 1985, Brush, Artz 1999). Likewise, the fitness between ERP and organizational function affects performance (Seddon, Calvert & Yang 2010, Morton, Hu 2008). This fit should be a dynamic construction (Albu et al. 2015) to reflect continuous growth and evolution until the "critical mass" is achieved (Davenport, Harris & Cantrell 2004). Thus, the second research question is

***RQ2: when, and on what basis, should an organization deploy more resources to leverage the ERP Business Value?***



Business Process Management Journal

Business Process Management Journal

Thus, this research aims to develop an ERP capability process model, using the orchestration theory lens (i.e. the dynamic and evolving fitness perspective), to advise professionals when they should invest in ERP resources and when they should invest in ERP organizational complementary resources. Process theories shed light on the sequence of activities and thus explain how particular outcomes evolve over time (Shaw, Jarvenpaa 1997). This process model is believed to be able to help us understand how ERP resources should be structured and developed over time to realise the ERP benefits. To sum up, to answer the first question, this research contributes to knowledge by extending the Melville's concept of IT business value (2004) to consider the resources required to realise each group of ERP benefits. Then, to answer the second research question, the orchestration theory, combined with the framework of synergizing the IT resources with OCRs, should indicate the emergence of new capabilities (Piccoli, Ives 2005).

## 2. Literature Review

### 2.1 ERP Business Value Model

IT business value is the impact of IT investments on organizational capabilities through the different levels of the organization (Schryen 2013) and thus organizational performance (Melville, Kraemer & Gurbaxani 2004). Likewise, ERP, besides its ability to reduce a firm's risk in uncertain circumstances (Tian, Sean 2015), is perceived to have a positive impact on organizational performance including the improvement of productivity and profitability (Nicolaou, Dehning & Stratopoulos 2003, Nicolaou 2004); of inventory reduction (Madapusi, D'Souza 2012); and of other measures of performance (Shang, Seddon 2000), together with improving organizational capabilities such as renovation (Ma, Dissel 2008), and leanness (Powell, Riezebos & Strandhagen 2013) capability. Therefore, conditioned by many factors, it affects organizational profitability (Dehning, Pfeiffer & Richardson 2006), the organization's market value (Anderson, Banker & Ravindran 2006) and therefore a higher stock market return (Ranganathan, Brown 2006). Thus, if it is implemented, integrated, used, absorbed and assimilated appropriately, it can be a source of competitive advantage (Stratman 2007, Romero et al. 2010) . Therefore, the ERP business value could be defined as the impact of ERP on organizational capabilities which affects the organization's financial and non-financial performance.

Business Process Management Journal

There are different business value models and frameworks (Soh, Markus 1995, Dedrick, Gurbaxani & Kraemer 2003) for understanding how IT investments create value for organizations. The IT Business Value model of Melville et al (2004) and the subsequent research (Schryen 2013, Nevo, Wade 2011) are used in this study because they consider both kinds of resource (organizational and IT). Indeed, a misfit between the ERP package (ERP resources) and the organizational functions (OCRs) affects both the success of implementing an ERP project (on time within budget) and project investment success after its implementation (Gattiker, Goodhue 2005). Therefore, ERP should be customised to a certain level and organizational processes should be changed to keep the fit between the two (Soh, Sia 2004). Therefore, this conceptual demarcation of resources by Melville enables us to use orchestration theory to make a certain IT group of resources contingent on a set of organizational complementary resources

### 2.1.1 ERP Resources

IT resources are IT investments in hardware, software applications and IT department skills, with the aim of achieving a specific business objective (Aral, Weill 2007, Wang et al. 2012). ERP resources may be defined as the ERP functions and features that enable an organization to record and process data accurately, along the supply chain (Forslund 2010) and/or it may be that the ERP features of integration, flexibility and transversality enable organizations to automate, inform and transform ways of doing business (Uwizeyemungu, Raymond 2012). Furthermore, an ERP system such as SAP has not only its own integrated modules but also other extended modules such as supply chain management, customer relationship management and other business intelligence applications (Holsapple, Sena 2005, Snabe et al. 2008). The existence of one module affects the entire performance: the more the modules are implemented and integrated, the higher the benefits realised (Madapusi, D'Souza 2012).

Human IT resources are also found to have an impact on ERP performance such as the ability to deal with any lack of fit between the organization's business processes and the ERP package (Customization) (Chou, Chang 2008). Furthermore, the IT competences in project management are found to be critical for delivering a ERP project within time and cost (Dezdar, Ainin 2011a) in a way which satisfies the users and assures them of its quality (Tsai et al. 2011, Tsai et al. 2012) thus realising the benefits (Velcu 2010, De Toni, Fornasier & Nonino 2015).

### 2.1.2 ERP Organizational Complementary Resources (OCRs)

Since ERP implementation does not happen in a vacuum, the existence/lack of the various Organizational Complementary Resources (OCRs) is argued to be critical for the variation in the

levels of success (Albu et al. 2015). OCRs that are found in the literature to be necessary are the organization's strategy, structure (Albu et al. 2015), control system (Kallunki, Laitinen & Silvola 2011), compensation system (Silveira, Snider & Balakrishnan 2013), people (Sammon, Adam 2010) including their demographics (age, cognitive style, education, gender and work experience) (Jasperson, Carter & Zmud 2005), peer advice ties (Ann Sykes 2015) and their psychological factors (e.g. readiness to change in attitude (Stratman, Roth 2002)) and top management roles (Law, Ngai 2007, Liu, Seddon 2009, Dezdar, Ainin 2011b) (e.g. their role in the continuous alignment between the organization's strategic objectives and the long term capabilities of the ERP (Chou, Chang 2008)).

Since benefit realisation from investment in an ERP system, i.e., the maturing of the capability to yield sustained benefits, depends on the effective use of the system (Somers, Nelson & Karimi 2003), the factors that affect the effective use of the system should be considered as OCRs in achieving such benefits. Not only is the negative impact of breaching the psychological contract with the users considered (Klaus, Blanton 2010), but also psychological factors such as perceptions of ease of use, usefulness, quality of vendor, quality of service and expected benefits in realising the desired benefits should be considered (Petter, DeLone & McLean 2008, DeLone, McLean 2003). Kamhawi (2008) finds that the perceived shared benefits affects the perceived ease of use and usefulness of an ERP system. As predicted by the Theory of Reasoned Action (TRA) (Montano, Kasprzyk 2008), the theory of Bagchi et al (2003) uses TRA to show that user involvement and attitude to the ERP system affect the way in which it is used.

### 2.2 ERP Benefits Dynamic Capability Model

There are two main schools of thought about understanding how benefits can be realised. On the one side, the benefits management school focuses on identifying, planning, executing, reviewing and exploiting benefits (Ward, Taylor & Bond 1996). On the other, the capabilities school focuses on identifying and assessing the impact of the organization's capabilities, competences and resources required for realising benefits (Doherty, Ashurst & Peppard 2011, Uwizeyemungu, Raymond 2012). However, ways of reconciling the two schools are hardly to be found in the literature. Studies which have attempted to bridge the gap between them are Seddon's study (2010), which shows that while current ERP resources and OCRS (i.e. functional fit and overcoming organizational inertia) are necessary for realising short-term benefits, long term benefits will not be felt unless benefits management is imposed through the implementing of improvement projects. In addition, Velcu (2010) found that when ERP resources are aligned



Business Process Management Journal

Business Process Management Journal

with the organizational strategy, they affect the performance of internal business processes and therefore customer benefits and financial benefits.

### 2.2.1 Dynamic Versus operational capabilities

Capabilities are of two types: operational and dynamic. While the operational capabilities are involved in the routine of performing individual tasks, the dynamic capabilities are involved in the routine of coordinating, integrating, expanding and retiring these tasks (Helfat and Peteraf, 2003). Amit and Schoemaker (1993) define operational capability as the ability of an organization to deploy, integrate and make use of its assets toward a specific goal. According to this definition, which this paper adopts, IT capability is the ability of an organization to deploy, integrate and make use of its IT resources to enhance organizational performance (Wang et al. 2012). Furthermore, the capability does not count as a full organizational capability until it becomes a routine integrated in the organization processes to the point where it permits the "repeated, reliable performance of an activity" (Helfat and Peteraf, 2003).

Each operational capability has its lifecycle, starting from the time when it was established. It becomes mature and ends with what is called capability branching. When capability branching occurs, the factors external to a capability (which can be external or internal to an organization) affect its lifecycle, such as a managerial decision to have a "selection event" point which transforms the performance by transforming the capability (Helfat, Peteraf 2003). Indeed, a managerial decision can reverberate throughout the creation of strategic resources (Sirmon et al. 2011). Thus, Helfat in 2007, describing the complementary operational capabilities (at the branching stage) of dynamic capabilities (e.g. to renew or redeploy), underlines the function of top management of structuring, bundling and leveraging the organization's resources/capabilities for the sake of achieving sustainable competitive advantage. To structure the resources means to acquire, accumulate and divest them. Once acquired, they must be bundled (tailored) into the organization's system so that the leveraging process (coordinating and deploying) can take place to achieve the organization's performance targets. Hence, it has been found that it is critical for top management to prioritize, synchronise and support (orchestrate) the resource management activities of managers at all levels of the firm in the interests of organizational performance (Chadwick, Super & Kwon 2015) and sustainable competitive advantage (Sirmon et al. 2011).

### 2.2.2 Resources Orchestrations

Asset Orchestration is the "capacity of managers to create purposefully, extend or modify the resource base of an organization" (Helfat et al. 2007) so that corresponding capabilities can be created (Helfat et al. 2007). Resource orchestration takes a firm one step further toward mixing

resources, capabilities and interventions by managers that deploy more resources (Sirmon, Hitt & Ireland 2007). Thus, resource orchestration is the integration of asset orchestration and resource management (Chadwick, Super & Kwon 2015). Each capability has lifecycle started at its foundation stage but they all end differently. They can end by any of the 6 Rs (renewal, retirement, redeployment, recombination, replication, or retrenchment) (Helfat, Peteraf 2003). Thus, by orchestration mechanisms, organizational performance can be transformed from one level to the next by deliberately "branching" the lifecycles of the organization's capabilities. Each resource orchestrated into an organizational IT portfolio creates a new capability that builds a new organizational environment state that may require a new resource (Cui, Pan 2015). In other words, resource orchestration theory implies that deploying an extra resource will lead to something (a capability) that leads to incremental performance (benefits) (Davis-Sramek, Germain & Krotov 2015).

Orchestration affects not only a firm's IT resources; it can also cover IT resources alone or organizational complementary resources alone, or these two combined. Wang et al (2012) show that investing in Technological IT Resources (TIR) at a time of stability is more effective at such times, whereas investing in Human IT Resources (HIR) is more viable in a dynamic environment. Indeed, Sirmon and Hitt (2009) find that the fit between the resource investment decision (which resource to invest in) and thwe deployment decision (where to deploy the resource) is more critical to the organization's performance than simply seeking to maximize any of the decisions alone. Therefore, it can be proposed that synergizing and fitting IT resources and organizational complementary resources (which resources should be deployed where and when) is more critical that merely rationalising the purchase of IT resources one by one or the development of organizational intangible assets (human resources capabilities) at some distance from the strategy of the IT resource management. By applying the same argument to ERP benefits, synergizing an ERP resources plan and plans for developing organizational human resources is expected to have a greater impact than focusing on any of these islands alone.

### 2.2.3 Benefits Management and Dynamic Capabilities

Benefits management frameworks and models are implicitly inherent in the concept of dynamic capabilities. For instance, researchers spotlight the value of benefits exploitation capability in realising more benefits from the current IT portfolio (Ashurst, Hodges 2010, Ashurst, Doherty & Peppard 2008) and ERP system (Norton et al. 2013) by investing in organisational resources (e.g. training) rather than technological ones. Likewise, the active benefits management



Business Process Management Journal

framework shows that benefits management is a continuous process (Remenyi, Sherwood-Smith 1998). Davenport et al (2004) underlines that ERP implementation is an ongoing process until the "critical mass" of implementation is achieved, able to integrate the main function of departments so that the full value of ERP can be realised. Therefore, it is practical to use a benefits review as a mechanism to follow up implementation and take action so that the organizational fitness with current and new ERP implementation is perceived to be associated with the organizational sustainable financial performance from ERP (Nicolaou, Bhattacharya 2008).

The factors required to realise ERP benefits are immense. Without a significant capability in the organization to change as it implements the new technology, the benefits will not be realised and thus the value of investing in this technology will not be felt. The activities required for delivering ERP benefits are project management factors (for IT Resources) and management factors for business change (for OCRs) (Badewi 2016). Both should work together in a unified and consistent framework for managing the value curve which underpins the organizational capabilities (Axelos 2011, Jenner, APMG 2014, Serra, Kunc 2015). Figure 1, adopting the value curve, helps to visualise the idea of the different blueprints required for achieving different benefits

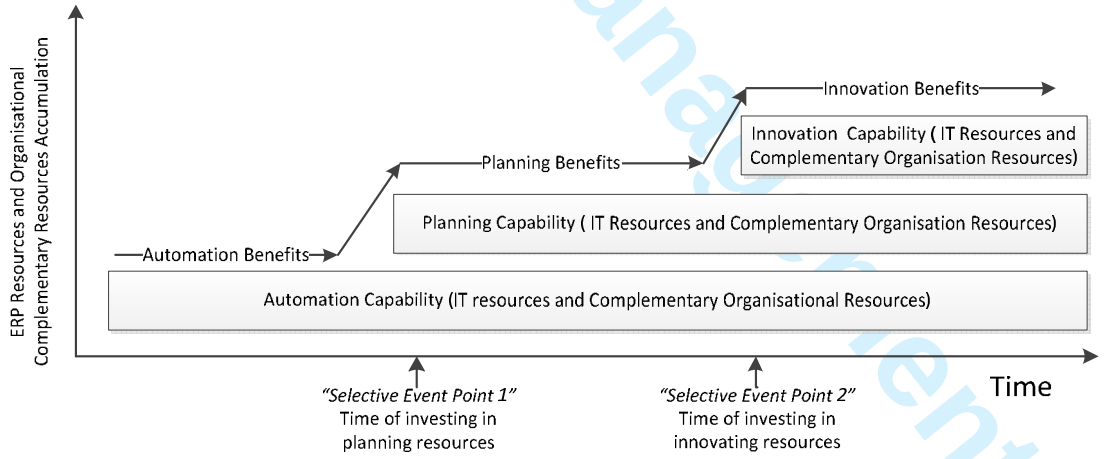



**Figure 1: Framework showing the Capability for Realising ERP Benefits**

## 3 Research Methods

In this study, we conducted case analysis of 12 organizations that have implemented ERP and 8 consulting organizations in a range of developing and developed countries; namely, Egypt, Saudi Arabia, the UK, USA and Australia. Table 1 summarizes the major characteristics of these firms.



Business Process Management Journal

We used purposeful sampling and considered several factors in selecting the cases. First, Information Systems in Developing Countries (ISDC) are quite different from their counterparts in developed countries, in particular in the context of IS innovation (Avgerou 2008). In addition scholars working in the interpretive research paradigm believe that the reality of one organization is not the same as that of another (Walsham 2014). However, selecting organizations from different countries, contrasting and comparing the organizational factors, above all the cultural factors, has been found very helpful in theory development. Second, A UK private organization which was perceived to have shown unusual performance by means of its ERP system was contrasted with another private one from the USA which was perceived to have shown normal performance with the same means. In addition, a UK council which had a relatively well-integrated system was contrasted with an Australian council which had a less well-integrated ERP system. A Saudi ministry which had invested more in IT was contrasted with a Saudi Bank which had invested more in people. Third, five Fast Moving Consumer Goods (FMCG) organizations in Egypt, the Emirates, Saudi Arabia and the UK were contrasted because all of them face the same problems of tracking, planning and innovating in their product lines. Finally, a healthcare organization which had a continuous innovation programme was contrasted with the other organizations. Later, eight consultants in the UK and Egypt were approached. They were selected for their long service (15 years or more) and for their experience in international projects involving ERP implementation and/or the management of realising ERP benefits.

We collected data for this study both from interviews and archives. The participants were approached in a snowball process at some public and private organizations where ERP was implemented and/or where they worked as senior ERP consultants. The average interview time was four hours, including initial and follow-up sessions. Interviews were tape-recorded unless informants objected. To assure the accuracy of the interview data, we conducted number check (Lincoln and Cuba, 1985) in which the original informants verified our tape transcripts or interview notes. The aim of these interviews was to grasp the social constructions of experts about the different ways in which they implemented the ERP and then to validate and contrast these with the results from the previous stage.

Data have been collected from interviews in 12 organizations which have implemented ERP and 8 consulting organizations in a range of developing and developed countries; namely, Egypt, Saudi Arabia, the UK, USA and Australia (Table 1). The participants were approached in a snowball process at some public and private organizations where ERP was implemented and/or



Business Process Management Journal

Business Process Management Journal

where they worked as senior ERP consultants. The average interview time was four hours, including initial and follow-up sessions. In parallel, relevant documents were collected from each organization. Annual IT reports (such as progress reports on plans for realise benefits) and information about ERP implementation and post-implementation plans were analyzed.

Data analysis used familiar approaches for inductive studies (Eisenhardt, 1989; Glaser & Strauss, 1967). Analysis began with detailed written account and schematic representation of each ERP implementation process. After constructing the case histories, we conducted within case analysis, where the basis for developing early construct surrounding ERP implementation process. For this purpose, we focused on analyzing the interview data as well as integrating and triangulating facts from various data sources. Triangulation of archival and interview data enables richer and more reliable description of each case (Jick, 1979) and improves construct validity (Yin, 2003).

Next, cross case analysis was conducted, looking for similar constructs and themes in the cases (Eisenhardt and Graebner, 2007). In order to preserve the integrity of replication logic across cases (Eisenhardt, 1989; Yin, 2003), we began cross case analysis after most data had been collected. We relied on constant comparison across multiple informants and over time to detect concept patterns (Glaser and Strauss, 1967). We also used archival data in order to enable richer and more reliable description of each case (Jick, 1979) and improves construct validity (Yin, 2003). In an iterative fashion, we analysed the data by continuously visiting the consistency between the data and an emergent structure of theoretical arguments (Miles & Huberman, 1994). We also presented the inductive model to informants inviting their feedback and comments. These interactions were conducted through face-to-face meetings, telephone discussion, and email dialogue.

Information Systems in Developing Countries (ISDC) are quite different from their counterparts in developed countries, in particular in the context of IS innovation (Avgerou 2008). In addition scholars working in the interpretive research paradigm believe that the reality of one organization is not the same as that of another (Walsham 2014). However, selecting organizations from different countries, contrasting and comparing the organizational factors, above all the cultural factors, has been found very helpful in theory development. In the present study, a critical realist paradigm was used, which contrasted transcripts. As shown in the interview guide (Table 6), peers were asked about what others had done, to see whether they agreed or disagreed and why, on the principle of "revealing and challenging prevailing beliefs

and social practices" (Myers, Klein 2011). In fact, getting rich input from different countries improved the process of theory development since different experiences in different contexts helped to explain the differences in realising the benefits from the use of ERP.

A UK private organization which was perceived to have shown unusual performance by means of its ERP system was contrasted with another private one from the USA which was perceived to have shown normal performance with the same means. In addition, a UK council which had a relatively well-integrated system was contrasted with an Australian council which had a less well-integrated ERP system. A Saudi ministry which had invested more in IT was contrasted with a Saudi Bank which had invested more in people.

Moreover, five Fast Moving Consumer Goods (FMCG) organizations in Egypt, the Emirates, Saudi Arabia and the UK were contrasted because all of them face the same problems of tracking, planning and innovating in their product lines. Finally, a healthcare organization which had a continuous innovation programme was contrasted with the other organizations. Later, eight consultants in the UK and Egypt were approached. They were selected for their long service (15 years or more) and for their experience in international projects involving ERP implementation and/or the management of realising ERP benefits. The aim of these interviews was to grasp the social constructions of experts about the different ways in which they implemented the ERP and then to validate and contrast these with the results from the previous stage.

**Table 1: Interviewees**

| | Organization | Country | Role | Exp | System | Available Systems* |
|---|---|---|---|---|---|---|
| **1** | Pharmaceutical Company | Egypt | ERP Manager | 5 | SAP | P, S, A |
| **2** | Health Care Services | Saudi Arabia | SCM Manager | 4 | | P,S,A, D |
| **3** | Pharmacy Retailing Group | Saudi Arabia | Corporate Sales Manager | 20 | EPICOR | P,S,A |
| **4** | Ministry | Saudi Arabia | IT manager | 15 | Best-of-breed | All Except Pr |
| **5** | Bank | Saudi Arabia | ERP integration manager | 10 | Best-of-breed | All Except Pr |
| **6** | Government | Australia | CIO | 17 | Best-of-breed | All Except Pr |
| **7** | Safety and Security tools manufacturing | USA | ERP Analyst | 14 | Oracle | All |
| **8** | Nuclear Technologies | UK | ERP Consultant | 15 | Oracle | All except Pr |
| **9** | Food and Beverage production | UK | ERP Manager | 7 | SAP | All |
| **10** | Food and Beverage production | Emirates | Supply Chain Manager | 6 | SAP | All |
| **11** | County Council | UK | ERP Manager | 8 | Oracle | All except Pr |



Business Process Management Journal

| | | | | | | |
|---|---|---|---|---|---|---|
| | (Focus Group) | | Programme Manager | 12 | | |
| | | | ERP Customer Manager (ERP) vendor representative | 20 | | |
| **12** | Food and Beverage production (Focus Group) | Egypt | IT Infrastructure Manager | 6 | SAP | All except O |
| | | | MM ERP manager | 5 | | |
| | | | SD ERP manager | 5 | | |
| | | | CIO | 20 | | |

*P → Purchasing, Logistics and Inventory System , S→ Sales and Customer Services, A→ Accounting Information System, D→ Advanced Data Analytics Pr→Production and M→ Fixed Assests and Maintenance system, O→ Other customized systems

## 4 Findings

### RQ1: what ERP resources, Organizational Complementary Resources (OCRs) are required to gain the different kinds of ERP benefits?

ERP benefits in this research are divided into automation, planning and innovation benefits, while automation benefits concern the productivity of organizational processes, better management of warehouses, informational (planning) benefits concern improvements in production scheduling and in decision-making (Uwizeyemungu, Raymond 2010). Transformational (innovative) benefits, for their part relate to the development of new products. This framework is used in the literature that deals with understanding ERP effects (Uwizeyemungu, Raymond 2009, Uwizeyemungu, Raymond 2012, Uwizeyemungu, Raymond 2010). Building on this area of research, this research divides benefits into automation, planning and innovation benefits

### 4.1 ERP Automating Benefits

ERP Automating benefits are benefits that are realised once an organization automates its value-engineered business processes. Automating current processes does not add much value in itself; rather, automating the new processes that are value-engineered is the main way to derive value from automating benefits (Peppard, Rowland, 1995).

> "*The problem that we faced in ERP implementation in our company* ***is automating the AS-IS.*** *We did not have at that time the* ***vision of the To-Be****. Indeed, it was a very big mistake which costs us a lot, later. Without understanding why do we do what we do, we will not be able to "fit" the ERP in a way that would let the benefits be realised*" ERP consultant in UK from the food industry.



Business Process Management Journal

Automation benefits of ERP are seen in the productivity of the organizational processes, better management of warehouse space and better integration of resources (Uwizeyemungu, Raymond 2010), cost reduction through time reduction, elimination of double entry, reduction of errors and less time in the cycle of purchasing and selling.

#### *4.1.1 ERP Automating Organizational Complementary Resources (OCRs)*

Regardless of the importance of ERP resources to achieve automating benefits, they are not sufficient unless they are complemented by the organization's capacity to realise these benefits. Therefore, to be able to have ERP automating, ERP automating OCRs should first be available. ERP automating capability is defined as the ability of an organization to map all business processes on tits ERP system in such a way that all data from their origin to their destination are recorded and analysed using ERP resources.

The ultimate automating benefits can emerge only when the users of the system integrate its use in their practices in such a way as to minimize the manual work. These practices can be valid only if there is a positive attitude (based on ease of use, usefulness and the need to use) to the system, which inclines the users to use it. This attitude may be governed by the organization's values vis-à-vis changes and organizational transformations (Besson, Rowe 2012). Likewise, this research has found that cultural factors such as openness to new ideas and readiness to change are critical for accepting the ERP as a concept. A disciplined culture (with its routinisation of the organization's processes) is found critical for successfully mapping the business functions on an ERP system. Indeed, openness and readiness to change usually come if one is self-confident enough to be able to control the environment (the fear of the unknown represented by new technology and new business processes).

> "*Before implementing the ER … [we tried] to make **business process re-engineering** before implementing the ERP. By doing so, we could hedge **the risk of the negative perception by the users and their reactions to the new processes** and the risks of **new technology**.*" ERP Consultant in Egypt

This may explain why Ram et al (Ram, Corkindale & Wu 2015) found a positive relationship between the readiness to change and successful business process re-engineering and system integration. Indeed, this culture was found to have affected the different factors such as the users' age, education and background.

> *" You know what is our problem in integrating the processes of ERP in our employees DNA? They are less familiar with technology. Although we had an easy*



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> *system before implementing SAP, but SAP for them has been overwhelming. This company as you see is in a* ***very remote area****. The human resources available* ***are not qualified to use such technology****… To be honest, when you see a company dominated* ***by old mature people*** *it is* ***not really easy to change them****."* CIO of an Egyptian food manufacturing company

### *4.1.2 ERP Automating Resources*

The ERP resources required to achieve automating benefits are classified under technologies, features and IT department requirements. The features that appear to be important are features that enable workers to adapt quickly to the system from the psychological perspective, features such as the convenience and comfortable interfaces and self-help support features, to reduce the anxiety of the users and decision-makers about adopting a new system. Although ERP is known in automation software, some organizations are not able to experience its automating benefits. Such benefits need not only to be integrated in a certain department, but also needs integrating as a whole which functions as a single system in the enterprise. Thus, if ERP cannot be integrated in this way, it fails to confer the automating benefits.

The technologies that are perceived to be required are scanning and text reading technologies and tracking technologies such as RFID and Bar Code, which connect an organization via technologies with other external organizations and, most important, which integrate one technology with others. For instance, unlike the British local authority body which has a "scanning" system (to digitalise the manual invoices and external documents with an external stakeholder which is not integrated with the current system), the Australian governing council struggles hard to integrate its own system with those of its vendors, citizens and other external parties because they do not have a suitable integration platform

> *"I mean we would have focused* ***on our software suppliers*** *to move much faster into the area of* ***connecting with the core system.*** *For example, let's say the taxation system – make that available for citizens as well itself: mobile applications hifi applications and IPad applications android, all that is very, very slow to come forward.* ***I mean that is one of the problems****"* CIO Australian Government

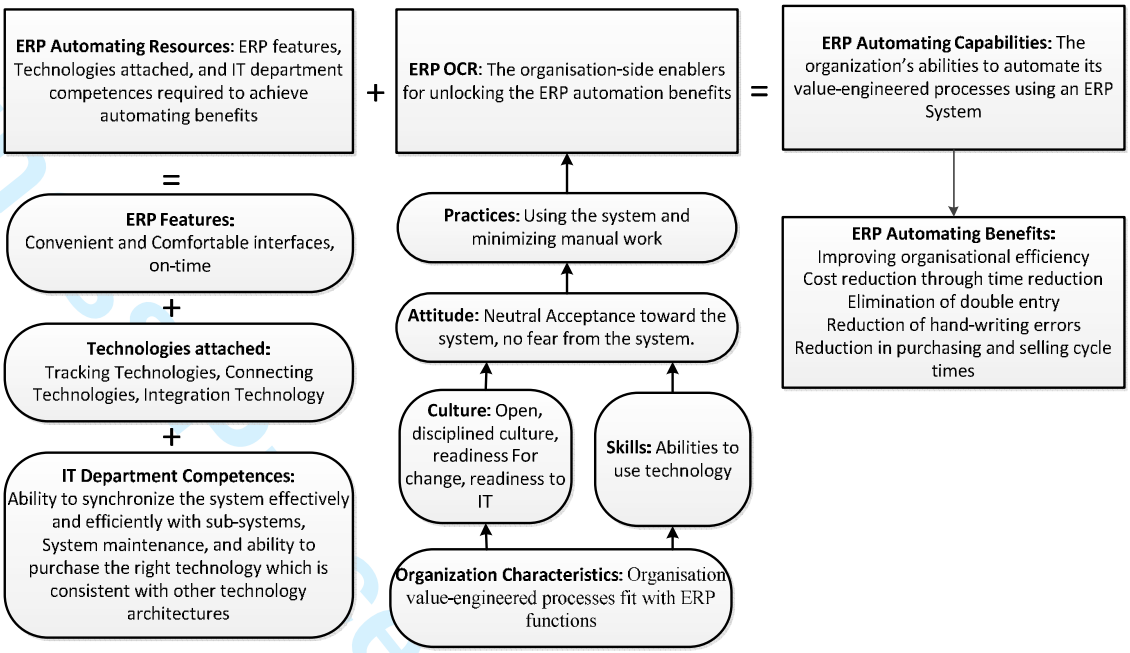



**Figure 2: Process of Realising ERP Automating Benefits**

Although ease of use and perceptions of usefulness are psychological factors, ERP resources can ease the way a job is done by using simple customized systems in routine places, as a Point of Sales (POS) system does. Unlike the Egyptian food company in which users were challenged in using the system because it caused a bottleneck in the processes of their sales functions, a pharmaceutical company in its marketing department overcame this problem by implementing an "easy-interface" system for sales representatives and integrating this system with the ERP.

> *"Yet our marketing department has struggled a lot in implementing the ERP. After discussing that with the XYZ consulting company, we implemented a very easy point of sale [application] which is integrated with ERP. Doing this mad the implementation very successful and now the marketing and sales people are using the ERP in virtually all their transactions"* MM (Material Management) SAP consultant at an Egyptian pharmaceutical company

The IT department competences required are technical competences such as the ability to synchronize the systems effectively and efficiently without breaching, so that users can trust the reliability and adaptability of the process.

### 4.2 ERP Planning Benefits

Planning and controlling benefits are benefits that are realised from the ability to use the ERP system to understand, and therefore to predict, the behaviour of the internal and external environment so that an organization can plan and therefore control, its environmental factors.



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ERP, according to the literature, can, it is argued, affect the forecasting quality (Dorantes et al. 2013). Nevertheless, this research found that this statement is based on many assumptions. The assumptions can be classified into OCRs and ERP resources as illustrated in Figure 3.

#### *4.2.1ERP Planning Organizational Complementary Resources (OCRs)*

ERP planning capability is the ability of an organization to use ERP planning resources so as to understand and therefore control, the external and internal environment. OCRs were found to be critical for building ERP planning capability (being part of the organizational routine) and were found to be either users' factors (skills and attitudes) or organizational factors (characteristics and culture).

Capability needs to be mature before it can realise its benefits and be self-sustainable. This will not happen until it is integrated in the organizational routine or becomes part of the users' practices. For it to be a part of the users' routine, they must value the use of it and perceive the ease of use in the planning process. Both perceptions are required for a positive attitude toward it (Badewi, Shehab & Peppard 2013). Without knowing how to use it, these perceptions will undervalue it lowest and therefore will not use it effectively enough for gain the expected benefits (Burton-Jones, Grange 2012). In this research it has been found that, to use it, employees need to be IT qualified (and able to work on reports) and qualified in business practices (able to recognize planning models in sales and/or inventories). As the quotation in Table 2 shows, the reporting skills of an IT-user are his/her ability to comprehend and use the ERP reporting features smoothly, whereas the business reporting skills are the his/her ability to understand and to apply the business planning principles and concepts of ERP reporting functionalities.

Hence the quality of the planning system is found in some studies not to be critical for using these systems (Popovič et al. 2012), where the knowledge share culture could be the missing link (Popovič et al. 2014). In this research, we found that a negative knowledge share culture affects management policies in setting different permissions and accessibilities regarding data in different departments in such a way as may hinder effective planning.

> *The problem in planning through the system is that* ***decision-makers want to hold on to the information:*** *they* ***do not want to share information*** *across different department" ERP Implementation Consultant at an Egyptian Company*

> *"In my experience, there is* ***no clear intention to enable organizations to share data****. As a supply chain manager I* ***cannot see*** *the demand forecasts from the marketing department although we have an integrated system. That is why we are still working*



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*on a **push inventory**. You cannot imagine **how much we lose because of that**. I have talked to top management a million times but no way." Supply Chain specialist in Food Manufacturing at an Emirates company*

**Table 2: sample of quotations showing the skills required for planning using ERP**

| IT- users reporting skills | Business reporting skills |
|---|---|
| *"Although we gave them a lot of training on planning features, users do not know how to **use the planning features of the system**. They are not interested in the system. The **training** was **not effective** at all because they were **not involved in the system** itself"* Production Planning SAP consultant at Egyptian Food manufacturing | *"Based on my experience of ERP systems, a significant number of organizations fail to recoup planning benefits not because of the ERP; but because users **do not understand the planning concepts** in it."* ERP consultant in Egypt |
| *"Planning activities could be more abstract, as I mentioned before (realising the benefits requires money and time). When I saw MRP implemented that essentially matched supply and demand, I saw the planning people **overwhelmed**. They planned on a **spread sheet and implemented it on ERP**. It is **more accurate** but it **is not easy for them**. If users do not use it, then **you will not get the benefits**."* ERP analyst at an American company manufacturing safety equipment | *"In the Inventory department, the users and super users **do not understand the inventory models.** However, in the Accounting and Costing department, the new manager gives cost accountants training in modern accounting principles. This has had a significant impact on users to not only **believe in the power of the system**, but also this **made them start to plan costs using the ERP**"* MM SAP consultant at an Egyptian food manufacturing company |

Furthermore, if an organization does not value the planning function of management, it cannot be expected to plan using ERP, which poses more challenges in learning and adopting. This idea was triggered when an Egyptian expert claimed that the first reason for not achieving any planning benefits from ERP is that the organization in itself does not have any manual/ or structured method of planning. This argument was scrutinized by the other interviewees and found to apply to Arabic organizations at least.

*"Planning!! They do not have **any structured planning system**. Planning in best cases is for the week. **I have never seen any of them using any ERP planning tools**. Organizations should know how to plan first before using ERP for planning" ERP Oracle Consultant in Egypt*

Thus, we found an organization that applies lean principles in Egypt has a strong planning system to minimize its costs. This indeed helped the organization in question to realise planning benefits that were beyond its peers. Furthermore, organizations which strongly believer in the power of technology in planning and scheduling activities outperform others which do not. This is consistent with another research belief that pre-implementation expectations affect the use of



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the system in the post-implementation phase (Saeed et al. 2010, Veiga et al. 2013). However, there are organizations that value the culture of planning, but do not believe in the value of using ERP for planning.

> *"The users undermine the use of ERP in planning. They **believe that ERP is not for planning**. It is just to automate the processes. They still plan using Excel. There is **no clear motivation to explore or exploit the ERP planning features**" MM specialist at an Egyptian food company*

#### *4.2.2 ERP Planning Resources*

ERP resources are technologies, features and IT department competences. The features found to be most important are their convenient statistical reporting features, convenient at least from the perspective of users and visual tools in reporting features. In one organization,

> "*I think one of the weaknesses of the ERP system is that sometimes tools for planning are **not too easy to use**. Planning data **can be overwhelming** to the user and I know upnext?? in my other company, we have reliable custom reports and custom screens to **help users really be comfortable with planning that are provided by the ERP system***." ERP Analyst at an American company producing safety equipment

In the same vein, since planning is almost about using historical data to predict and therefore to control future behaviour, the power of ERP to provide high level statistical abilities conveniently for the average person, with easy-to-use statistical interfaces in an organization will help ERP to be incorporated in its normal daily planning and controlling practices.

> *"Now, after we upgraded the Oracle ERP, we have **convenient and easy-to-use features** that enable normal users **to use the statistical power of the ERP system**. This has enhanced **many planning activities**" ERP Manager of a Nuclear Power organization in the UK*

Technologies that are perceived to be relevant are the capacity to store data, speed of receiving and sending data and reporting technologies.

> *"If that were much more closely coupled with the finance system, it would be beneficial everywhere, because at the moment it is a whole section doing that. All its performance is to report on it. That is the next step, reporting, because there are many different systems and different databases. We **now** have to **develop our own data warehouse that we report** from. And that form would sort out a lot of problems as well"*



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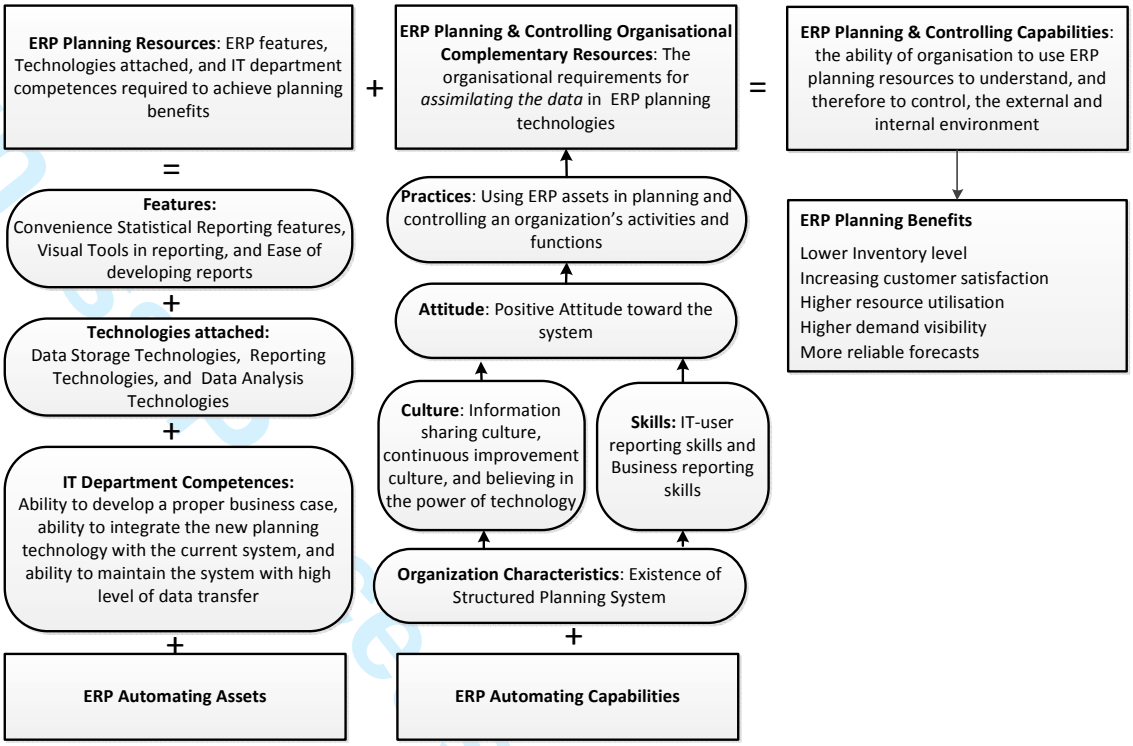



**Figure 3: Process of realising ERP Planning Benefits**

Finally, IT technical competences are needed to ensure the integrity of the system as well as the real-time information availability. IT business partnership competence (Chen et al, 2013) is the ability of the IT department to collaborate with other business functions; this is required, in particular the ability to develop a business case. Business case development should take account of different internal stakeholders in estimating the impact of a new planning system. It should do so not only to make them buy into the system but also to let them plan how the benefits could be realised in terms of the time required to realise the expected level of performance, responsibilities, duties and accountabilities.

> "*Yes, **business case**! You know we bought a planning system for our ministry costing millions. Nobody used it for ages, until a consultant **discovered it.** After that this consultant made **a plan for us to use it**. I agree with you, benefits management helped us to bring life back to this dead system. **Once the benefits were identified**, the senior staff brought the system in and the business plan was developed to use this the system. Now it is working and integrated with the current IT infrastructure (an ERP system)"*
> IT member of the senior staff in a Saudi ministry

But of course it is not advisable to wait until a consultant company "discovers" a purchased system. Without the IT ability to develop a business case in such a way as to buy the sponsors in and assign responsibilities for realising the benefits for the expected IT purchases, this IT is built for failure (Maklan, Knox & Peppard 2012)



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### 4.3 ERP Innovation Benefits

Business innovation benefits in this research come very close to the type III IS innovation of Swanson's typology (Swanson 1994), which is embedded in core business technology, is contingent by IS strategy to business and IS business oriented. Achieving IT business innovation is not a matter of IT innovation only; rather, it is a matter of the organizational capacity to innovate using IT as well (Ashurst et al. 2012).

#### *4.3.1 ERP Innovation Organizational Complementary Resources*

ERP innovation capability is the ability of an organization to innovate in its business functions and processes by means of ERP resources. Indeed, once the organization practices (routines) help an organization to innovate, they become the most robust enablers of innovation through ERP (Srivardhana, Pawlowski 2007). This routine is mainly based on the following organizational mind-set.

> *"What you can say to **create a routine of innovation** by **a continuous alignment** and **improvement of business processes using IT**"* SCM of a healthcare service in Saudi Arabia

Once an organization is able to understand its environment (and has incorporated this in its routines) or examine its understandings using its IT resources and to buy and integrate the "novel" IT resources to enhance its organizational processes, products and services, it will be able to tackle innovation from its experience of investing in ERP and its ancillary systems. Indeed, the mentality which creates this "routine of innovation" is conditioned by the organization's belief (that of its top management, IT staff and non-IT staff) in the power of technology to make organizational innovation possible. This belief is reflected in the organizational attitude to using technology in setting the organization's strategy and in its organizational culture. It was clear from the innovative organizations that their culture had an intimate knowledge of information technologies and their use.

However, some organizations share this same attitude but do not have the ability to use the data available in datasets since they do not share the scientific approach to dealing with data; for example, they have no culture of testing hypotheses to differentiate between the valid and invalid ones (Scientific Culture). The organizations that are not interested in understanding their environment are not expected to innovate using their data. Seeking to understand and examine one's surroundings is the cornerstone of innovation.

ERP, if it is well integrated, can help in understanding and examining one's circumstances by providing reliable, valid and timely data. Nevertheless, the ability to use statistics in creative

ways to understand these data patterns so that the new realities/perspectives/insights can be understood is the main bottleneck. Creativity in using the data for decision making opens the potential for unleashing opportunities, that have not so far discovered cross-sectional analysis, through correlating different aspects in different departments. For instance, one UK respondent extolled

> "… *cross company data scientists, justifying the job role of an analytical centre of excellence. We have got health and safety analysts that can do Chi-square and do it from a health and safety viewpoint. If we can combine the health and safety with procurement information we can now say just one very simple thing, which is that the contractors working for us have more accidents*" Expert user in the UK (Nuclear Power)

An Innovative Support Unit, also called a Centre of Excellence (CoE), allows innovative ideas to be filtered and shared across departments. Furthermore, if data need to be translated into projects or programmes, the Innovative Support Unit will sponsor the programs (Govindarajan, Trimble 2010). Although one of the Saudi companies uses an innovation-supporting unit, under the name "business development unit", the lack of a clear strategy impairs the alignment between the new initiatives that leads to contradictions between different programs, leading to unsatisfactory performance.

Furthermore, we found that a highly centralized bank in Saudi Arabia was unable to realise innovation although it had ERP innovation resources, whereas a decentralized Ministry of Finance in Saudi Arabia tended to achieve more innovation from its ERP. This evidence supports the research findings of Tambe et al (2012) that organizational practices such as decentralization act as enablers for achieving innovation and productivity using IT.

#### *4.3.2 ERP Innovation Resources*

Besides the ERP innovation OCRs, ERP innovation resources are required, as illustrated in Figure 4. ERP resources range from the IT ability to customize the current system reliably and validly and the scalability of the system (its ability to extend and keep pace with the growth and functions of the organization (Mital, Pani & Ramesh 2014) to the deployment of "novel" technologies (i.e. being the first to use and integrate them).

One of the main problems of a traditional ERP system is that it is too strict to enable an organization to use it in planning and innovation, as is widely accepted in the literature (Davenport, 2000). As a CIO at Australian Council says,



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"*However people normally do not like that because it means that they have to follow a very strict path how the system works. If it is outside the system, there is more flexibility*".

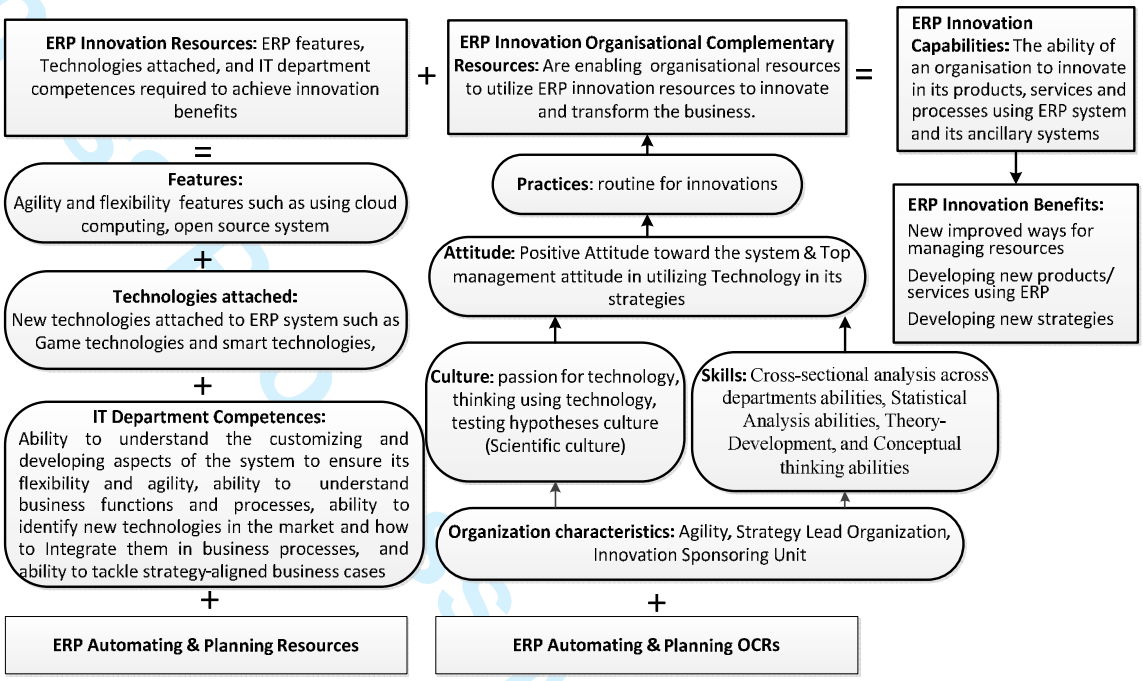



**Figure 4: Process of realising ERP Innovation Benefits**

At the same time, we found that organizations which have a more flexible ERP infrastructure are more agile in seizing new opportunities. For instance, a Saudi enterprise has adapted a cloud ERP system in the belief that the staff will become flexible enough to implement a road map of the IT projects that will be integrated in its ERP system. The same applies to the safety and security equipment manufacturing organization in the US:

"*One brand factory cannot produce finished goods for the other brand. This introduces a transformation project which is included in the ERP implementation. The ERP system helps facilitate the continuous transformation of our business because* ***they are more flexible*** *and rather than automate the business processes, I would agree that the ERP system could be a vehicle for transformation.*" ERP analyst in safety and security equipment manufacturing

Gaming technologies, using Kinect technology, were used in one Saudi organization in a limited way; however, this gave it superiority to its competitors in the short run. We believe that this superiority will not be sustained once the competitors buy this new technology; however, the ability of an organization to be superior in purchasing and fitting novel technologies is the main source of competitive advantage. To tell the truth, the ability to purchase the best technology at



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the right time by the IT department is sometimes limited by its ability to develop a business case that addresses this need. Since the business-IS linkage is critical for innovation processes (Tarafdar, Gordon 2007), we have found in this research that when the job specification and description of the IT staff identify this competence, innovation capabilities through ERP are improved.

> *"I had a very good background in supply chain management before being a SAP consultant.* ***My understanding of the current business processes*** *enabled me to talk to functional managers to* ***introduce new ideas*** *in business by* ***using the unused ERP functionalities****. Now it becomes* ***part of my business*** *to help users* ***to introduce new services to the custome****rs ...part of my job description is to train business users and* ***help them to increase their performance by innovating new ways for doing tasks*** *... Now my job is not technical troubleshooting; rather my task is* ***to improve business processes through the ERP****"* SAP SCM of a healthcare service in Saudi Arabia

**RQ2: when, and on what basis, should an organization deploy more technologies to leverage the ERP Business Value?**

The ERP organizational resources required for all groups of benefits are not the same, as shown in Figure 2 to 5. But they are complementary. In other words, as supported by Figure 1 and as the quotations show in Table 3, the expected planning blueprint (which is based on ERP planning resources and ERP planning OCRs) will not create the expected planning capability without having the automation blueprint. Likewise, the required blueprint for business innovation benefits will not achieve the desired capability until the planning capability is mature enough. The rationale of the need for automating (integrating) ERP resources for planning is that the production planning is based on the sales and material planning data (Günther, Grunow & Neuhaus 2006). Without such data, the production manager will not be able to plan (understand) the production patterns using ERP-enabled features.

In the same vein, the ERP automation OCRs are important for the ERP planning capabilities. If there is a negative attitude to the system (a positive attitude is required for the successful realising of automation benefits) and users are not skilled enough in business or IT to plan through the system, it is difficult to expect these users to innovate their processes and products/services using the data in them. Likewise, in ERP resources, without having an integration platform to collect the current and accurate data from the source and send it to the data use locations (for automational benefits) and without the ability to synchronize a huge amount of data from across the organization and its supply chain (a requirement for planning),



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the ability to identify new opportunities for improvement through the ERP data (ERP innovation benefits) decline.

**Table 3: Sample quotations showing the interdependence between Automation, Planning and Innovative ERP blueprints and capabilities**

| | Planning | Innovation |
|---|---|---|
| **Integration** | *"if we could have a better-integrated planning system with 10 year financial and other business planning etcetera, a* ***lot of corrections for the moment, because planning is done in isolation****. Let's say this example with us. We plan all our budget scenarios with this thing but* ***we do not actually use the financial system for the planning.*** *We do financial planning outside of our system. So there is* ***a lot of excel spreadsheet*** *and other staff and discussions here and there but it is all* ***outside our financial system*** *and it would be a great benefit having all that in the system"* CIO Australian | "*So I would consider that this* ***global transformation*** *will – could – not achieve without the ERP system because* ***it is an integrated system****, it was a global system. Sales orders from US customer go to the same system, sales orders could be sourced from the Japan factory and they have the same shared system. If it was global systems, sales order were in the US part of the same system as the Japan factory*" ERP analyst in safety and security equipment manufacturing" ERP Analyst from a US manufacturing company |
| **Integration and Planning** | *"Recently I went to company X….. I spoke to the business people. They do not care. A lot of spreadsheets cut into small spreadsheets not in SAP.* ***Spreadsheets were everywhere.*** *No one knows what is going on. The tale is growing, growing and growing. Complexity is growing. Inventory is growing. We have no control. My point is how* ***we can control if we do not understand?*** *How can* ***we innovate and improve*** *while* ***we do not understand?*** *Once you control the data, you can control the environment and thus you can understand what is going on. By understanding you can build the improvement*." ERP UK consultant | |

By comparing and contrasting the five manufacturing companies, the lower the level of an organization's capabilities the more it can gain higher level benefits. For instance, EGY F has a medium level of ERP resources since it lacks tracking technologies but the systems are integrated. It does not have ERP OCRs because staff strongly resist the system. Its readiness to change is the lowest of the five cases and its ability to use technology is lower than theirs because it is dominated by old and less skilled labour (being located in a remote area). This organization achieves the lowest level of Automational Benefits. Furthermore, although it has invested a great deal in planning ERP resources (such as a huge capacity for data storage, very advanced reporting systems, advanced data analysis systems and visual reporting), it has not realised any planning benefits. The same applies to its innovation benefits (from ERP).

EGY P and Saud P are similar in their ERP resources and OCRs for automation and planning. However, unlike EGY P, Saud P invests more in training users for business certificates and IT skills. The business skills of EGY P's employees can be considered the major bottleneck for enabling users to plan using ERP, since the users are unfamiliar with forecasting, analytic and different inventory systems in the SAP. This is why they import files to Excel sheets to plan



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using the traditional methods that they used before ERP. Indeed, although neither has ERP innovation resources nor OCRs, Saud P is able to innovate from ERP because it could continuously enhance its pricing systems in line with seasonal demand.

Some aspects of UK F and Emir F are quite similar (all the resources are the same except the lack of tracking resources in UK F and lack of a knowledge sharing culture in Emir F. On the one hand, UK F does not have a good tracking system which obviously affects the quality of its data and leads to trouble in planning by means of ERP. This organization has all the ERP planning resources and OCRS. But because of its invalidated (wrong) data, its capacity to plan through the system is significantly reduced and this negatively affects innovation through the system. On the other hand, Emir F lacks a knowledge sharing culture and hence its top management restricts the accessibility of data from different departments. This radically affects planning and innovation because users and decision-makers cannot see over departmental borders. Nevertheless, internally each department plans well, using the available historical data. Innovation is implemented through a central department which has access to all data.

**Table 4: Level of Benefits for Five Manufacturing Companies**

| | Automation Blueprint | | Planning Blueprint | | Innovation Blueprint | | |
|---|---|---|---|---|---|---|---|
| | ERP Resources | ERP OCRs | ERP Resources | ERP OCRs | ERP Resources | ERP OCRs | Benefits |
| Saud P | | | | | | | A(3) P(3) I(2) |
| EGY P | | | | | | | A(3) P(2) I(1) |
| EGY F | | | | | | | A(1) P(1) I(1) |
| UK F | | | | | | | A(2)P (1) I (1) |
| Emir F | | | | | | | A (3) P(2) I(2) |

***Automation ERP Resources – Black:*** well integrated and tracked from the original point to the point of use
***Gray:*** integrated but no tracking of the movement of products ***white:*** neither integration nor tracking
**Automation ERP OCRs** – ***Black***: ***k*** this organization uses ERP in its normal processes with no trouble
***Gray***: few struggles in the work using ERP
***Planning ERP Resources - Black***: this organization has the required ERP resources for planning
***Planning ERP OCRs- Black:*** this organization is able to use ERP in its routine planning ***Gray:*** this organization has some elements required for planning but it lacks some elements such as a knowledge sharing culture)
**Innovation ERP Resources** – ***Black***: innovation resources are available. **Gray**: some resources are available but others are not such as the IT ability to understand business and ability to find suitable "novel" technologies and deploy them successfully
**Innovation ERP OCRS - *Gray*** it lacks some requirements for innovation benefits, such as a scientific culture and cross sectional analysis
**Benefits** scale of 3; three is the highest, one is the lowest (null) and two is normal. A is for Automating Benefits, P is for planning benefits and I is for innovation benefits

## 5 Discussion

Unlike the prevalent notion in the literature that ERP kills innovation in organizations (Trott, Hoecht 2004), this research has found evidence that ERP can be a source of innovation. Without



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the ability to have reliable, timely and valid data from the current IT resources (by matching and integrating ERP functions to organizational functions and processes (Soh, Kien & Tay-Yap 2000)), planning (understanding the data patterns) would be impossible, even new planning if resources are invested in it. Without understanding the patterns, innovation is difficult. This supports and extends the propositions of Srivarhana and Pawlowski (2007), which are based on Absorptive Capacity theory (Zahra, George 2002) of the ability of ERP to be an enabler for sustained business process innovation when an organisation is able to acquire (by ERP automation OCRs), assimilate (by ERP planning OCRs), or transform and exploit knowledge (by ERP Innovation OCRs innovation) through ERP. Thus, as supported by the literature (Gupta, Kohli 2006), the organization's ability to integrate ERP in its current processes so that data are collected from their source to be used (on condition of having the users' and organization's ability to absorb and assimilate) in information and knowledge creation is the key to realising the potential value of investment in ERP.

As illustrated in Table 5, this research contributes to five streams of research: namely, RBT, IT Business value, Orchestration theory, benefits management and ERP benefits taxonomy. RBT is based on the idea of identifying the resources that cause rent (abnormal profit beyond that of other competitors) (Seddon, 2014). Unlike previous research which suggests that ERP is a commodity and cannot be a source of competitive advantage (Seddon 2005), this research contributes to this argument by suggesting that it can be so if we consider the time factor in orchestrating different ERP resources and OCRs. i.e. when the resources should be purchased, developed or built. Timing depends not only on the IT competence to understand and bring the new technology to the organization (Piccoli, Ives 2005) but should also be based on the level of maturity of the organization to realise lower level benefits from the current IT assets portfolio, for instance, maturity in attitude to the ERP. In this research, while the attitude required for automational benefits involves merely an acceptance of technology, this acceptance should be stronger if planning benefits are to recouped and so should the belief in technology as an enabler of transformation by innovation. These findings support Jasperson's argument 92005) for the implementation of ERP in stages so that users can see the positive outcome from the current ERP implementation before deciding to upgrade/invest in more resources.

Unlike the current Resources orchestration theory stream, which suggests that competitive advantage requires adaptation to external environmental factors (Teece, Pisano & Shuen 1997), this research spotlights the role of mature internal capabilities (built on internal resources



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combined with OCRs) in determining the timing for upgrading, transforming or extending current capability.

The IT Business Value concept of Melville et al (2004) is extended in ERP implementation which, besides being an infrastructure for other IT projects, entails the management of radical organizational change. ERP resources are found to be features, the technologies attached and IT department competences. OCRs are the organization characteristics that affect the culture and users' skills. Skills and culture affects the attitude, which is translated into practices.

Combining the Melville framework with the ERP benefits taxonomy of Automation, planning and innovation, has helped us to provide the three blueprints required for the three organizational capabilities which ensure that the three groups of benefits are realised. Therefore, this research argues, the role of the Benefits management team is not only to audit benefits (Badewi 2016) but also to manage the evolving process of realising ERP benefits until they reach the "critical mass" (Davenport, Harris & Cantrell 2004) which is identified in this research as the innovation blueprint.

**Table 5: Contributions to knowledge**

| Stream of research | Contribution to knowledge |
|---|---|
| **IT Business Value** (Melville, Kraemer & Gurbaxani 2004) | The IT framework is extended. The OCR resources are classified into practices, attitude, culture, skills and organizational capabilities. IT resources are classified into features, attached (ancillary) technologies and IT department competences. |
| **ERP benefits taxonomy of Automate, Inform and Transform** (Uwizeyemungu and Raymond, 2009;2010; 2012) | This framework is used, but the required OCRs and IT resources are classified and listed. |
| **Orchestration Theory** (Helfat et al. 2007, Teece 2007, Sirmon et al. 2011) | This research contributes by considering the level of use of the current internal resources before deciding to invest in new technology or develop new organizational resources/capabilities. It is used to understand when the organization should invest in a higher level of capability (OCRs and ERP resources) |
| **Resource Based View** (Seddon 2014) | Timing of investment can be a factor in achieving abnormal financial performance |
| **Benefits Management** (Davenport, Harris & Cantrell 2004, Ward, Taylor & Bond 1996, Esteves 2009, Remenyi, Sherwood-Smith 1998) | ERP benefits management role should be extended until the organization is able to innovate in its processes and products and services through the data held by the ERP databases |

## 6 Conclusion

Although the "P" in ERP stands for planning, many academics and practitioners still believe that ERP applies to automation only. This research spotlights that the ability to invest in ERP can



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increase the innovation and planning capabilities of the organization only if it is extended and grown at the right time and if it is supported by OCRs. It is not cost effective to push an organization to achieve all the benefits at the same time; rather, it is clear that an organization would not be able to enjoy a higher level of benefits until it achieves a significant number of lower-level benefits. Thus, investing in higher-level benefit assets directly after an ERP implementation, when there are no organizational capabilities available to use these assets, could be inefficient. Moreover, it could be stressful to users when they see plenty of new ERP resources without the ability to use them. Although it could be of slight benefit to introduce, for example, business intelligence to employees in the "stabilizing period" (Badewi, Shehab & Peppard 2013) , from the financial perspective, it is a waste of money since the benefits would not be realised as expected. Therefore, orchestrating ERP assets with the development of organizational capabilities is important for achieving the greatest effectiveness and efficiency of the resources available to the organization.

It is interesting to note that interviews with people in developing countries enrich the analysis in planning and automating benefits, forming a contrast to interviews with people in developed countries, which focused on the benefits of ERP business innovation. This is one of the main benefits of the critical realist paradigm. Furthermore, diversity in the countries participating in this research allows insightful analysis of new organizations that do not have enough experience with ERP systems to guard against deriving the benefits from automating and planning before seeking to achieve business innovation benefits through buying more ERP resources.

This study is interpretive in its nature; it comes to explore a phenomenon that some organisations outperform others in utilizing ERP asset. Although it reveals many interesting findings, it needs to be backed by a positive research to translate the findings into propositions and hypotheses to be tested using either case studies or survey research. This research comes to create knowledge gaps in other research to develop models and theories to rediscover the power of an ERP system in enabling organisation to achieve business innovation.



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# References


Albu, C., Albu, N., Dumitru, M. and Dumitru, V. F. (2015), "The Impact of the Interaction between Context Variables and ERP Systems on Organizational Performance. A Case Study from a Transition Economy", *Information Systems Management,* , no. just-accepted.

Amit, R. and Schoemaker, P. J. (1993), "Strategic assets and organizational rent", *Strategic Management Journal,* vol. 14, no. 1, pp. 33-46.

Anderson, M. C., Banker, R. D. and Ravindran, S. (2006), "Value implications of investments in information technology", *Management Science,* vol. 52, no. 9, pp. 1359-1376.

Ann Sykes, T. (2015), "Support Structures and their Impacts on Employee Outcomes: a Longitudinal Field Study of an Enterprise System Implementation", *MIS Quarterly,* vol. 39, no. 2, pp. 473-A11.

Aral, S. and Weill, P. (2007), "IT assets, organizational capabilities, and firm performance: How resource allocations and organizational differences explain performance variation", *Organization Science,* vol. 18, no. 5, pp. 763-780.

Ashurst, C., Doherty, N. F. and Peppard, J. (2008), "Improving the impact of IT development projects: the benefits realization capability model", *European Journal of Information Systems,* vol. 17, no. 4, pp. 352-370.

Ashurst, C., Freer, A., Ekdahl, J. and Gibbons, C. (2012), "Exploring IT-enabled innovation: A new paradigm?", *International Journal of Information Management,* vol. 32, no. 4, pp. 326-336.

Ashurst, C. and Hodges, J. (2010), "Exploring business transformation: the challenges of developing a benefits realization capability", *Journal of Change Management,* vol. 10, no. 2, pp. 217-237.

Avgerou, C. (2008), "Information systems in developing countries: a critical research review", *Journal of Information Technology,* vol. 23, no. 3, pp. 133-146.

Baccarini, D. and Bateup, G. (2008), "Benefits management in office fit-out projects", *Facilities,* vol. 26, no. 7, pp. 310-320.

Badewi, A. (2014), "Project Management, Benefits Management, and Information Business Success", 9-11 September, 2014, Ulster Business School, Ireland, .

Badewi, A. (2016), "The impact of project management (PM) and benefits management (BM) practices on project success: Towards developing a project benefits governance framework", International Journal of Project Management, vol. 34, no. 4, pp. 761-778.

Badewi, A. & Shehab, E. (2016), "The impact of organizational project benefits management governance on ERP project success: Neo-institutional theory perspective", International Journal of Project Management, vol. 34, no. 3, pp. 412-428.

Badewi, A. (2015), "Project Management, Benefits Management, and Program Management ", in Barclay, C. and Osei-Bryson, K. (eds.) *Strategic Project Management: Contemporary Issues & Strategies for Developing Economies,* 1st ed, CRC Press, Taylor & Francis Group, US, pp. 85-104.

Badewi, A. and Shehab, E. (2013), "Cost, Benefit and Financial Risk (CoBeFR) of ERP Implementation", *Advances in Manufacturing Technology XXVII - Proceedings of International Conference on Manufacturing Research (ICMR 2013)* , 19-20 September, Cranfield University, UK, pp. 207-212.

Badewi, A., Shehab, E. and Peppard, J. (2013), "Benefit Realisation Modelling for ERP systems using System Dynamics", *Advances in Manufacturing Technology XXVII - Proceedings of International Conference on Manufacturing Research (ICMR 2013),* 19-20 September, Cranfield University, UK, pp. 225 - 230.

Bagchi, S., Kanungo, S. and Dasgupta, S. (2003), "Modeling use of enterprise resource planning systems: A path analytic study", *European Journal of Information Systems,* vol. 12, no. 2, pp. 142-158.

Besson, P. and Rowe, F. (2012), "Strategizing information systems-enabled organizational transformation: A transdisciplinary review and new directions", *The Journal of Strategic Information Systems,* vol. 21, no. 2, pp. 103-124.

Breese, R. (2012), "Benefits realisation management: Panacea or false dawn?", *International Journal of Project Management,* vol. 30, no. 3, pp. 341-351.

Brush, T. H. and Artz, K. W. (1999), "Toward a contingent resource-based theory: the impact of information asymmetry on the value of capabilities in veterinary medicine", *Strategic Management Journal,* vol. 20, no. 3, pp. 223-250.

Burton-Jones, A. and Grange, C. (2012), "From Use to Effective Use: A Representation Theory Perspective", *Information Systems Research,* vol. published online before print November 8, 2012.

Carr, N. G. (2003), "IT doesn't matter", *Educause Review,* vol. 38, pp. 24-38.

Chadwick, C., Super, J. F. and Kwon, K. (2015), "Resource orchestration in practice: CEO emphasis on SHRM, commitment-based HR systems, and firm performance", *Strategic Management Journal,* vol. 36, no. 3, pp. 360-376.

Chen, Y., Wang, Y., Nevo, S., Jin, J., Wang, L. & Chow, W.S. 2013, "IT capability and organizational performance: the roles of business process agility and environmental factors", European Journal of Information Systems, vol. 3, no. 21, pp. 250-269.

Chou, S. W. and Chang, Y. C. (2008), "The implementation factors that influence the ERP (enterprise resource planning) benefits", *Decision Support Systems,* vol. 46, no. 1, pp. 149-157.

Cui, M. and Pan, S. L. (2015), "Developing focal capabilities for e-commerce adoption: A resource orchestration perspective", *Information & Management,* vol. 52, no. 2, pp. 200-209.

Davenport, T. H., Harris, J. G. and Cantrell, S. (2004), "Enterprise systems and ongoing process change", *Business Process Management Journal,* vol. 10, no. 1, pp. 16-26.

Davenport, T.H. 2000, Mission critical: realizing the promise of enterprise systems, Harvard Business School Press, Boston, Massachusetts.

Davis-Sramek, B., Germain, R. and Krotov, K. (2015), "Examining the process R&D investment-performance chain in supply chain Operations: The effect of centralization", *International Journal of Production Economics,* .

De Toni, A.F., Fornasier, A. and Nonino, F., ( 2015), *The impact of implementation process on the perception of enterprise resource planning success*.

Dedrick, J., Gurbaxani, V. and Kraemer, K. L. (2003), "Information technology and economic performance: A critical review of the empirical evidence", *ACM Computing surveys,* vol. 35, no. 1, pp. 1-28.

Dehning, B., Pfeiffer, G. M. and Richardson, V. J. (2006), "Analysts' forecasts and investments in information technology", *International Journal of Accounting Information Systems,* vol. 7, no. 3, pp. 238-250.

DeLone, W. and McLean, E. (2003), "The DeLone and McLean Model of Information Systems Success: A Ten-Year Update", *Journal of Management Information Systems,* vol. 19, no. 4, pp. 9-30.

Dezdar, S. and Ainin, S. (2011a), "Examining ERP implementation success from a project environment perspective", *Business Process Management Journal,* vol. 17, no. 6, pp. 919-939.

Dezdar, S. and Ainin, S. (2011b), "The influence of organizational factors on successful ERP implementation", *Management Decision,* vol. 49, no. 6, pp. 911-926.

Doherty, N. F., Ashurst, C. and Peppard, J. (2011), "Factors affecting the successful realisation of benefits from systems development projects: findings from three case studies", *Journal of Information Technology,* vol. 27, no. 1, pp. 1-16.

Dorantes, C., Li, C., Peters, G. F. and Richardson, V. J. (2013), "The effect of enterprise systems implementation on the firm information environment", *Contemporary Accounting Research,* vol. 30, no. 4, pp. 1427-1461.

Drazin, R. and Van de Ven, Andrew H (1985), "Alternative forms of fit in contingency theory", *Administrative Science Quarterly,* , pp. 514-539.

Esteves, J. (2009), "A benefits realisation road-map framework for ERP usage in small and medium-sized enterprises", *Journal of Enterprise Information Management,* vol. 22, no. 1/2, pp. 25-35.

Eisenhardt, K.M. 1989. 'Building theories from case study research', Academy of Management Review, 14: 532-550

Eisenhardt, K. M, and Graebner, M. E. (2007) 'Theory Building from Cases: Opportunities and Challenges', Academy of Management Journal 50(1): 25–32.

Forslund, H. (2010), "ERP systems' capabilities for supply chain performance management", *Industrial Management + Data Systems,* vol. 110, no. 3, pp. 351-367.

Gattiker, T. F. and Goodhue, D. L. (2005), "What happens after ERP implementation: understanding the impact of interdependence and differentiation on plant-level outcomes", *MIS quarterly,* , pp. 559-585.

Glaser, B. G., and Strauss, A. L. 1967. The Discovery of Grounded Theory: Strategies for Qualitative Research. Hawthorne, NY: Aldine.

Govindarajan, V. and Trimble, C. (2010), *The other side of innovation: Solving the execution challenge,* Harvard Business Press.

Günther, H., Grunow, M. and Neuhaus, U. (2006), "Realizing block planning concepts in make-and-pack production using MILP modelling and SAP APO©", *International Journal of Production Research,* vol. 44, no. 18-19, pp. 3711-3726.

Gupta, M. and Kohli, A. (2006), "Enterprise resource planning systems and its implications for operations function", *Technovation,* vol. 26, no. 5–6, pp. 687-696.

Haddara, M. and Paivarinta, T. (2011), "Why Benefits Realization from ERP in SMEs Doesn't Seem to Matter?", *System Sciences (HICSS), 2011 44th Hawaii International Conference on,* IEEE, pp. 1.

Helfat, C. E., Finkelstein, S., Mitchell, W., Peteraf, M., Singh, H., Teece, D. and Winter, S. G. (2007), *Dynamic capabilities: Understanding strategic change in organizations,* Blackwell Publishing, USA.

Helfat, C. E. and Peteraf, M. A. (2003), "The dynamic resource-based view: capability lifecycles", *Strategic Management Journal,* vol. 24, no. 10, pp. 997-1010.

Ho-Chang Chae, Koh, C. E. and Prybutok, V. R. (2014), "Information Technology Capability and Firm Performance: Contradictory Findings and their Possible Causes", *MIS Quarterly,* vol. 38, no. 1, pp. 305-A14.

Holsapple, C. W. and Sena, M. P. (2005), "ERP plans and decision-support benefits", *Decision Support Systems,* vol. 38, no. 4, pp. 575-590.

Jasperson, J. S., Carter, P. E. and Zmud, R. W. (2005), "A comprehensive conceptualization of post-adoptive behaviors associated with information technology enabled work systems", *Mis Quarterly,* vol. 29, no. 3, pp. 525-557.

Jenner, S. and APMG (2014), ***Managing benefits: optimizing the return from investments,*** 2nd ed, Stationery Office, UK.

Jick, T. D. (1979) 'Mixing Qualitative and Quantitative Methods: Triangulation in Action', Administrative Science Quarterly 24: 602-611.

Kallunki, J., Laitinen, E. K. and Silvola, H. (2011), "Impact of enterprise resource planning systems on management control systems and firm performance", *International Journal of Accounting Information Systems,* vol. 12, no. 1, pp. 20-39.

Kamhawi, E. (2008), "System Characteristics, Perceived Benefits, Individual Differences and Use Intentions: A Survey of Decision Support Tools of ERP Systems", *Information Resources Management Journal,* vol. 21, no. 4, pp. 66-83.

Ke, W. and Wei, K. K. (2008), "Organizational culture and leadership in ERP implementation", *Decision Support Systems,* vol. 45, no. 2, pp. 208-218.

Keller, R. T. (1994), "Technology-information processing fit and the performance of R&D project groups: A test of contingency theory", *Academy of Management Journal,* vol. 37, no. 1, pp. 167-179.

Klaus, T. and Blanton, J. E. (2010), "User resistance determinants and the psychological contract in enterprise system implementations", *European Journal of Information Systems,* vol. 19, no. 6, pp. 625-636.

Kohli, R. and Grover, V. (2008), "Business value of IT: an essay on expanding research directions to keep up with the times", *Journal of the association for information systems,* vol. 9, no. 1, pp. 23-39.



Business Process Management Journal

Law, C. C. H. and Ngai, E. W. T. (2007), "ERP systems adoption: An exploratory study of the organizational factors and impacts of ERP success", *Information & Management,* vol. 44, no. 4, pp. 418-432.
Lawrence Norton, A., May Coulson-Thomas, Y., Coulson-Thomas, C. J. and Ashurst, C. (2013), "Ensuring benefits realisation from ERP II: the CSF phasing model", *Journal of Enterprise Information Management,* vol. 26, no. 3, pp. 218-234.
Lincoln, Y. S. and E.C. Guba (1985). Naturalistic Inquiry. Beverly Hills, CA: Sage.
Locke, K. (2001) Grounded Theory in Management Research. Thousand Oaks: CA: Sage.
Ma, X. and Dissel, M. (2008), "Rapid renovation of operational capabilities by ERP implementation: lessons from four Chinese manufacturers", *International Journal of Manufacturing Technology & Management,* vol. 14, no. 3, pp. 1-1.
Madapusi, A. and D'Souza, D. (2012), "The influence of ERP system implementation on the operational performance of an organization", *International Journal of Information Management,* vol. 32, no. 1, pp. 24-34.
Makadok, R. (2001), "Toward a synthesis of the resource based and dynamic capability views of rent creation", *Strategic Management Journal,* vol. 22, no. 5, pp. 387-401.
Maklan, S., Knox, S. and Peppard, J. (2012), "Why CRM fails—and how to fix It", *Image,* .
Melville, N., Kraemer, K. and Gurbaxani, V. (2004), "Review: Information technology and organizational performance: An integrative model of IT business value", *MIS quarterly,* vol. 28, no. 2, pp. 283-322.
Miles, M. B., and Huberman, A.M. (1994) Qualitative Data Analysis: An Expanded Sourcebook. United States of America: Sage.
Mital, M., Pani, A. and Ramesh, R. (2014), "Determinants of choice of semantic web based Software as a Service: An integrative framework in the context of e-procurement and ERP", *Computers in Industry,* vol. 65, no. 5, pp. 821-827.
Montano, D. E. and Kasprzyk, D. (2008), "Theory of reasoned action, theory of planned behavior, and the integrated behavioral model", *Health behavior and health education: Theory, research, and practice,* vol. 4, pp. 67-95.
Morton, N. A. and Hu, Q. (2008), "Implications of the fit between organizational structure and ERP: A structural contingency theory perspective", *International Journal of Information Management,* vol. 28, no. 5, pp. 391-402.
Myers, M. D. and Klein, H. K. (2011), "A Set of Principles for Conducting Critical Research in Information Systems.", *MIS Quarterly,* vol. 35, no. 1.
Nevo, S. and Wade, M. R. (2010), "The formation and value of it-enabled resources: Antecedents and consequences", *Management Information Systems Quarterly,* vol. 34, no. 1, pp. 10.
Nevo, S. and Wade, M. (2011), "Firm-level benefits of IT-enabled resources: A conceptual extension and an empirical assessment", *The Journal of Strategic Information Systems,* vol. 20, no. 4, pp. 403-418.
Nicolaou, A. I. (2004), "Firm performance effects in relation to the implementation and use of enterprise resource planning systems", *Journal of Information Systems,* vol. 18, no. 2, pp. 79-105.
Nicolaou, A. I., Dehning, B. and Stratopoulos, T. (2003), "Financial analysis of potential benefits from ERP systems adoption", *The Journal of Business and Information Technology,* vol. 2, no. 1, pp. 40-50.
Nicolaou, A. and Bhattacharya, S. (2008), "Sustainability of ERPS performance outcomes: The role of post-implementation review quality", *International Journal of Accounting Information Systems,* vol. 9, no. 1, pp. 43-60.
OGC (2011), *Managing successful programmes,* 4th ed, TSO Shop, United Kingdom.
Peppard, J., Galliers, R. D. and Thorogood, A. (2014), "Information systems strategy as practice: Micro strategy and strategizing for IS", *The Journal of Strategic Information Systems,* vol. 23, no. 1, pp. 1-10.
Peppard, J. & Rowland, P. 1995, The essence of business process re-engineering, Prentice Hall, UK.
Petter, S., DeLone, W. and McLean, E. (2008), "Measuring information systems success: models, dimensions, measures, and interrelationships", *European Journal of Information Systems,* vol. 17, no. 3, pp. 236-263.
Piccoli, G. and Ives, B. (2005), "Review: IT-dependent strategic initiatives and sustained competitive advantage: A review and synthesis of the literature", *Mis Quarterly,* vol. 29, no. 4, pp. 747-776.
Popovič, A., Hackney, R., Coelho, P. S. and Jaklič, J. (2012), "Towards business intelligence systems success: Effects of maturity and culture on analytical decision making", *Decision Support Systems,* vol. 54, no. 1, pp. 729-739.
Popovič, A., Hackney, R., Coelho, P. S. and Jaklič, J. (2014), "How information-sharing values influence the use of information systems: An investigation in the business intelligence systems context", *The Journal of Strategic Information Systems,* vol. 23, no. 4, pp. 270-283.
Powell, D., Riezebos, J. and Strandhagen, J. O. (2013), "Lean production and ERP systems in small- and medium-sized enterprises: ERP support for pull production", *International Journal of Production Research,* vol. 51, no. 2, pp. 395-409.
Ram, J., Corkindale, D. and Wu, M. (2015), "Examining the role of organizational readiness in ERP project delivery", *Journal of Computer Information Systems,* vol. 55, no. 2, pp. 29-39.
Ranganathan, C. and Brown, C. V. (2006), "ERP investments and the market value of firms: Toward an understanding of influential ERP project variables", *Information Systems Research,* vol. 17, no. 2, pp. 145-161.
Remenyi, D. and Sherwood-Smith, M. (1998), "Business benefits from information systems through an active benefits realisation programme", *International Journal of Project Management,* vol. 16, no. 2, pp. 81-98.
Romero, J., Menon, N., Banker, R. and Anderson, M. (2010), "ERP: Drilling for Profit in the Oild and Gas Industry", *Communications of the ACM,* vol. 53, no. 7, pp. 118-121.
Saeed, K. A., Abdinnour, S., Lengnick Hall, M. L. and Lengnick Hall, C. A. (2010), "Examining the Impact of Pre-Implementation Expectations on Post-Implementation Use of Enterprise Systems: A Longitudinal Study", *Decision Sciences,* vol. 41, no. 4, pp. 659-688.
Sammon, D. and Adam, F. (2010), "Project preparedness and the emergence of implementation problems in ERP projects", *Information & Management,* vol. 47, no. 1, pp. 1-8.



Business Process Management Journal

Schryen, G. (2013), "Revisiting IS business value research: what we already know, what we still need to know, and how we can get there", *European Journal of Information Systems,* vol. 22, no. 2, pp. 139-169.
Seddon, P. B. (2014), "Implications for strategic IS research of the resource-based theory of the firm: A reflection", *The Journal of Strategic Information Systems,* vol. 23, no. 4, pp. 257-269.
Seddon, P. B. (2005), "Are ERP systems a source of competitive advantage?", *Strategic Change,* vol. 14, no. 5, pp. 283-293.
Seddon, P. B., Calvert, C. and Yang, S. (2010), "A Multi-Project Model of Key Factors Affecting Organizational Benefits from Enterprise Systems", *MIS Quarterly,* vol. 34, no. 2, pp. 305-A11.
Serra, C. E. M. and Kunc, M. (2015), "Benefits Realisation Management and its influence on project success and on the execution of business strategies", *International Journal of Project Management,* vol. 33, no. 1, pp. 53-66.
Shang, S. and Seddon, P. B. (2000), "A comprehensive framework for classifying the benefits of ERP systems", *Americas Conference on Information Systems,* pp. 1005.
Shang, S. and Seddon, P. B. (2002), "Assessing and managing the benefits of enterprise systems: the business manager's perspective", *Information Systems Journal,* vol. 12, no. 4, pp. 271-299.
Shaw, T. and Jarvenpaa, S. (1997), "Process models in information systems", in *Information systems and qualitative research,* Springer, , pp. 70-100.
Silveira, G. J. C. d., Snider, B. and Balakrishnan, J. (2013), "Compensation-based incentives, ERP and delivery performance: Analysis from production and improvement perspectives", *International Journal of Operations & Production Management,* vol. 33, no. 4, pp. 415-441.
Sirmon, D. G., Hitt, M. A. and Ireland, R. D. (2007), "Managing firm resources in dynamic environments to create value: Looking inside the black box", *Academy of Management Review,* vol. 32, no. 1, pp. 273-292.
Sirmon, D.G. & Hitt, M.A. (2009), "Contingencies within dynamic managerial capabilities: interdependent effects of resource investment and deployment on firm performance", Strategic Management Journal, vol. 30, no. 13, pp. 1375-1394.
Sirmon, D. G., Hitt, M. A., Ireland, R. D. and Gilbert, B. A. (2011), "Resource orchestration to create competitive advantage breadth, depth, and life cycle effects", *Journal of Management,* vol. 37, no. 5, pp. 1390-1412.
Snabe, J. H., Rosenberg, A., Mller, C. and Scavillo, M. (2008), *Business process management: The sap roadmap,* SAP PRESS.
Soh, C., Kien, S. S. and Tay-Yap, J. (2000), "Enterprise resource planning: cultural fits and misfits: is ERP a universal solution?", *Communications of the ACM,* vol. 43, no. 4, pp. 47-51.
Soh, C. and Markus, M. L. (1995), "How IT creates business value: a process theory synthesis", *ICIS,* Citeseer, pp. 29.
Soh, C. and Sia, S. K. (2004), "An institutional perspective on sources of ERP package–organisation misalignments", *The Journal of Strategic Information Systems,* vol. 13, no. 4, pp. 375-397.
Somers, T. M., Nelson, K. and Karimi, J. (2003), "Confirmatory Factor Analysis of the End-User Computing Satisfaction Instrument: Replication within an ERP Domain*", *Decision Sciences,* vol. 34, no. 3, pp. 595-621.
Srivardhana, T. and Pawlowski, S. D. (2007), "ERP systems as an enabler of sustained business process innovation: A knowledge-based view", *The Journal of Strategic Information Systems,* vol. 16, no. 1, pp. 51-69.
Stratman, J. K. (2007), "Realizing Benefits from Enterprise Resource Planning: Does Strategic Focus Matter?", *Production and Operations Management,* vol. 16, no. 2, pp. 203-216.
Stratman, J. K. and Roth, A. V. (2002), "Enterprise resource planning (ERP) competence constructs: Two-stage multi-item scale development and validation", *Decision Sciences,* vol. 33, no. 4, pp. 601-628.
Swanson, E. B. (1994), "Information systems innovation among organizations", *Management Science,* vol. 40, no. 9, pp. 1069-1092.
Tambe, P., Hitt, L. M. and Brynjolfsson, E. (2012), "The extroverted firm: How external information practices affect innovation and productivity", *Management Science,* vol. 58, no. 5, pp. 843-859.
Tarafdar, M. and Gordon, S. R. (2007), "Understanding the influence of information systems competencies on process innovation: A resource-based view", *The Journal of Strategic Information Systems,* vol. 16, no. 4, pp. 353-392.
Teece, D. J. (2007), "Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance", *Strategic Management Journal,* vol. 28, no. 13, pp. 1319-1350.
Teece, D. J., Pisano, G. and Shuen, A. (1997), "Dynamic capabilities and strategic management", *Strategic Management Journal,* vol. 18, no. 7, pp. 509-533.
Tian, F. and Sean, X. X. (2015), "How do Enterprise Resource Planning Systems Affect Firm Risk? Post-Implementation Impact", *MIS Quarterly,* vol. 39, no. 1, pp. 39-A9.
Tiernan, C. and Peppard, J. (2004), "Information Technology:: Of Value or a Vulture?", *European Management Journal,* vol. 22, no. 6, pp. 609-623.
Trott, P. and Hoecht, A. (2004), "Enterprise resource planning (ERP) and its impact on the innovative capability of the firm", *International Journal of Innovation Management,* vol. 8, no. 04, pp. 381-398.
Tsai, W., Shaw, M. J., Fan, Y., Liu, J., Lee, K. and Chen, H. (2011), "An empirical investigation of the impacts of internal/external facilitators on the project success of ERP: A structural equation model", *Decision Support Systems,* vol. 50, no. 2, pp. 480-490.
Tsai, W., Lee, P., Shen, Y. and Lin, H. (2012), "A comprehensive study of the relationship between enterprise resource planning selection criteria and enterprise resource planning system success", *Information & Management,* vol. 49, no. 1, pp. 36-46.
Uwizeyemungu, S. and Raymond, L. (2009), "Exploring an alternative method of evaluating the effects of ERP: a multiple case study", *Journal of Information Technology,* vol. 24, no. 3, pp. 251-268.



Business Process Management Journal

Uwizeyemungu, S. and Raymond, L. (2010), "Linking the effects of ERP to organizational performance: Development and initial validation of an evaluation method", *Information Systems Management,* vol. 27, no. 1, pp. 25-41.
Uwizeyemungu, S. and Raymond, L. (2012), "Impact of an ERP system's capabilities upon the realisation of its business value: a resource-based perspective", *Information Technology and Management,* vol. 13, no. 2, pp. 69-90.
Veiga, J. F., Keupp, M. M., Floyd, S. and Kellermanns, F. (2013), "The longitudinal impact of enterprise system users' pre-adoption expectations and organizational support on post-adoption proficient usage", *European Journal of Information Systems,* vol. 1, pp. 17.
Velcu, O. (2010), "Strategic alignment of ERP implementation stages: An empirical investigation", *Information & Management,* vol. 47, no. 3, pp. 158-166.
Walsham, G. (2014), "Empiricism in interpretive IS research: a response to Stahl", *European Journal of Information Systems,* vol. 23, no. 1, pp. 12-16.
Wang, N., Liang, H., Zhong, W., Xue, Y. and Xiao, J. (2012), "Resource structuring or capability building? An empirical study of the business value of information technology", *Journal of Management Information Systems,* vol. 29, no. 2, pp. 325-367.
Ward, J. and Daniel, E. (2006), *Benefits Management: Delivering value from IS & IT Investments,* Wiley, England.
Ward, J., Taylor, P. and Bond, P. (1996), "Evaluation and realisation of IS/IT benefits: an empirical study of current practice", *European Journal of Information Systems,* vol. 4, no. 4, pp. 214-225.
Zahra, S. A. and George, G. (2002), "Absorptive capacity: A review, reconceptualization, and extension", *Academy of management review,* vol. 27, no. 2, pp. 185-203.
Zhong Liu, A. and Seddon, P. B. (2009), "Understanding how project critical success factors affect organizational benefits from enterprise systems", *Business Process Management Journal,* vol. 15, no. 5, pp. 716-743.
Zuboff, S. (1985), "Automate/informate: the two faces of intelligent technology", *Organizational dynamics,* vol. 14, no. 2, pp. 5-18.

# Appendix

**Table 6: Interview Guide**

| | Question or Statement | Rationale for the Question or Statement |
|---|---|---|
| **1** | Let me introduce myself, my university and my research project | To familiarise the interviewee with the interview and to let him/her understand the aim and objectives of the research |
| **2** | Could you introduce yourself? | To reveal the years of experience, type of experience, which ERP system(s) he/she had experienced and which module(s) he/she had had more experience of. |
| **3** | What are the benefits of an ERP system? | To reveal all the benefits perceived by the respondents without any bias from researcher intervention. |
| **4** | What are the benefits of the Accounting System, Procurement system, Inventory system, production system? [Question modified according to the respondent's experience] | To get in-depth information about the benefits of each module because the previous general question might have led the interviewee to talk about "general benefits". This question motivated the respondents to talk in-depth about the ERP benefits in his/her area of expertise. |
| **5** | Of the basis of what you have said, could we classify ERP benefits into Automating benefits, planning benefits and transforming benefits? If so, could you give me examples of each? | This question comes in a biased way to validate my understanding of what has been said so far. If the interviewee accepts this, he/she will support my argument by more explanation to reinforce this classification. If not, he will advise me what the classes should be. |
| **6** | Do you think these benefits could come without intervention? Do we need to do something to manage them? | The interviewee is expected to remember from his experience how the benefits were realised. Even if his organization has not done anything to manage the benefits, he is expected to say, "although some benefits, such as X & Y were achieved without much effort, realising these benefits needed some management". |
| **7** | What was required to gain the automating benefits?<br>(giving examples of other organizations | To get a list of the factors, capabilities and/or environmental factors that affected the conferring of automating benefits. The interviewee is expected to |



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|---|---|---|
| | which gained these benefits) | compare and contrast his/her experience with the experience of others |
| **8** | What about planning benefits? (giving examples of other organizations which gained these benefits) | …… planning benefits |
| **9** | What about transforming benefits? (giving examples of other organizations which gained these benefits) | …… transforming benefits |

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# ERP benefits capability framework: orchestration theory perspective

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**2017-05-31**
Emerald
https://doi.org/10.1108/BPMJ-11-2015-0162
Amgad Badewi, Essam Shehab, Jing Zeng and Mostafa Mohamad, (2018) ERP benefits capability framework: orchestration theory perspective, Business Process Management Journal, Volume 24, Issue 1, pp. 266-294

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