

Implementation Challenges of an Enterprise System and Its Advantages over Legacy Systems

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Abstract

This paper explores the implementation challenges of Enterprise Resource Planning in the industry and its advantages over legacy systems. The paper depicts the historical background of ERPs and their significance in facilitating coordination among the functional areas of organizations in the industry. It also discusses the role it plays in promoting the activities of Supply Chain Management (SCM) and Customer Relationship Management (CRM). The paper presents empirical data on ERPs and their challenges and implementation. A discussion has also been presented over some of the major implementation issues and considerations related to the connectivity, integration, and customization of the ERP systems. The paper closes with a conclusion on the role and place of ERPs in the modern enterprise systems.

Keywords: Enterprise Resource Planning, legacy system, integration, connectivity

INTRODUCTION

Implementation Challenges of an Enterprise System and Its Advantages over Legacy Systems

What does it take to achieve a competitive edge in today's connected world? A business must be able to timely evaluate its operations and make sense of its overall business effectiveness by collecting organization wide information without any interruptions or sluggishness. That is the main reason why businesses invest millions of dollars in computing systems which are either developed in-house or outsourced. Often as an unintended consequence of growth, companies become departmentalize where every department such as Human Resources (HR), Sales, finance, marketing or operations becomes its own entity and develop or purchase business applications to fit its own departmental needs. As a result companies can deploy systems with little or no integration abilities thereby severely hampering the ability of executive management to make informed decisions (Vatcharaporn & Piyanan, 2004, p. 165). For example, on one hand the traditional Accounting Information Systems (AIS) have enable the decision-making by reporting transactions processing information but on the other hand, the same systems become inefficient in a challenging environment where automation, efficiency, and real-time data reporting are required (Essays, 2013).

By definition, a legacy system is a reference to an outdated computer or software systems that are not upgradeable to the latest versions. But it does not mean that the legacy systems are defined by age instead they are defined by the lack of the original manufacturer support incapable of meeting latest organizational requirements. In incompatible environments, legacy systems may require high maintenance and a complex matrix of interrelating components (with added compatibility layers) to prolong device or application functionality (Janssen, 2010). Most legacy systems are prime examples of disparate computing systems with little or no ability to integrate with other deployed systems within an organization. In order to resolve discontinuities of information throughout a company's computing systems; enterprise resource planning (ERP) system was developed and deployed (Vatcharaporn & Piyanan, 2004, p. 165). Due to the investments made in the legacy systems, companies have been trying to get by until they start to lag in the market or their customers start to complain about their inability to process & deliver orders in a consistent timely fashion. If the legacy systems have been formed as mission-critical computing systems then companies are also resistant to replace them with the latest ERP systems (Turban et al., 2013, pg. 377). Figure 1 and Figure 2 show the pre (disparate) and post (integrated) ERP environment (p. 310, fig. 10.5).



Figure 4 ERP integration of sub systems to share data

Implementing an ERP system is extremely challenging because it requires redesign of business processes, change of perception in how people approach their jobs, and integration of many types of information systems. A best practice would be to first evaluate the existing inefficiencies of existing processes and then either suggest improving or significantly simplifying the processes (Turban et al., 2013, p. 306).

Background

By the 1940s many data-processing pioneers had realized that the new machines would require programming. The common thinking was that it would be a one-time, quick, and easily compartmentalized job which indeed was not true. Even though by the mid-1950s they had developed a great deal of understanding about programming but it was not until 1960s that the term software was beginning to settle with the data-processing managers. It was 1960s when the packaged application software established a corporate niche (Haigh, 2002) and the growth of Enterprise Information Systems (EIS) started. Early systems solely focused on the automation of individual functions such as financial accounting or inventory management (Cre8, 2014).

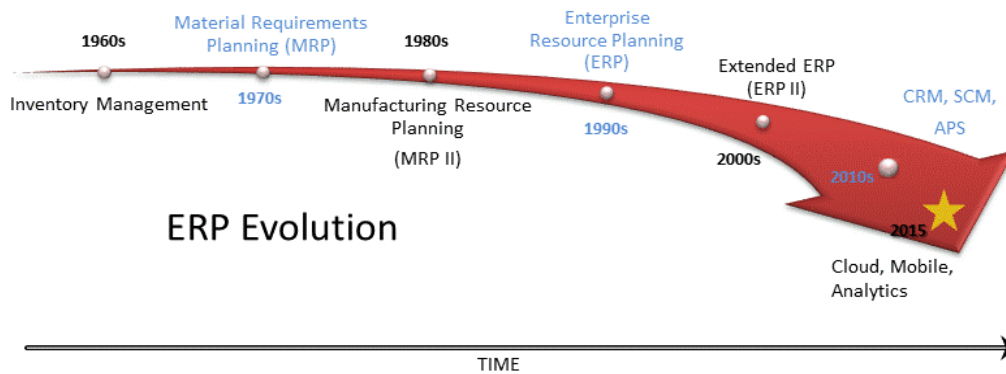


Figure 5 ERP Evolution

Material Requirements Planning (MRP), figure 5, was the first-generation of system developed in the 1970s to support manufacturing operations specifically procurement of material, bringing in the right amount of raw material at the right time. MRP systems created the bill of materials (BOM) in which the top level assembly was broken up into the individual parts and quantities. The BOM guided the purchasing department when to order based on the component lead time as located in the MRP system. The second generation system Material Resource Planning (MRP II) went several steps beyond MRP which had stopped at the receiving dock. MRP II captured the process stream from the manufacturing floor (production planning, equipment capacity, resource scheduling, demand forecasting, order analysis, and quality tracking) to the shipping dock where the product was packaged and delivered to the end customer. In addition, MRP II provided utilities to track employee attendance, contribution, and productivity. It was not until 1990s when the MRP and MRP II were evolved into the next generation system called Enterprise Resource Planning (ERP). While MRP focused on planning material purchases and MRPII added in-plant scheduling and production controls, ERP focused to integrate the information flow from all sources within a company such as finance, marketing, production, shipping, and human resources (Taylor, 2015). ERP used a single database which obtained data from all departments within a

company and kept the processes running smoothly ensuring visibility, accessibility, and consistency. ERP later developed into Extended ERP by the 2000s and included customer relationship management (CRM), supply chain management (SCM), and advanced planning and scheduling. The recent continuing ERP trends include capabilities for Cloud, Mobile, and Analytics (Cre8, 2014).

Even though MRP, MRP II, and ERP, ERP II are essentially iterations of a similar system, however, according to an article by the Business Performance Improvement Consultancy, most implementations of any of the three systems fail to achieve the desired results because the business managers and the IT managers lacked fundamental knowledge and underestimated the proper training required. A business manager with casual IT comprehensions could setup the system incorrectly whereas an IT manager with a casual business senses could automate the current business processes without making any improvement. Indeed the processes may even become more cumbersome and hard to accomplish. If a company is contemplating implementing ERP systems, it is imperative that business and IT managers are synchronized and that proper training has been accounted for (Taylor, 2015).

In Vatcharaporn et al.'s (2004) case study, a survey was conducted to learn from ERP users about their collective experience of implementing connected ERP systems. The survey was based on detailed interviews with ERP user companies across government and business sectors. The survey found that the need to integrate process and information was one of the main driving factors. The study concluded that when evaluating ERP systems, most user companies' integration methodologies did include criteria to incorporate data and application integration oriented approaches. An ERP system provides backbone to integrate all business units where one unit actions impacts other units due to the usage and sharing of common data. The accuracy and timeliness of data enables management to make quick and informed decisions with minimized risks. The study found that efficiency, productivity, and be able to respond to customers' needs were the driving forces for companies to invest millions of dollars in ERP systems. Once international organizations reap success and benefits by implementing ERP application(s) in their headquarters or some of the branch offices, they drive out ERP implementation throughout the organization. Industry trend, media sensation, and customer influence might be the other driving factors for some companies. Even though ERP was developed in manufacturing, it can also be used in many sectors including healthcare, banking, public, and service; however some of the packaged modules may not be useable. The study also revealed that financial accounting, material planning & forecast, sales and distribution were the mostly installed modules. Instead of either implementing the big-bang approach which outright gets rid of the legacy system and transfers all users to the new system or the accelerated approach; most companies used a phased roll out method to first implement the mission-critical modules (Vatcharaporn et al., 2004, pp. 166-167).

Enterprise systems are complex in nature and often require help from the original equipment manufacturer (OEM), consulting firm, and/or Value Added Reseller (VAR) which adds customized features, training, and maintenance services. When implementing enterprise systems, process and change management are two of the major challenges. Enterprise systems can significantly increase Productivity but modules integration is the key to realize full potential. Outdated or inconsistent business processes can result in low quality data which can be improved by reengineering and consolidating legacy processes into an enterprise system. Before zeroing in on an enterprise system, companies must consider the following (Turban et al., 2013, p. 304-305):

- **Problems Identifications** – Clearly identify the problems which need to be resolved (p. 305)
- **Goals** – Define and explain the targeted goals that needs to be achieved (p. 305)
- **Support** – Determine and outline the type of support that system needs to provide (Turban et al., 2013, p. 305)

Even though ERP systems have become industry standard for business functions integration but questions remained as the following (Fosser et al., 2008):

- **Competitive Edge** - If every company is using the same software then how does a company achieve a competitive edge (Fosser et al., 2008)?
- **Custom-Built Legacy Systems** – If custom-built legacy systems are discarded, does that discard our competitive advantage too (Fosser et al., 2008)?

For many organizations, ERP systems are the way to do business but some want to turn ERP systems into their competitive advantage. Recently researchers have begun to understand the connection between enterprise systems and competitive advantage which is the focus of the study done by Fosser et al., 2008. Many companies have implemented ERP systems without worrying about the competitive advantage. For them, ERP system is the necessity to do business and they are afraid that without it they will lose their reputation and might face pressure from customers (Fosser et al., 2008). Beard and Summer (2004) have suggested a “Common System Paradox” in which a company may lose its pre-existing competitive advantage after implementing an enterprise

system. In the recent years, a new approach to competitive advantage “resource-based view” is applying focus on the resources behind the vanilla strategies (Fosser et al., 2008).

Modern global economy is exerting pressure on many organizations to reevaluate their existing legacy ERP systems. Manufacturing industry along with others has found that business intelligence (BI) and big data can turn them into agile organizations. They have concluded that their legacy ERP systems have become obsolete and their best solution may rest in cloud-based enterprise systems (Garrehy, 2015). Many ERP systems are based on lean manufacturing principles that minimize waste. Manufacturing ERP software enables detection and prevention of defects. As a result, scrap and rework is reduced. Costly excess inventory is eliminated by better tracking and accurate demand planning (Turban et al., 2013, p. 308).

Topic Analysis

There are several drawbacks in a typical legacy environment which may include (Grilli & Cropper, 2010, slide 5):

- Firmly inflexible development and delivery methodologies
- Long turnaround time to address business change
- Complex structure and hard to manage programs
- Mismatch between functionality and user expectations
- Functionality holes causing user dissatisfaction
- Costly and/or annoying upgrades
- Tools incompatibility, different applications developed in different languages

In addition to what is mentioned above there can be many other reasons for replacing legacy systems. The legacy systems may also be the first-generation ERP systems that are unable to cope in today’s connected world. So when should a company choose to replace their legacy system? Well, it depends on many things (Garrehy, 2015).

Reason’s to replace your Legacy Systems

Let’s review some of the major reasons for replacing legacy ERP systems (Garrehy, 2015):

- **High Maintenance Costs** – Your old legacy system is getting harder to maintain and becoming increasingly expensive to operate especially when your’s version of software and/or hardware is no longer supported by the original manufacturer. Considering the total cost of ownership (TCO) of your current legacy system, it may be beneficial to replace it with a latest cloud-based ERP system.
- **Mismatched Functionality** – Your business model and/or processes have evolved faster than the existing system can support. Your legacy system is becoming painfully slow and difficult to use, every little move seems to crash the system. Your customers have started to notice that you are falling behind in the technology and your competitors have much better customer response systems in place.
- **Disparate Information** – Older systems often require extra time and energy to process the information. The executive management in your company is always furious about receiving the proper information in a timely manner. Your legacy system is not generating the reports in a manner management need them and you have run out of options to further modify your reporting system.
- **Obsolete Hardware** – Seems like every Monday and Friday mornings your server is down especially when you need to process customer orders or employees payroll. Your desktop, laptop are taking forever to boot and often crashing for different reasons. You can go drink coffee while your desktop is rebooting.
- **Obsolete Software** – The vendor who originally developed your legacy software is no longer in the business or has phased out your version by many years now or has been bought out by a different company which no longer supports your software. You are unable to get any vendor support and you are left at the mercy of your under staffed, overly worked IT department.

You are one of the decision makers in your company and now that you have started to think about replacing your legacy system, you started to do some research and run into the horror of failed ERP replacement stories. It is a known fact that large scale replacement of legacy systems is a very challenging, expensive and a risky task. Very often, ERP implementation costs and deployment schedules are overshadowed by the level of customizations to bring the ERP stock solutions closer to your business processes and applications. Let’s look at some of the projects that are known for their failures rather than their success (modernsystems.com, 2015):

- **Hershey’s ERP Implementation Issue** - The Wall Street Journal reported in 1999 that Hershey’s biggest dud is its new computer system. In mid-July 1999, Hershey turned on a new \$112 Million computer system with all sort of automation from taking candy orders to putting pallets on the trucks. But two months later the company announced that the things did not pan out right. Hershey net income dropped 19% in 3rd quarter and Hershey to miss earnings estimates, expecting \$150 Million loss in sales (Nelson & Ramstad, 1999).

- **Nike's Supply Chain & ERP Implementation Problem** – In 2000-2001, Nike's investment of \$400 Million on updating their SCM and ERP implementation resulted in a 20% dip in their stock, \$100 Million in lost revenues and a bunch of class action lawsuits. Their biggest mistake: they implemented the new demand software without testing it and as a result almost everything went awry (Monahan, 2013).
- **HP's Centralized ERP Disaster** – During the rollout of a new ERP system, it is common to have some issues but if there are too many issues happening at the same time, it can bring down the ERP implementation. When HP had issues moving its North American divisions into a single ERP system, it cost them \$160 million in backlogged orders and lost revenues. The original cost of the project was indeed five times smaller than the financial punishment that HP took (Monahan, 2013).
- **Waste Management's Massive Failure** – In 2005 Waste Management started an 18 months ERP implementation phase which was a total failure. Since 2008, Waste Management has been involved in a \$100 Million legal battle in a lawsuit against SAP executive who participated in the fraudulent implementation (Monahan, 2013).
- **FoxMeyer Drugs' Bankruptcy Battle** – FoxMeyer Drugs, a \$5 Billion dollar company who went bankrupt after failing to implement a \$100 Million dollar ERP system called Delta III project in 1993. The implementation started in 1994 and 1995 but by 1996 FoxMeyer was driven into bankruptcy. In 1997, FoxMeyer filed a \$500 Million dollars lawsuit each against SAP (ERP supplier) and Andersen Consulting responsible for system integration (Monahan, 2013).
- **The Navy's \$1 Billion Dollar Mistake** – This is an ERP implementation failure in epic proportions as since 1998, United States Navy has wasted \$1 Billion dollars in four different ERP projects based on SAP AG software. All four implementations turned out to be redundantly incompatible and did not meet the Navy's requirements (Monahan, 2013).

The before mentioned are just few of the serious implementation blunders over the decades but businesses shall look upon these epic failures and learn from their collective mistakes. ERP implementation can be successful when a suitable system is evaluated and implemented by the right people to do the job (Monahan, 2013).

Companies are hoping to replace their legacy systems with ERP systems but it is a known fact that a complete replacement is not possible. Many organizations customize ERP systems to fit their needs but the level of customization must precede once the desired degree of integration and connectivity has been determined. Organizations need to pay attention as a higher level of connectivity is expensive and difficult to maintain, on the other hand a low-level integration may limit the flow of data. Business requirements identifications and matching with the ERP features must be done before implementing any enterprise system. An evaluation must be done to determine the level of customization needed versus changing business practices to meet ERP software requirements as more customization will lead to system issues. Incoming updates might overwrite on the customizations and in some cases the customization may have to be removed before applying system updates. Vatcharaporn et al., 2004 have found that most organizations took the middle road and only customized the functional modules for which changing business practices were not feasible. Because ERP is still an evolving process, consultants and VARs have a larger role in implementing enterprise systems. ERP systems have a true advantage over the legacy systems with respect to integration and flow of data across the organizations regardless of geographical distances. But because ERP data structure is extremely complex and proprietary, under some circumstances an interface with third party applications may not be possible which limits the use of third party applications. Vatcharaporn et al., 2004 study found that after the ERP system went live; many companies discarded their legacy systems because broken flow of data made it harder to provide the timely information to the management. According to the survey, companies should consider purchasing an ERP system based on the following critical factors (Vatcharaporn et al., 2004, p. 169):

- **Open System** – Choose an ERP system which provides easier integration with third party applications (p. 169).
- **Customization** – Limit the level of customization as it will create problems because any customization done outside of the core ERP system will be overwritten at the next major update (p. 170).
- **Legacy Infrastructure** – Make sure to evaluate the connectivity between the existing legacy database and of the new ERP system as data transfer may pose some serious challenges (p. 170).
- **Standard Software** – Select the ERP package which employs the same industry standards as the third-party applications to enable cross functioning among several vendors (p. 170).
- **Security** – Security must be included by design at all levels of ERP core technologies (p. 171).
- **Third Party Support** – Do your due diligence to select an ERP system with most amount of third-party support because ERP systems are complex and not easy to understand at the core level (p. 171).
- **Implementation** – Implementing an ERP system is a daunting task and requires highly skilled staff and consultants to carefully map the business processes to the desired ERP system. Do the

connectivity, integration, customization analyses before releasing the ERP system to production (Vatcharaporn et al., 2004, p. 171).

According to analyst firm Gartner in 2014, approximately 75% of all ERP projects fail, despite the industry’s continuous drive to deliver better customer service and advanced IT systems. But why? The answer does not lay with one thing instead there are bunch of things that needs to be done long before starting an implementation phase. An independent researcher Vanson Bourne summarized his findings that as a first step, even before making any financial commitment, the vendor must babysit the client and help them understand their needs, communicate the objectives clearly and spend significant amount of time resolving the client’s concerns about the ERP implementation (Whyte, 2014).

The 2014 ERP report by Panorama Consulting Solutions investigated ERP software selection, implementation and satisfaction trends across industries, company sizes and geographic locations. The report summarized the overall ERP customers’ experience (from January 2013 to February 2014) with regards to enterprise software, vendors, consultants and implementations. According to the Panorama Consulting Solutions, “The report summarizes Panorama’s independent research into the experiences of ERP customers with regards to enterprise software, vendors, consultants and implementations overall.”

Data Summary by Year

YEAR	COST	% OF COST OVERRUNS	DURATION	% OF DURATION OVERRUNS	% RECEIVING 50% OR LESS BENEFITS
2013	\$2.8MM	54%	16.3 months	72%	66%
2012	\$7.1MM	53%	17.8 months	61%	60%
2011	\$10.5MM	56%	16 months	54%	48%
2010	\$5.5MM	74%	14.3 months	61%	48%

Source: Panorama Consulting’s 2014 ERP Report
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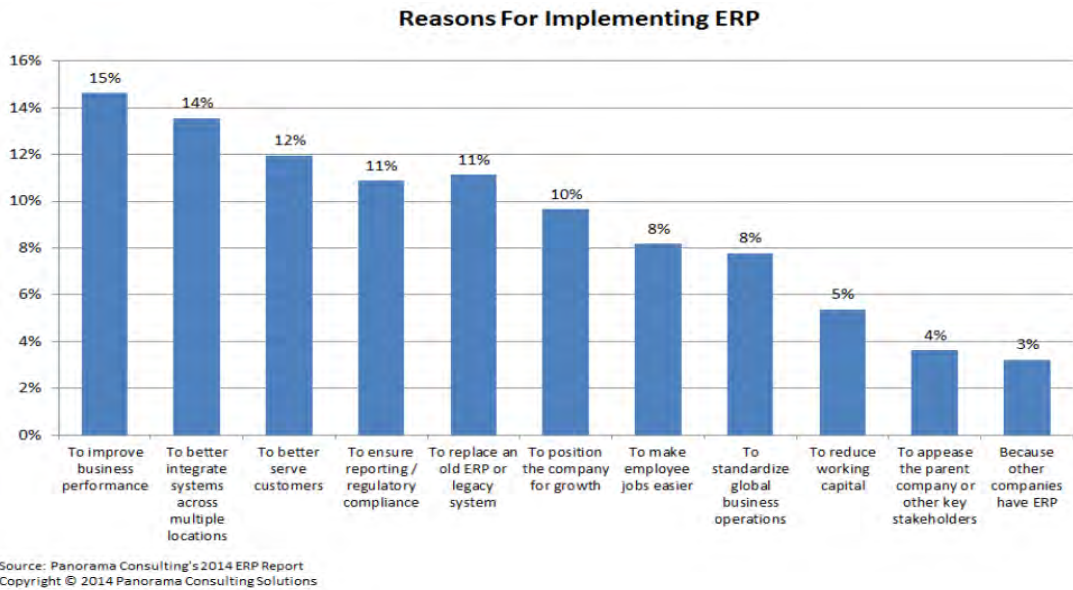
Here are some of the amazing facts (Panorama, 2014, p. 2):

- 16.1 months - The average duration (p. 2).
- ~ 54% - Projects exceeded planned budget. Main reason: organizational issues (p. 2).
- 72% - Projects exceeded planned durations (p. 2).
- 66% - Organizations received less than 50-percent of the measurable benefits (p. 2).
- \$6.5 M - Average cost of ERP implementations (p. 2).

The Panorama 2014 report emphasizes that organizations that do shortchange their investment to organizational change and business process management are likely to have organizational issues often leading to exceed their planned durations (Panorama, 2014, p. 3). It is important to note that the research respondent organizations all have had recent ERP experience: 39% with completed ERP implementation, 35% in implementation phase, and 19% in the planning phase (p. 3). Another significant point in the study supports the underlying foundation of this paper that integration is one of the major milestones for replacing legacy ERP systems. According to the Panorama’s study, the reasons cited for implementing ERP were (p. 3):

- 15% - To improve business performance (p. 3).
- 14% - To integrate systems across multiple locations (p. 3).
- 12% - To improve response time to customers (p. 3).
- 11% - To improve reporting and compliance (p. 3).
- 11% - To replace an old ERP or legacy system (p. 3).
- 10% - To grow revenue (p. 3).
- 8% - To improve job satisfaction (p. 3).

- 8% - To standardize global operations (p. 3).
- 5% - To reduce overhead of existing legacy system (p. 3).
- 4% - To satisfy key stake holders (p. 3).
- 3% - To release competitive pressure (p. 3).

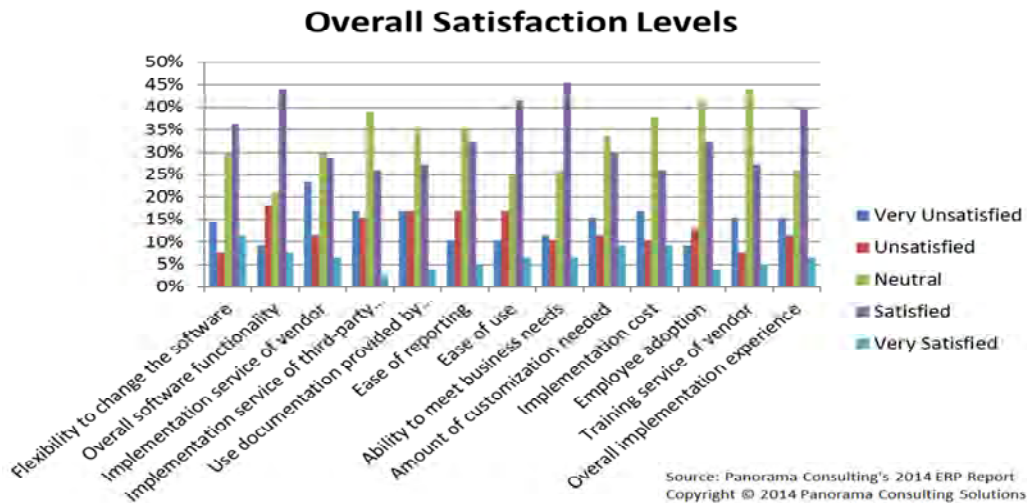


According to the Panorama’s 2014 report, the level of satisfaction rate from implementation was the following:

- 52% - Satisfied or very satisfied over functionality (p. 6).
- 51% - Satisfied or very satisfied over ability to meet business needs (p. 6).

On a contrast, the level of unsatisfied rate from implementation was the following:

- 35% - Unsatisfied or very unsatisfied over vendor’s implementation service (p. 6).
- 34% - Unsatisfied or very unsatisfied over vendor’s documentation (p. 6).
- 33% - Unsatisfied or very unsatisfied over third-party assistance (p. 6).



The satisfactory level with each installed component is clear even though slightly more than half of the respondents are considered satisfied. Rolled out implementations without a business case are not able to measure success or failure versus time. Working with stakeholders and customers together to define project scope, goals, expected results, and defined milestones can create more realistic satisfaction and success measures (Panorama, 2014, p. 7).

Conclusion

In today’s connected world, your business is depending on your ERP system which not only must support critical business processes, strategies, and controls but also be flexible and user friendly. Implementing ERP system is a highly complex job so proper evaluations on the connectivity, integration, data transfer,

customization, business processes changes, security by design, availability of skilled staff and consultants with core and third party application knowledge must be done before finalizing the purchase of ERP system which would require millions of dollars of investment. In conclusion, the cost of the ERP system might only be 30 percent of the actual implementation cost so make your implementation plan carefully (Garrehy, 2015). Panorama Consulting firm has provided an excellent summary that “while costs, durations and benefits received fluctuate year to year due to economic conditions, implementation trends and data set make-up, the facts remain: organizations that do not allocate enough of their budget to organizational change and business process management are more likely to face organizational issues, such as low buy-in, often leading to extended durations (Panorama, 2014).”

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