Benefits and Process Improvements for ERP Implementation: Results from an Exploratory Case Study

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Abstract

This exploratory qualitative single case study discusses the benefits and process improvements pertinent to enterprise resource and planning (ERP) projects. The study was conducted in a Canadian case organization in the oil and gas industry that includes twenty participants from four project role groups of senior leaders, project managers, project team members, and business users. The results of the study revealed twenty-two key benefits and four process improvements from which organizations can draw value while planning for ERP projects. The top six benefits include: standardization of common business processes, single integrated system, standardized reporting, improved key performance indicators (KPI), all countries in one system, and easy access to data. Knowing and maximizing these key benefits may prove beneficial for organizations, while planning for major investments in ERP systems.

Keywords: Enterprise Resource Planning, ERP, implementation, exploratory qualitative study, benefits, process improvements, critical challenges, critical success factors, strategies, Canadian oil and gas industry

1. Introduction

Enterprise Resource and Planning (ERP) is a software package composed of several modules that uniquely provide cross-functional integration through embedded business processes and customizable options for answering specific needs of each organization. The origin of ERP began with material requirements planning (MRP), which further expanded to MRP II capabilities, and then evolved into a strong enterprise system that integrates and optimizes many business processes for improved productivity and competitive advantage (Clevenson, Guimaraes & Yoon, 1998; Wallace & Kremzer, 2001; Helo & Addo-Tenkorang, 2011). ERP is clearly an important phenomenon from which management can draw key benefits. However, it is a well-known fact that ERP implementations most often do not perform according to business expectations due to high costs and lengthy time frames (Davenport, 1998; Ehie & Madsen, 2005; Momoh, Roy & Shehab, 2010; Stanciu & Tinca, 2013). This qualitative exploratory single-case study in the Canadian oil and gas industry is an examination of the benefits and process improvements achieved during ERP implementation.

2. Literature Review

This study reviewed some of the foundational studies by Themistocleus, Irani, O'Keefe, and Paul (2001); Mishra & Mishra (2011); Stanciu & Tinca (2013); Menon (2019). According to the study conducted by Themistocleus et al. (2001) ERP provide several benefits such as efficiency of firms, competitiveness, reduced development risk, and solving legacy system problems. They also highlighted business benefits such as increased productivity and the satisfaction of customers and vendors. It was also pointed out that the return on investment (ROI) was low due to problems in integrating multiple information systems (Themistocleus et al. 2001). Qualitative study of Mishra and Mishra (2011) indicated potential outcomes due to ERP projects. Some of the notable improvements were seen in maintenance, financial, and procurement areas. Mishra and Mishra (2011) also argued that ERP systems will bring in personnel and process changes, including job reductions and responsibility rationalizations.

Stanciu and Tinca's 2013 empirical study explored two ERP implementation projects and highlighted significant factors that determined project success. In the context of ERP, Stanciu and Tinca (2013) indicated that ERP project team and service, ultimate user satisfaction, ERP product, continuous commitment to change and processes in the ERP system, and user knowledge and involvement as some of the significant factors for ERP

project success (Florescu, Ionescu & Tudor, 2010). It was also noted that ERP success can be increased by learning from past mistakes and using experience gained from previous projects (Stanciu & Tinca, 2013).

Menon's 2016 exploratory case study in a Canadian case organization highlighted several critical challenges encountered during ERP implementation. The study evoked a comprehensive list of sixty critical challenges (Menon, 2016). Disbanding the project team very quickly after implementation was the most important challenge (identified by six, or 30%, of participants), followed by interface issues, lack of proper testing, time zone limitations, stress, offshoring, people's resistance to change, a short hyper-care period, data cleansing, excessive customization, and leadership that didn't understand the complexities. It was also noted that critical challenges were significant during ERP projects (Menon, 2016; Menon, Muchnick, Butler & Pizur, 2019).

Menon (2019) also listed some of the effective strategies that can be used to overcome critical challenges. The key strategies emerged to overcome challenges include having the right people for support and guidance from experts, change management, clear communications, hands-on training, lots of testing, and risk management (Menon, 2019). Adopting these strategies early in the project, can overcome challenges and increase business benefits for organization (Menon, 2019).

3. Methodology

To understand the perceptions of each of the four project role groups; senior leaders, project managers, project team members, and business users, this study used a qualitative exploratory single-case study design. Exploratory case study research is used to investigate a phenomenon by understanding perceptions and is usually focused on a small sample population for arriving at in-depth and rich data (Hewlett, 2005; Yin, 2014). Qualitative exploratory case studies typically involve small heterogeneous samples that can offer in-depth investigation, and such a case study is considered an appropriate tool for undertaking research in ERP implementation (Yin, 2009; Mishra & Mishra, 2011). Important characteristics applicable to exploratory case study research were aligned with this study's objectives. The study design was also conducive to identifying rich insights into the identified role groups' perceptions and differences (Woodside, 2010). This exploratory case study research also involved in collecting documentation, archived records, or both (Denzin, 2012; Howe, 2012; Nickson, 2014). The case setting used for this study is a Canadian oil and gas company involved in a large ERP implementation. The inclusion criteria required that the participants must have experience in ERP project roles, and also in ERP implementation projects in the Canadian oil and gas industry.

Stratified sampling was used due to the small sample size and the desire to obtain data from each stratum or participant group of the sample (Gerring, 2007). Twenty participants were selected for this study using stratified purposive sampling from the case organization and the sample represented four participant project team roles that consisted of three senior leaders, four project managers, six project team members, and seven business users. McLeod (2010) suggested that case-study research advocates for participants be knowledgeable about the phenomenon in its context, which was a requirement for participant inclusion in this study.

The draft interview guide was composed of interview questions which include "how would you describe the benefits and process improvements achieved through the implementation"? In this study, document review facilitated data triangulation, which provided another source of data beyond the semi-structured interviews (Yin, 2009; Denzin, 2012; Howe, 2012; Nickson, 2014). The researcher conducted a total of 20 face-to-face interviews with participants from the four project team role groups comprising of 3 senior leaders, 4 project managers, 6 project team members, and 7 business users. Qualitative data analysis software NVivo 11, by QSR International (2016), was used to organize, tabulate, and code the interview responses. The identified themes and findings were loaded into NVivo for qualitative data analysis by reading transcripts and field observations, apply tools for evaluation, enter data information, evaluate and triangulate data.

4. Discussion of Results

Research findings from the interview responses from four ERP project role groups are discussed below. The study generated a total of 22 benefits, which are listed in Appendix A. Based on the highest frequency count, the top six benefits (Table 1) were drawn from all four project role groups. These include standardization of common processes, one integrated system, standardized reporting, improved key performance indicators (KPI), having all countries in the same system is good, and access to comparable and visible data. The participant responses also produced four process improvements (Table 2), which included improved and strong process planning as well as improvements in demand planning, accounts receivable (AR) cash operations, and offshoring business activities.

Table 1. Benefits from ERP Implementation as Reported by Members of the Project Role Groups

Benefits: Top Themes	Senior Leader	Project Manager	Project Team Member	Business User
Standardization of processes	2	3	2	1
One integrated system	1	1	2	–
Standardized reporting	–	–	3	1
Improved key performance indicators (KPIs)	1	1	1	–
Having all of the countries in same system is good	–	–	–	3
Access to comparable and visible data	–	2	–	1
Total	4	8	9	7

Note. The table highlights top six benefits achieved from ERP implementation in the case organization. This is based on high-frequency count across all four project role groups. A dash indicates that no member of the group reported that benefit.

Table 2. Process Improvements from ERP Implementation as Reported by Members of the Project Role Groups

Process Improvements from ERP implementation	Senior Leader	Project Manager	Project Team Member	Business User
Improved and strong process improvement	2	1	2	–
Improvements in AR cash operations	1	–	1	–
Improvements in off-shoring business activities	–	–	1	1
Improvement in demand planning	–	–	1	–
Total	3	1	5	1

Note. The table highlights four process improvements achieved from ERP implementation in the case organization. This is based on high-frequency count across all four project role groups. A dash indicates that no member of the group reported that process improvement.

Senior leader role response highlights. Participant SL1 pointed out that the new SAP (ERP software) system offered a number of features and tools that were not available in the old system. SAP offered "credit limits and customer exposure measure[d] in real time." In addition, SAP provided "improvements in accounts receivable (AR) cash operations and to manager customer payments from a credit and AR perspective." Participant SL2 opined that the implementation resulted in stronger process improvement and global standardization of processes. Participant SL3 observed that after four years of working in SAP after go-live, no one in the organization wanted to go back to the old JDE (another ERP software) system. The benefits described by SL3 are:

We are now part of a truly global organization, we transact on the same platform globally and we can compare the effectiveness of our business activities and outcome and we can compare much more effectively against our peer groups, we can look at things like key performance indicators, process performance indicators, and the like and see how well we stack up against our peer groups.

SL3 also stated about process improvements achieved:

First of all the process, the KPIs are, are, very well-defined, much better defined than they were before. Hmm and we can we can measure our performance in [a] much more rigorous fashion and I think, yes, on the whole people can see that we managed various elements of our processes.

Project manager role response highlights. Participant PM1 stated that benefits of the ERP implementation lie in standard process, making data visible, KPIs, fairly lean business, and to making it profitable "in the right way." According to PM1, process improvements were made, but the implementation added complexity because back-office and reconciliation activities moved offshore. The benefits cited by participant PM2 were one

integrated system, increased staff efficiency, easy access to real-time data, structure, and above all, segregation of duties. Participant PM3 described the prime benefit as global support received from one support team, which earlier had a separate Canada team to support. After moving to the new solution, the Canadian case organization had to adopt global processes and therefore had to change its way of doing business. Participant PM4 described benefits as reduced headcount and its resulting economic savings, improved KPIs, common practices, and integrated business. PM4 noted:

[The case organization] is a vendor to US from a fuels perspective, yet it is a customer from a lubricant perspective, so from the ability of distributing lubricant products globally, distributing lubricant products globally across North America efficiently out of warehouses built in from Canada and in the US, all that is enabled by the implementation of the existing processes.

Project team member role response highlights. Based on experience with the previous system, TM1 argued that JDE was more user-friendly than SAP, but that the new system was more powerful. TM2 recognized that the value and benefits the business could get from the implementation may have become evident later, but TM2 did not witness these firsthand because the participant moved to another business role in the case organization 2 or 3 months after go-live:

In a nutshell I didn't see too many benefits myself, not, that doesn't mean that they weren't there, and they are not experiencing them now, but I think the time horizon to actually achieve those benefits was a little bit longer than what was expected.

Benefits as described by participant TM3 included a standard chart of accounts, standard processes, centralization of processes, easier reporting and comparison of results, and a streamlined perspective incorporated with the rest of the world. Participant TM4 stated that the benefits were global, as business speaks in the same language as other countries, financials and job roles are aligned, and all were forced to clean up the data. Participant TM5 described the benefits as standardization of processes similar to those of other countries, increased efficiency and cost savings, and streamlining of reports in SAP. The process improvements included improvements in the lubricants supply chain for demand planning. According to TM6, the benefits were lower costs, simplified process, and one structure with same job roles across organization. TM6 also argued that there was a downside:

We definitely had process improvements because of lack of understanding, hmm, had process improvements because of missed, that happened on the project, and I will give an example, withholding tax. I did a big project for improving the withholding tax for Canada, and I am doing the same for chemicals and they didn't do a good job in understanding the requirements for withholding tax in Canada when we did the data conversion for all the vendor master from JDE to SAP. We didn't understand the process, which led into lot of gaps.

Business user role response highlights. Participant BU1 stated that from a day-to-day perspective, one of the benefits was having all countries in the same system, with the same language, and having the same processes. Participant BU2 felt that from the perspective of a business user, the benefits included ownership, efficiency, and true integration. BU2 further explained:

I think the whole supply chain and I, and I see, ah, ownership, ah, from all parts of the business ah there is a true integration for me as an end user to, to do my job. So, right from the beginning when a deal is struck before I was disconnected from it. Now I am part of it, I am part of the success of it.

Participant BU4 observed that the main benefits were business gaining control of inventory management, paying on time, and billing and collecting money on time. Participant BU5 emphasized that the benefits from the implementation were access to data, standardized reporting, defined roles, and segregation of duties. Being globally aligned and having more functions were the benefits pointed out by BU6. As for process improvements, BU6 said that the business is reversing the previous decision of moving customer creation functions offshore, moving them back onshore so the business need not wait 24 hours to complete the creation of new customer data in SAP. Participant BU7 stated that the benefit was that there was only one SAP system, which is fast, easy to use, and reliable.

5. Themes in Benefits and Process Improvements

Table 1 provided the list of top six benefits drawn from the frequency count from all four role groups: standardization of common processes, one integrated system, standardized reporting, improved KPIs, having all countries in the same system is good, and access to comparable and visible data. The response also produced four process improvements (Table 2), which included improvement in demand planning, improvements in accounts receivable (AR) cash operations, and improvements in offshoring business activities.

Theme highlights on benefits. Standardization of processes was one of the main benefits from the ERP implementation as cited by eight participants (40%) across all project role groups. Senior leader participant SL2 added: "I think ultimately it's the global standardization of processes [that] allowed us to be more cost effective and efficient." Participant PM3 commented that "from an IT perspective, you know, the standardization of course, and much of the infrastructure is more standardized and centrally located." Participant TM5 explained:

one of the key [benefits] would be the standardization of processes. Using this system means that you are processing exactly the same as what another country would do it [sic] [and] you are going to be talking [in] the same terminology; in terms of processes you can then use common resources, who could be located somewhere across the globe doing these services for you.

Another benefit is "having one integrated system" (PM2), which allows the global company "to have all countries on the same platform" (TM6) with each organization "speaking the same language as the other countries on the same system" (TM6). Standardized reporting is another benefit that the participants emphasized. Whereas TM1 addressed the benefit as "so from a reporting perspective, for the most part, I think it was easier at a higher level to report on the performance for downstream," TM3 added "it is easy to [and] it makes it much more simpler [sic] to compare results, to file results."

Another theme that emerged was improved KPIs. Senior leader participant SL3 commented, "First of all the process, the KPIs are, are, very well defined, much better defined than they were before, and we can, we can [now] measure our performance in much more rigorous fashion." TM1 added that invoicing "became better and the KPI performance and stuff like that, compared to when we first went live."

Another theme that was identified was that having all countries in the same system is good. This benefit can be applied to a multi-national and global organization so that bringing all the countries in one single system becomes advantageous for the organization. Participant BU3 observed, "having everybody on the same platform is a benefit for the customer to do business with different areas of the organization." Further, BU1 noted:

Having all of the countries on the same system is probably good, and especially because when you're talking to other countries or you're trying to streamline something, and you're all talking the same language and you're all understanding the process, so that's definitely a benefit.

Access to data is another theme that emerged from the participant responses. "Getting all this data [and] making it all visible," and getting all the "data and information in one place" are required by the case organization, according to PM1 and PM2, respectively. Participant BU5 stressed the importance of data access by stating, "benefits is [sic] having access to data [and] being comparable."

Theme highlights on process improvements. The participants commented about general improvements and strong process improvements across all four ERP project role groups. Senior leader SL3's comments were more strategic in nature:

We can assess the performance of our supply and trading organization and our operations activities and the various processes that are involved, for example, in our hydrocarbon movements. So we can assess our process performance in this area versus our peer [companies across the globe] and so forth.

Participant PM1 added that: "I think organizationally, we actually on one hand, we improved it by making it visible." Regarding improvements on accounts receivable and cash operations, SL1 commented that "from a credit perspective, I think there were a number of improvements on the AR cash operations side, generally a better set of tools to manage customer payments [and] from a credit and accounts receivable perspective." Offshoring business activity was another theme on process improvements. TM3 observed that they were able to offshore and centralize many of their processes. Participant BU4 detailed the offshoring process:

Business offshored [to another country], that's where all of our US truck tickets gets entered [sic], where all of our Canada, US rail movements gets ticketed [sic], where our invoicing is done from, you know something's, I put in here, but the end result comes from [other country]. They are putting the numbers in. [Researcher: *Is this a process improvement?*] I think so, just because when I did it myself all those things, I was stretched too thin, and the system would let me put in anything I wanted in there, so it's a business and a system improvement.

Another process improvement was in demand planning. Participant TM5 commented that "demand planning was done in multiple spreadsheets, what I mentioned earlier, [and] now everything is done through this module [APO Advanced Planning and Optimization] in SAP. It would project the demand, [and] hence it will trickle down all the way to production."

The literature review indicated that themes (Tables 1 and 3) such as standardization of processes, integrated

system, data, and standardized reporting were aligned with ERP (Finney & Corbett, 2007; Jeng & Dunk, 2013; Pundir et al., 2007; Somers & Nelson, 2001; Tambovcevs & Merkuryev, 2009). Direct quotations from the participants explain the implications of the themes.

Table 3. Themes on Benefits and Process Improvements

RQ2. Themes on Benefits & Process Improvements	Literature
Standardization of processes	Tambovcevs & Merkuryev, 2009
One integrated system	Tambovcevs & Merkuryev, 2009
Standardized reporting	Pundir et al., 2007
Improved key performance indicators (KPIs)	—
Having all of the countries in same system is good	—
Access to comparable and visible data	Finney & Corbett, 2007; Somers & Nelson, 2001
Improved and strong process improvement	—
Improvements on AR cash operations	—
Improvements in offshoring of business activities	—
Improvement in demand planning	—

Note. Themes on benefits and process improvements are based on highest frequency count. Literature is the corresponding research literature. A dash indicates that the theme was not found in the literature.

The first benefit was standardization of processes, which was described by participant SL2: "the global standardization of processes allowed us to be more cost effective and efficient" and also by SL3: "work is highly standardized [and] we can you know move certain activities to different parts of the world. We can do that far more effectively now than we ever could, and so that's been a tremendous benefit for us." The second benefit theme is to have "one integrated system," "with all countries in one system," because having the same roles, processes, and organizational structure simplifies the business (TM4, TM6). The definition of ERP as an integrated system is sometimes mis-interpreted by the organization. It is a centralized integrated enterprise system (CIES) that provides all the core business functions required to manage the organization. Standardized reporting is another benefit theme, which according to TM5, was: "Streamlining, wherein people used to have different spreadsheets, small databases running just to monitor their own jobs; now everything is in SAP and they can just run the reports."

Improved KPIs are a benefit newly identified by the current study. Participant SL3 stated, "First of all, the process, the KPIs are very well-defined, much better-defined [than] they were before, and we can we can measure our performance in [a] much more rigorous fashion." According to BU1, having all countries in same system is good, "especially because when you're talking to other countries or you're trying to streamline something and you're all talking the same language and you're all understanding the process, so that's definitely a benefit." Finally, the last benefit identified was the access to comparable and visible data. It is important for the business to "have all data and information in one place" (PM2), and "getting all this data and making it visible" (PM1) is important as well.

The process improvements were "improvements on AR cash operations" using a "better set of tools to manage customer payments, eh, from a credit and account receivable perspective" (SL1), and the "cost savings associated with it" (TM3). Another process improvement was offshoring, because of which the "business could centralize a lot of processes" (TM3). Finally, the improvement in demand planning was another process improvement because "from multiple spreadsheets, SAP could project the demand to trickle it down to production" (TM5) faster than in the previous tool.

Significance of benefits and process improvements in ERP implementation. One of the key findings was that responses from the case organization in the current study underscored the importance of benefits and process improvements (Table 3) achieved during ERP implementation (Finney & Corbett, 2007; Mishra & Mishra, 2011;

Somers & Nelson, 2001; Tambovcevs & Merkuryev, 2009). The research specified 22 benefits in total (Appendix A), and the top six benefits were highlighted in Tables 1 and 3. The study also uncovered four process improvements (Table 2) achieved from implementation. Based on the literature, the benefits, such as access to comparable and visible data, standardization of processes, integrated systems, and reporting were aligned with critical success factors in ERP (Finney & Corbett, 2007; Somers & Nelson, 2001; Tambovcevs & Merkuryev, 2009). The global organization, one of the leading oil and gas companies, with very strong presence in the energy sector had rolled out SAP in many countries. The researcher acknowledged that the case organization had extensive experience in implementation, and therefore the benefits discussed by the participants were significant to the study.

6. Conclusion

The literature espouses several benefits for organizations undertaking ERP implementations and knowing them in advance can help achieve desired project results. The current study examined a large-scale ERP implementation in the Canadian oil and gas industry (Menon et al., 2019, Menon, 2019). Six key themes on benefits and four themes on process improvements were uncovered from interview responses, based on high frequency counts. The top six benefits that were added to the body of knowledge include: standardization of common processes, one integrated system, standardized reporting, improved key performance indicators (KPI), having all countries in the same system is good, and access to comparable and visible data (Finney & Corbett, 2007; Mishra & Mishra, 2011; Somers & Nelson, 2001; Tambovcevs & Merkuryev, 2009).

One of the key benefits of ERP projects, the concept of integrated system, sometimes is mis-interpreted by the business. ERP is a centralized system that provides tight integration with all major enterprise functions be it HR, planning, procurement, sales, customer relations, finance or analytics, as well to other smaller connected application functions. In that sense "enterprise resource and planning" (ERP) could ideally be described as "centralized integrated enterprise system" (CIES). The study also highlighted four process improvements, which include: improved and strong process planning, improvements in demand planning, accounts receivable (AR) cash operations, and offshoring business activities.

Like other exploratory case studies, this study also has limitations. Although the selected sample size was within norms, the sample size was not significant enough to generalize study population (Marshall, Cardon, Poddar & Fontenot, 2013; Yin, 2011). The selection of 20 participants from four project role groups of senior leaders, project managers, project team members, and business users allowed attainment of productive data on benefits and process improvements in ERP projects. The researcher believes that if the study were to be replicated, it would necessary to avoid having a general senior leader group and instead add a business leader group and an IT leader group to get both the business and IT perspectives from senior leadership.

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APPENDIX A. FULL LIST OF BENEFITS OF ERP IMPLEMENTATION

Benefits of ERP implementation	Senior Leader	Project Manager	Project Team Member	Business User
Access to comparable and visible data	–	2	–	1
Became a global company	–	–	–	1
Being globally aligned with more functions	–	–	–	1
Didn't see too many benefits	–	–	1	
Economic savings	–	1	–	–
Fairly small and lean business	–	1	–	–
Gained control of inventory management	–	–	–	1
Global support	–	1	1	–
Having all of the countries in same system is good	–	–	–	3
Help follow a career path	–	–	–	1
Improved key performance indicators (KPIs)	1	1	1	–
Lower costs	–	–	1	–
One integrated system	1	1	2	–
Ownership, efficiency, and true integration	–	1	–	1
Review and quality standards	–	–	1	1
Same defined role and segregation of duties	–	1	1	1
SAP is easy, fast, and reliable	–	–	1	1
SAP Offered a number of features and tools	1	–	–	–
Standardization of processes	2	3	2	1
Standardized reporting	–	–	3	1
System works better, it drives efficiency	–	–	–	1
Tangible benefits to being on SAP	–	–	–	1
Total	5	12	14	16

Note. The table highlights all 22 benefits that emerged due to the ERP implementation in the case organization. This is based on high-frequency count across all four project role groups. A dash indicates that no member of the group reported the benefit.