ABSTRACT

Title of Document: GOVERNANCE STRATEGIES FOR ENTERPRISE APPLICATION SYSTEM IMPLEMENTATIONS

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Enterprise application system implementations are highly complex implementations that automate several business functions. This study aims at providing an alternative view of organization's enterprise application system (EAS) acceptance. Despite the large body of literature, there are still empirical inquiries to investigate the EAS system implementation from adopters' perspectives and how to identify risks in a multi-stakeholder and dynamic environment. The thesis consists of three essays on various aspects of relationship between enterprise application implementation in a multi-stakeholder environment and project governance.

The first essay develops and validates new scales for two specific variables, integration and inter-dependency risks. These variables are hypothesized as key determinant for organizational success of enterprise application implementations by mitigating risks involved in a multi-stakeholder environment. A model of

organization acceptance of enterprise systems was developed using these two scales and then tested for reliability from a total of 365 users and nine application groups. Inter-dependency risk was significantly correlated with perceived usefulness, consultant's industry and product knowledge. Both integration and inter-dependency risks are significantly related with success of the new enterprise application. This study would benefit project executives by offering valuable managerial insights to mitigate integration and inter-dependency risks.

The second essay discussed characteristics of sustainability of enterprise application implementation from organizational perspective acceptance of the system from end users is not enough. A case study was used to validate the characteristics of sustainability. The chapter sought to demonstrate the causal relationship between the organization's preparedness for sustainability and the emergence of implementation problems. The study extracted insight into the criticality of certain factors and the type of problems making decisions under weak governance situation.

The third essay develops determinants for project governance success of enterprise application implementations by mitigating risks in a multi-stakeholder environment by developing new scales for five specific variables. Definitions of five variables were used to develop a model that was presented for content validity and then tested for reliability from a total of 117 project executives globally. The measures were validated with reliabilities between 0.73 and 0.94. Relationships between five measures were broken down to meaningful components and a three tier project governance structure was proposed to mitigate integration and inter-dependency risks in a multi-stakeholder environment.

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By

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Dedication

To my son Krish and wife Swati, for their support and encouragement

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Chapter 1

Introduction

1.1 Background

The thesis entitled “Governance strategies for enterprise application implementations” consists of six chapters on various aspects of the relationship between enterprise resource planning software implementation and project governance.

Enterprise Resource Planning (ERP) or Enterprise application system (EAS) deployments are highly complex deployments that automate several business functions such as financials, accounting, supply chain, customer services management, human resources management and reporting among others. Due to the strategic nature of these implementations, these implementations act as strategic enablers for organizations implementing such applications. Globally the revenue of EAS software was approximately $31 billion in 2006 (Skibniewski and Ghosh, 2008) and continues to grow (Kwak et al., 2012). By 2011, the market was expected to grow to 47.7 billion USD, achieving a compound annual growth rate of 11 %. Given such widespread demand and cost involved in such implementations, academic researchers as well as practitioners have paid a great deal of attention to the mechanism of successful EAS system implementations, however their failure rate is still high. Hoermann et al. (2011) identified 12 individual success factors. There are several examples where individual critical success factors or risks are discussed not when multiple critical factors make an impact on the implementation. First example, in literature on success factors concentrates more on each implementation factor like selection or availability of training, but does not discuss when no training available for the selected EAS in the countries to be deployed. Second, what is the impact of a new operating system version released for the personal computers used by the end user? Current literature also discusses end users' perceived acceptance of the system based on ease of use and usefulness but does not discuss if system is not any easier to use compared to the legacy system or will the system remain ease if any business process change.

Management methodology of EAS projects has optimally established process and procedure to manage a project without involving multiple partners in a dynamic environment. This particular research stream failed to identify if there are critical factors or risk factors that are beyond the scope of the project manager's responsibilities (Aloini et al., 2007), and what process and controls should be in place to resolve issues and risks in such circumstances considering when multiple critical success factors or risks are impacting the outcome of the project simultaneously. There are two additional challenges that are observed. First, the critical success factors and risk factors described in the literature are focused on implementation success from the user's acceptance perspective and very limited studies from the organizational perspective. Second, operationalization of critical success factors from an organization perspective has not been studied, leading to a lack of understanding of project success. This is a major gap in existing research leading to lack of understanding of project success from adopter's perspective.

Extensive empirical research related to the success and failure of enterprise implementations has been conducted in the past decade (Helo *et al.,* 2008). In the empirical research stream, current literature is overwhelmingly dominated by Technology Acceptance Model (TAM) (Davis, 1989), leading to an unmanageable number of variables based on perceived usage and acceptance of the system, which is only good for explaining the decision process of end user based acceptance (Bueno and Salmeron, 2008; Chung et al. 2009). This stream of research does not provide any guidance for the desired adoption or diffusion of the application, nor does it ensure that the adopted solution can continue to be utilized in a changing business environment. In reality, an organization can adopt a cutting edge technology but under-utilize it or the technology might become unusable once the original business drivers of the implementation change. The problem with user acceptance based approaches to success is that it is defined using users' perceived attitude towards the solution, completely ignoring the organization's perspective, and how the implemented solution can respond to organizational and business environment changes. The conclusions based on this stream of study are developed and supported by statistical evaluation, but primarily with qualitative generalizations. In this research it's hypothesized that any theory of enterprise implementation approach must establish relationships with implementation partners and vendors, and includes strategies for empowerment, fairness, and accountability during the implementation life cycle.

The concept of adoption becomes even more complicated because in a multi-partner project execution environment, since interaction is required on multiple levels ((Dietrich et al., 2010). In addition, organizations must develop and maintain the ability to integrate newer business and technologies into their scalable solution. This multi-partner, multi-track process creates the problem of lack of understanding of how all the partners are working together. Current research is focused on treating each of the partners separately. Balancing these dimensions requires a rigorous oversight model and well defined executive level of oversight.

1.2 Problem statement

Consider the following situations:

> *Example 1: "Numerous models of Windows 7 tablets and netbooks, some less than a year old, that should be upgradeable to Windows 8 won't be able to handle Microsoft's new operating system due to problems with the Intel chips that power them, according to computer manufacturers and frustrated users". (Information Week, October 23, 2012*)

Intel and Microsoft are the two major vendors in operating systems and hardware processors, and major part of any enterprise architecture. Majority of end users use Windows operating systems in hardware run by Intel processors.

> *Example 2: "The VMware vCenter Server Appliance is a preconfigured Linux-based virtual machine that is optimized for running vCenter Server*

and associated services do not support Microsoft SQL Server as a supported local or remote database and DB2 as remote database".(VMware.com, a global leader in virtualization and cloud infrastructure, a major partner in any enterprise architecture)

In the next three to five years, more organizations will aspire to support a blended approach to enterprise architecture (EA), according to Gartner, Inc. Gartner analysts predict that 95 per cent of organizations will support multiple approaches to EA by 2015. "Businesses are realizing that there is no one way to support EA," said Julie Short, research director at Gartner. "Decisions may be heavily influenced by a business context and the organisation's business landscape, people and politics, future state vision and experience. Regardless of the approach, EA must facilitate change. The key is to create, not the perfect or elegant architecture for the moment, but the most adaptable architecture for the future." This requires an adaptable architecture that is undergoing a shift to a more integrated architecture. Driving this trend will require partnership between different vendors in the architecture.

Example 3: "On Thursday, Nov. 15, 2012 Google will discontinue support for Internet Explorer 8. As a result, GW community members will need to use alternate browsers in order to get the full functionality of the Google web interface. Users who access Google features through other browsers or from other programs such as Outlook will not be affected by this change. If you are a Windows XP user, there is no newer version of

Internet Explorer. Please use Mozilla Firefox or Google Chrome to access all features of the Google web interface." (George Washington University email to user community)

Google's enterprise Gmail is building momentum with commercial organizations with more than 5,000 seats, and it now presents a viable alternative to Microsoft Exchange Online and other cloud email services, according to Gartner, Inc. While cloud email is still in its infancy, at 3 percent to 4 percent of the overall enterprise email market, it is expected to be a growth industry, reaching 20 percent of the market by year-end 2016, and 55 percent by year-end 2020." Therefore while this is not a significant issue today, a similar issue in 8-10 years is likely to a major disruptive factor in organizational efficiency unless addressed now.

Example 4: "SAP and Microsoft, while competitors in some areas, have engaged in many high-profile co-development efforts over the years, such as Duet, an integration between SAP's business software and Microsoft SharePoint. Should SAP fail to support Windows 8, it could face some blowback from its customers that decide to upgrade to the new OS."(Gartner analysis)

Although an enterprise application was developed to be an off-the-shelf package and any such application has targeted multiple customers, adoptees of such applications often found there are several dependencies to make the implementation successful. Therefore there is a need for partnership between competitors to make customers successful as evident from the above statement.

One of the reasons is that enterprise applications now support global businesses and therefore should integrate with several layers of any organization's information technology architecture – no single vendor can provide that support. In the last decades, many studies have identified that the success rate is approximately 25%, the failure rate is also about 25%, and partial successes and failures exist around 50% (Kozak-Holland 2007). The top ten failed projects include: "UK government scraps the £12 billion National program for IT in the NHS", "New York City's CityTime project, SAP project woes impact Ingram Micro's profits – twice", "Montclair State University sues Oracle over a PeopleSoft project, but Oracle returns fire", "Epicor sued by customer over ERP project that turned into a 'big mess'", "Marin County accuses SAP, Deloitte Consulting of a racketeering scheme", "ERP software woes could cost Idaho millions" and "Lawson, CareSource Management head to court" among others. As evident from the list, some mission critical business operations are impacted by these projects.

> *"But, "ERP vendors are only one step in a broader ecosystem that includes the customers and the system integrators," Krigsman said."Ultimately solving the problem requires coordination among these three groups, but certainly the ERP vendors should take strong leadership."*

Previous discussions identified complexities in any enterprise application implementations and infrastructure required to support such an implementation (Hawking, 2007) and therefore interdependency with existing technical architecture and business process used by the adopter. Despite the benefits of EAS systems, the success rate of EAS system implementation turned out to be historically low. For example, Zabjek et al. (2009) reported that up to 90 percent of the projects are regarded as failures. Chakraborty and Sharma (2007) also argued that 90 percent of all initiated EAS implementations are considered as failures in terms of project management since most of the related studies are focused on critical success factors and risks associated with the implementation. In order to avoid the disastrous consequences of implementation failure and reap the benefits of EAS systems successfully, actively managing the risks inherent in EAS adoption and implementation is of critical significance for organizations that seek to create business value and competitive edge (Zeng, 2010). Obviously, it is very important to identify and understand the factors that impact heavily on the success of EAS implementation (Umble and Umble 2002) and continue to add value to business when environment changes.

1.3 Research objectives

This requires a possible holistic consideration to understand project success from the organizational perspective. Therefore, based on the discussion above, the following research questions are addressed:

R1: What is the meaning of success for enterprise application implementations from an organizational perspective?

The success is measured using the following four criterions: increased market share for the organization, better customer support, become an industry leader and improve organizational process efficiencies.

R2: Define a risk based decision model can impact ES success?

Risk based decision models explores cause and consequences of investigating relationships between stakeholder's independence in a project environment.

R3: How can we define an executable project governance structure for higher level of success?

Executable structure refers to a project governance methodology that can be implemented by project executives.

1.4 Importance of this research

On the research, a risk based measures is very useful for two distinct reasons. First, it can institutionalize a structured way to introduce the stakeholder with relatively poor visibility, and how each of the stakeholders groups works together. Current literature is focused on dealing with individual risks, and not impacts of multiple risks are impacting a deployment together. Also these measures provide an opportunity to establish the need for a comprehensive risk analysis framework. Second, the measures also opens up the opportunity for the project owning organizations to do many things, e.g., pre-assessment of risks, pre-emptive evaluation of changing resources situation, based on risk profile of different stakeholder groups where to outsource or procure consultant's support.

In reality, an organization can adopt a cutting edge technology but under-utilize it. An executable governance structure was presented to ensure ES implementation is sustainable. The thesis also proposed and validated an emerging approach of sustainability of EAS implementation from an organizational perspective and maps with project governance. The thesis suggests that project governance for sustainable implementations is best understood within the context of environmental and futuristic complexities that is beyond the responsibilities of project management, but involves project governance. Project executives can implement the topology presented in this chapter and therefore it has practical applications.

1.5 Organization of this research

This research consists of six chapters. Chapter 1 introduces background information and motivation for the research in the area of EAS systems. Chapter 2 reviews the previous efforts and findings in related areas. It presents an overview of critical success factors and risk factors in EAS. In chapter 3 have two main sections: first, the two new risk based measures are presented. The second section provides the research model, describing factors and components along with their definitions and causal relationships, research design, showing survey instruments and their descriptions. Results and analysis of the survey are also presented in this chapter.

Chapters 4 extend acceptance and adoption of new technologies and defines concept of sustainability of EAS deployment and contain the analysis of the case results and research findings. In chapter 5 have two main sections: first, a survey is designed to understand sustainability of deployments. The second section provides the research model, describing factors and components along with their definitions and causal relationships, research design, showing survey instruments and their descriptions. Results and analysis of the survey are also presented in this chapter. Chapter 6 summarizes the study and concludes by examining the contributions. Figure 1 shows the organization of this research.

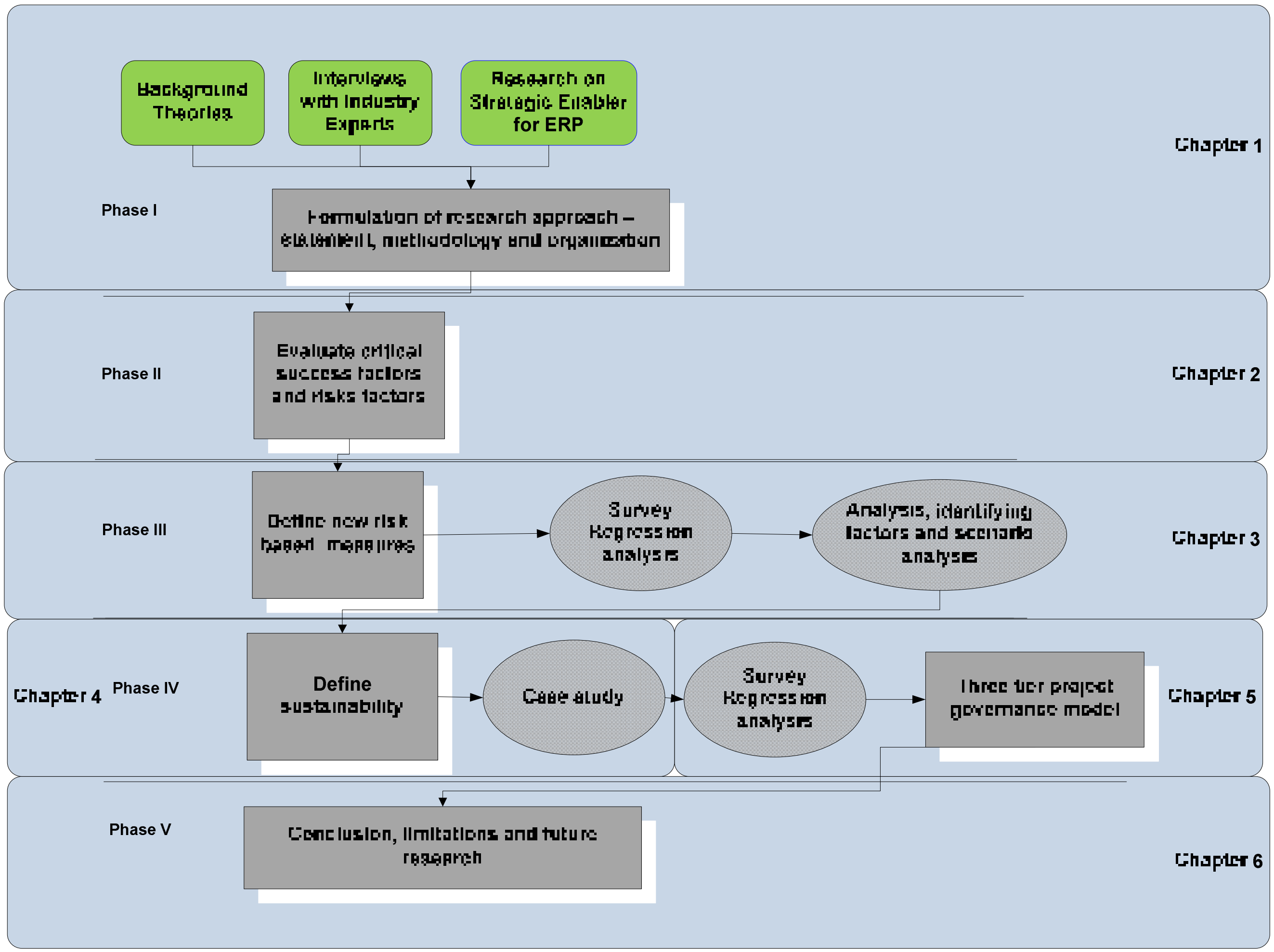


Figure 1: Research organization

Chapter 2

Enterprise application systems (EAS) implementations – Literature review

2.1 EAS concepts in prior literature

EAS are among the most important business transformation technologies that emerged during the last decade (Chung et al. 2008). Transforming a core business process requires intensive cooperation among executive peers and therefore for EAS adoption process which involves multiple business units, require a confrontation of reality, both external and internal (Chen et al. 2009; Miles 2010). Total cost of ownership, which is critical is measuring success (Jasilionienė and Tamošiūnienė 2009) of any product based implementation can only be measured if all the internal and external variables are considered properly. An EAS implementation is not merely a ‘‘computer project’’, it is strategic and must be approached as such. EAS systems are integrated applications with an impact on the entire organization (Aloini et al. 2007).

Mankins and Steele (2005) pointed out that to ensure good performance in a company, it is required to use a rigorous framework and use common business processes during any system implementation. EAS systems integrate the data and processes of an organization into one single system. EAS systems are software packages composed of several modules, such as human resources, sales, finance and production, providing cross-organization integration of data through embedded business processes. Also implementation must balance resistance to change and application of change management required (Davidavičienė 2008), can only be achieved using a pluralist approach. Therefore EAS project management should have systemic pluralist approach to manage complex IT projects (Williams 2002) like EAS implementations.

2.1.1 EAS system as Business Enablers

EAS systems provide seamless integration of business functions by providing them access to the information they need (Ghosh et al. 2010). Organizations using EAS have achieved savings by eliminating many different and often incompatible legacy systems as well as streamlining business processes (Jenson and Johnson, 2002). Therefore success of EAS projects is also measured by how much financial, efficiency gain or productivity gain the implementation created for the EAS adopter. Project management methodology for EAS systems therefore must work with all stakeholders so that overall value of implementation can be understood across the organization.

2.1.2 EAS system as Complex Project

While many project managers use the term 'complex project', there is no clear definition about what is meant beyond the general acceptance that it is something more than simply a `big' project (Williams 1999). This chapter does not aim to give a definitive definition of complex EAS projects either. It aims to be inclusive rather than exclusive, to encourage discussion of all of the dimensions of complexity as it applies to EAS projects relative to CSF and RFs, as well explain different types properties of complexities involved in any EAS implementation and how best to manage and govern such implementations.

There has been a wide range of literatures discussing complex projects within the domain of project management since the late 1990s. Remington and Pollack (2007) recommended using four types of complexities involved in a project. Sauer and Reich (2009) showed that we need to think project managers to have cognitive and affective (or emotionally intelligent) qualities to rethink their practice and whether a new kind of individual will be required to be tomorrow's IT project manager. Sauer and Reich (2009) also showed that project managers must focus on ultimate value, investment in trust, devolved, collective responsibility and willingness to continually adapt. All of these qualities go against the fundamental concept of project as a short term endeavor with specific begin and end. For our purpose of EAS complexities, there are four types of complexities: structural, technical, directional and temporal complexities (Remington and Pollack 2008). For a detailed discussion on paradigm shift needed to view EAS implementation as a complex project, refer to the article by Ghosh and Skibniewski (2011). Ghosh and Skibniewski (2011) proved that EAS project management is best understood within the context of environmental complexities.

2.2 Prior research in EAS implementation

Three distinct research streams are identified for EAS related research, i) value of EAS implementations, ii) critical success factors and risk factors and iii) TAM based empirical analysis. The first provides a comprehensive overview of the

EAS systems (Gupta 2000; Rao 2000; Chen 2001; Kerbache 2002; Payne 2002). These articles cover such aspects as research agendas; motivations and expectations and proposals on how to analyze the value of EAS systems (Esteves and Pastor 2001). The second stream focuses on the details associated with EAS implementations and their relative success and cost. The articles in this stream include topics such as implementation procedures, critical success factors, pitfalls and complexities in EAS implementations and successful strategies for effective EAS implementations. Esteves and Pastor (2001) classify the publications related to the implementation phase into four main topics: implementation approaches, implementation success, other implementation issues, and implementation case studies. The third stream focuses on the theoretical research models that have been developed to cover behavioral attitude of end users.

2.2.1 Value of EAS implementations

EAS implementations support multiple business areas (Umble et al. 2003, Skibniewski and Ghosh 2009) and introduce business process changes in the organization (Ross 1999; Kwahk and Lee 2008). EAS implementations are also expected to improve business process; consultants and solution providers can only provide the expertise how to knowledge base how the EAS package works (Helo et al. 2008, Sledgianowski et al. 2008). Readiness for change was found to be enhanced by two factors: organizational commitment and perceived personal competence (Kwahk and Lee 2008). However product knowledge about the EAS application is provided by software vendor and consultants (Helo et al. 2008) and should be part of the governance process. EAS projects are complex: PMP (2001) found that the average implementation time of an EAS project was between 6 months and 2 years and that the average cost is US$1 million (Aloini et al. 2007).

Since a full adoption of EAS systems spans all functional silos, the hazards of implementation uncertainty are usually salient. Therefore apart from EAS adopter, also EAS vendor and EAS consultancy combine their efforts and resources to achieve mutually desirable goals. Skibniewski and Ghosh (2009) identified resources are also required from training, application service provider and support for a successful implementation. Wang and Chen (2006) identified the importance of outside consultants for a successful implementation. Rose and Kręmmergaard (2006), Ghosh (2003), Ifinedo and Nahar (2009) identified the importance of technology organization for a successful implementation. Lui and Chan (2008) identified the importance of business process reengineering.

Therefore if we consider EAS implementation as a system, it is complex because “one made up of a large number of parts that interact in a non-simple way. In such systems the whole is more than the sum of the parts, not in an ultimate, metaphysical sense but in the important pragmatic sense that, given the properties of the parts and the laws of interaction, it is not a trivial matter to infer the properties of the whole” (Williams 2002). The success of EAS depends on how the system is integrated with other applications in the enterprise. The integration can often be underestimated and therefore add complexities.

Therefore applying the same definition, EAS projects consists of multiple sub projects(business requirements mapping, technical infrastructure development, change management to name a few) so that they hinder the effective modeling of complex projects, whose behavior is beyond the sum of their parts and whose reaction to changes in inputs is difficult for the human mind to predict.

Following Baccarini (1996)’s definition, project complexity as “consisting of many varied interrelated parts”. EAS will only be successful if all these parts work together. For a detailed discussion on project complexity, which is defined using of elements involved in the project and interdependence of elements readers are referred to Williams (2002), can be matched with number of elements involved and interdependence in any EAS implementation (Skibniewski and Ghosh 2009).

EAS project involves multiple business and technical areas as described before and all areas will not follow same pattern of life cycles in the implementation. The major challenge comes from project organization (consisting of multiple parties e.g. EAS adopter, EAS vendor, training provider and others, hence forth mentioned as actors of the ecosystem), scheduling, interdependencies and contract management. Structural complexities arise due to the fact that different sub-projects involved in any project may be at a different level of project life cycle at same point in time (Law and Ngai 2007; Somers and Nelson 2004; Raymond and Louis 2009). Interdependencies would arise to coordinate different actors involved in the EAS implementation.

The main technical challenge faced in any EAS system is the product life cycle may not match with adoption life cycle. Technical complexities arise when technical infrastructure required for EAS is non-compatible with existing environment of EAS adopter (Ghosh 2003; Hawking 2007) and therefore interdependency with existing technical architecture.

EAS requires business process changes to best practices as dictated by EAS vendor's supported business process which may not match with EAS adopters' business process. Changed business process may not benefit all sections or locations equally (Ghosh 2002). Directional complexity will be interdependent with management's objective from the EAS success.

EAS implementation spans multiple years, and any implementation faces shifting environment, and strategic directions which are outside the control of the project team, e.g. EAS vendor changing technology platform of the project that may require an upgrade of the environment used by EAS adopter.

2.2.2 Review of critical success factors and risk factors

Most frequently documented risk factors for EAS implementations are: a) inadequate selection of application, b) ineffective strategic thinking and planning strategic, c) ineffective project management techniques and bad managerial conduction, d) inadequate change management and e) inadequate training (Aloini et al. 2007). Both of a and b activities are identified to be project governance responsibilities (Grembergen and Hass 2008), c is a project management activity which can only successful if project governance empowers project managers properly and d and e are project management activity. Other documented management practices with correlations with implantation success are: explicitly defined information technology strategy, strategic alignment and management commitments (Bernroider 2008).

Specific critical success factors and risk factors are also quite well studied in literature. For a detailed reference on critical success factors for EAS implementations, refer to Moon's article (Moon 2007). For a detailed reference on risk factors for EAS implementations, refer to Aloin's article (Aloini, 2007). EAS projects often result in cost overrun, schedule delays, and sudden project terminations because poor selection of software and lack of management support. EAS projects involve business process changes, change management and technical risks, need proper project governance in place and empower project managers to execute. Project steering committee and project managers must have knowledge of applying complexity theory – structural, directional, technical and temporal processes, procedures, and policies and to implement them rigorously from the initial stage of the project.

The challenges on EAS implementation project needs successful "institutionalization" across multiple boundaries – within EAS adopter, EAS vendor, consultants, training and other support organizations. Streamlining a structure that satisfies all stakeholder, involves multiple organizations within a given time period is a difficult task.

Table 1. Evaluation of complexities of CSFs (CSFs only adopted from Moon, 2007)

No	Critical Success Factor	Type of Complexity	Project Management Perspective	Comments
1	Top management support and commitment	Structural and Directional	Top management/executive participation; company-wide support; employee recognition and incentive; funds support	Company-wide commitment; dedicated resources; funding utilization and alignment with objectives
2	Project Management and Evaluation	Structural	Effective project management; project planning project schedule and plan; project scope; work time schedule; detailed schedule; project completion time; project cost; auditing and control; project management of consultants and suppliers	Project managers will be required to work with multiple stakeholders who are not in direct hierarchy of the PM, therefore, governance should ensure project managers are empowered to execute.
3	Business Process reengineering and minimum customization	Directional and Temporal	BPR and alignment of the business with the new system; process adaptation level; process standards; business process skills; job redesign; worked with EAS functionality maintained scope; minimum customization	BPR is not directly related to EAS implementation but a necessary pre-requisite to make EASs successful. Changing business process would often lead to reduction in force, so BPR requires systemic approach to governance to adopt new system. This is a strategic direction to be set to meet business process with technical solution.

4	EAS team composition, competence and compensation	Temporal and Structural	Composition of project team member; project team empowerment; project team competence; the domain knowledge of the EAS project team; teamwork participation; attitude of the EAS project team; professional personnel; constitution of project team; EAS team compensation	Governance should ensure proper representation from all stake holders. Setup of proper steering committee; balanced implementation team and free up domain experts; project team: the best and brightest; Governance process should ensure proper risk-reward is balanced for team members.
5	Change Management Process	Structural and Directional	Managing changes; managing conflicts; conflicts between user departments;	Management of expectations; organizational resistance to change; change readiness; change in business goals during the project; conflicts between user departments; reasonable expectation with definite target
6	User training and evaluation	Structural	Training employee; education on new business processes; adequate training and instruction; training of project team and end-user; effective training; Hands-on training	Choice of education partner and medium and mode of training

7	Business plan and vision	Directional and Temporal	link to business strategy and execution, EAS strategy and implementation methodology and implementation; consensus on execution and control; clear EAS strategy execution	Business plan-vision-goals-justification; vision statement and adequate business plan; feasibility-evaluation of EAS project; Effective strategic thinking and planning strategic; competitive pressure; clear goals and objectives; clear desired outcomes; strategic IT planning;
8	Enterprise wide communication and cooperation	Directional and Temporal	Effective enterprise-wide communication; interdepartmental communication; free flow of information in project team; communicating EAS benefits; communication with EAS project team	Interdepartmental cooperation; open and honest communication among the stakeholders; cross-functional coordination;

Table 1 describes ten most frequently documented CSFs for EAS implementations, documenting project management and project governance challenges involved in resolving each of the CSFs. Table 2 describes how key EAS risk factors should be viewed from project complexities perspective. The tables clearly explain that each of the documented CSFs and RFs can only be viewed from a complex project perspective and improve project manager's understanding of the challenges they will face. This study will provide project managers a different perspective of the challenges and help better improve ways to deal with those challenges.

Table 2. Evaluation of complexities to mitigate key EAS risk factors (RFs only adopted from Aloini, 2007)

No.	Risk Factor	Type of Complexity	Risk Mitigation – Complexity Perspective
1	Inadequate selection of application	Structural, technical and directional	Selection can be proper if EAS adopter understands how it will impact on the business from implementation and supporting after the application goes to production. EAS adopter needs ensure that organization is capable of taking that initiative and ready to accept business, cultural and technological changes involved. Mitigation requires understanding the scope and domain of the implementation and ecosystem involved.
2	Ineffective strategic thinking and planning strategic	Structural, technical, temporal and directional	EAS adopters should understand all the fours complexities since all four complexities are involved in various CSFs. EAS adopter should carefully consider all the actors involved in EAS implementation ecosystem and ensure proper governing and management process is in place involving each actors involved.
3	Ineffective project management techniques and bad managerial conduction	Structural, technical, temporal and directional	Same as # 2
4	Inadequate change management	Temporal and structural	Change management may be due to technical complexities in the product (technical) and incompatibility between business process supported by the EAS and existing business process. The business process supported by the EAS is beyond any control of the EAS adopter and therefore temporal in nature.
5	Inadequate training	Structural and temporal	Availability of training may be out of control of EAS adopter and may add project complexities to schedule those tasks in the project plan.

2.2.3 Technology acceptance models for EAS implementations

Prior research has provided valuable insights into how and why employees make a decision about the adoption and use of information technologies (ITs) in an enterprise. From an organizational point of view, however, the more important issue is how managers make informed decisions about interventions that can lead to greater acceptance and effective utilization of IT (Venkatesh and Bala, 2008). To better understand and predict key outcomes associated with technology acceptance, several theoretical models have been proposed (Venatesh et al. 2000), which are based on the conceptual understanding of technology acceptance, primarily from behavioral aspects of users and acceptance of new technology from users' point of view.

Recent studies have also tried to incorporate perceived compatibility and therefore the studies have incorporated multiple variables (e.g. 21 as in this context) which becomes simple impossible to measure. The main strength of TAM is in its parsimony: intentions to use a technology influence usage behavior, and perceived usefulness (PU) and perceived ease of use (PEU) determine intentions to use (Bagozzi, 2007), however PU and PEU provides behavioral aspects of end users.

A full adoption of EAS systems spans all functional areas within an organization, e.g. accounting payables, accounting receivables, financial and accounting to name a few (Tatari et al. 2007), which implies the involvement of multiple business and technical areas. Stakeholders at the technical, business unit and corporate levels usually have very divergent interests leading to the need of explicit strategic alignment and continuous management commitment. Business process changes are inherent in EAS implementations as EAS vendor's supported business processes may not match with EAS adopters' business process. Changed business process may not benefit all sections of the EAS adopter's business or locations equally (Ghosh, 2002) leading to increased stress during the implementation process which need to be well managed in order for the implementation to be successful. The readiness for coping with these business process changes needs to be strategically managed from within the EAS adopter's organization using a proactive governance process with a built in internal change management component.

An understanding of your own company's business processes is imperative when it comes to making the decision about having an EAS implementation. The logic of an EAS system may conflict with the logic of the business which can lead to a failed EAS implementation or a weakened competitive position (Davenport, 1998). If an organization strives to install a system without establishing a clear vision and understanding of the business propositions, the integration efforts can turn into a disaster no matter how competent the selected software package (Davenport, 1998a,b). Because EAS systems are essentially developed as instruments for improving business processes such as manufacturing, purchasing or distribution, EAS implementations and BPR activities should be closely connected (Al-Mashari and Zairi, 1999). This can only be achieved through an exhaustive analysis of current business processes to identify the potential chances of re-engineering, rather than designing an application system that makes only the best of bad processes (Scheer and Habermann, 2000). The results of a survey of the criteria used by organizations in selecting their current information systems shows that the best fit with business procedures is the most important one (Everdingen et al., 2000).

The proposed research contributes to existing knowledge by (1) identifying a core set of predictor variables that may strengthen the predictive validity of traditional adoption frameworks and (2) presenting a comprehensive model of adoption that is theoretically grounded in the quantitative and qualitative literature as a means to gain better insight into the role of individual and structural influences on the adoption decision (Jackson, 2006).

The technology adoption research domain has yielded a number of valid predictors of adoption, yet the under-utilization of information systems continues to plague organizations. The primary goal of this research effort is to identify individual and structural variables that may strengthen the predictive validity of traditional technology adoption frameworks. The significance of the research is derived from the fact that minimizing the waste of time and resources on technologies that are fleeting and developing strategies that effectively address the underutilization of technologies continue to be key challenges for organizations. However, TAM has been extended to simplify an unmanageable number of variables (Somers and Nelson, 2004). A new paradigm is also proposed to address shortcomings of TAM (Bagazzi, 2007).

a. Technology Acceptance Model

“Davis 1989 introduced the technology acceptance model TAM, adapting the theory of reasoned action TRA, specifically modified for modeling user acceptance of information systems (Ajzen and Fishbein 1980; Fishbein and Ajzen 1975). The goal of TAM is to explain the determinants of computer acceptance related to user behavior across a broad range of end-user computing technologies and user populations. In addition, TAM provides a basis for tracing the impact of external variables on internal beliefs, attitudes, and intentions. TAM is formulated in an attempt to achieve these goals by identifying a small number of primary variables suggested by previous research dealing with the cognitive and affective determinants of IS acceptance, and using TRA as a theoretical framework for modeling the theoretical relationships among these variables (Davis et al. 1989). In this model, perceived usefulness and perceived ease of use are of primary relevance for IS acceptance behavior” (Chung, 2008).

“TAM proposes that external variables indirectly affect attitude toward using, which finally leads to actual system use by influencing perceived usefulness and perceived ease of use. All the relations among the elements of TAM have been validated through many empirical studies. The tools used with TAM have proven to be of good quality and to yield statistically reliable results” (Chung, 2008).

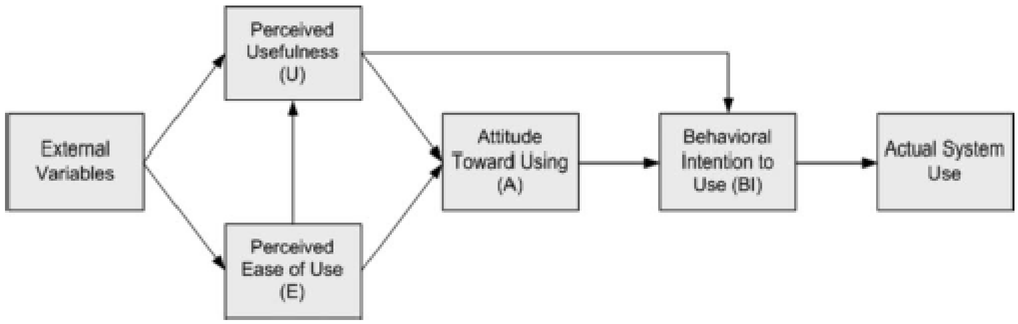


Figure 1: Technology acceptance model (TAM) (Davis, 1989)

b. DeLone and McLean IS Success Model

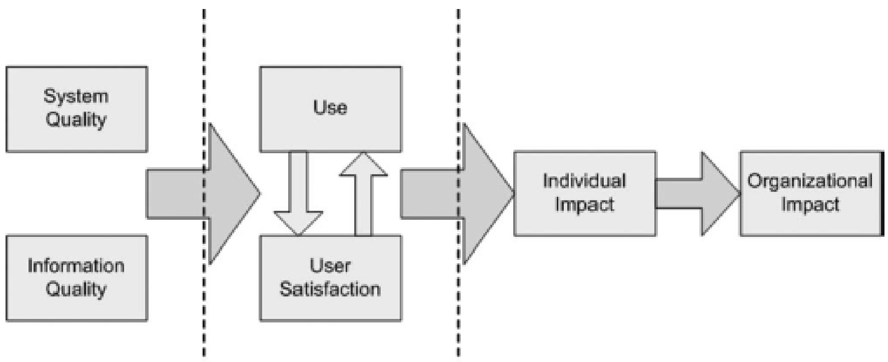


Figure 2: DeLone and McLean IS Success Model (DeLone and McLean, 1992)

“In recognition of the importance in defining the IS dependent variables and IS success measures, DeLone and McLean proposed a taxonomy and an interactive model as a framework for organizing the concept of IS success DeLone and McLean 1992. They defined six major dimensions of IS success—system quality, information quality, use, user satisfaction, individual impact, and organizational impact. A total of 180 articles related to IS success were then reviewed using these dimensions to construct the model. DeLone and McLean’s IS success model D&M IS success model, deals with both process and causal considerations. These six dimensions in the model are proposed to be interrelated rather than independent” (Chung, 2008).

c. Chung, Skibniewski and Kwak model

The proposed EAS systems success model blends TAM and D&M’s information systems success models and integrates them with key project management principles. The goal of the EAS systems success model is to better evaluate, plan, and implement EAS projects and help senior managers make better decisions when considering EAS systems in their organization.

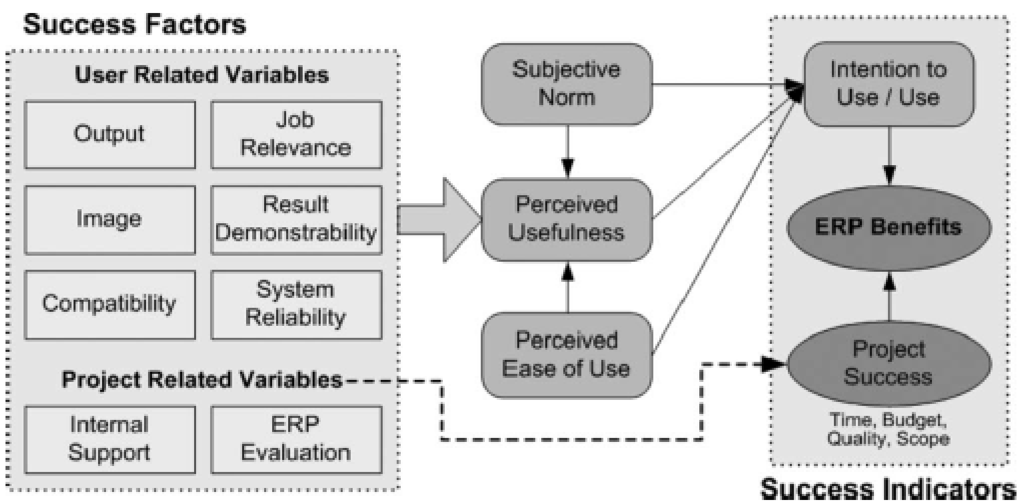


Figure 3: EAS acceptance model based on subjective norm (Chung et al., 2008)

d. Negahban, Baecher and Skibniewski model

Negahban et al. (2012) proposed a decision-making model that organizations could utilize to adopt EAS systems. This model had incorporated new elements that have been set as its new decision-making core. Furthermore, they identified and ranked the prohibitive criteria that were at play and prevented from successfully adopting and implementing EAS systems in order to increase the understanding of their impact on EAM's processes.

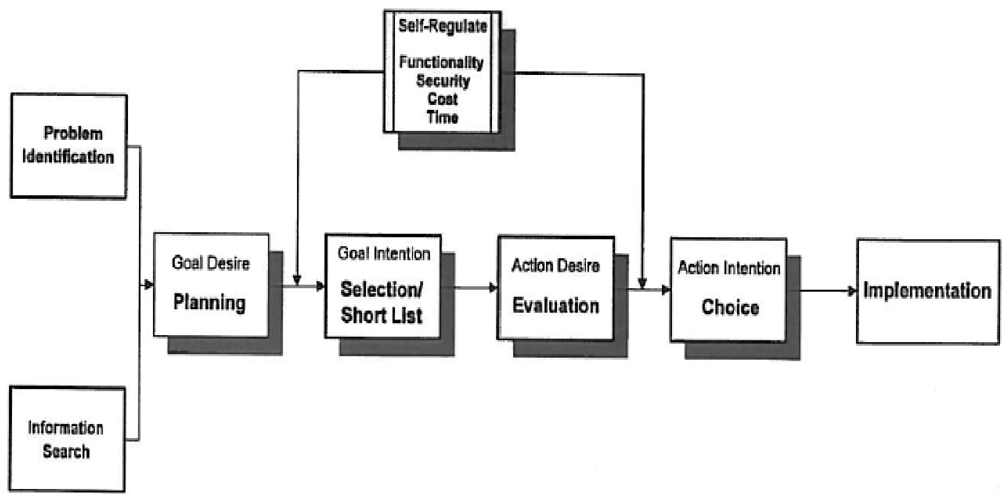


Figure 4: EAS acceptance decision model (Negahban et al., 2012)

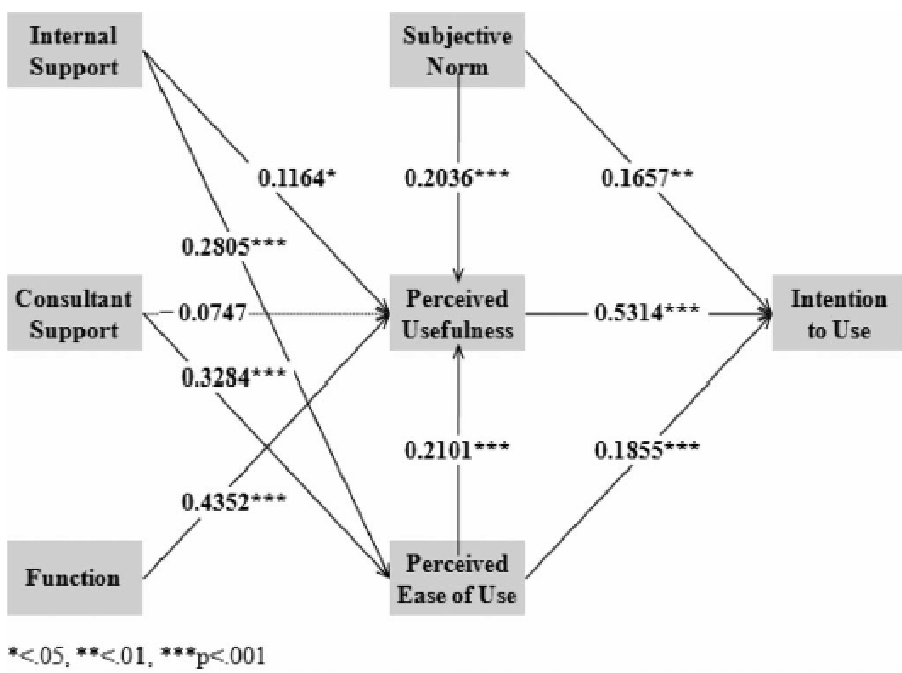


Figure 5: EAS acceptance model based on subjective norm (Kwak et al., 2012)

e. Kwak, Park, Chung and Ghosh model

The latest published in EAS adaptation research extends TAM variables by Kwak et al. (2012), who showed that managerial practices and socio-environmental factor are significantly related to the original TAM variables in the context of EAS system. This study extended existing literature by investigating potential managerial and socio-environmental factors affecting user adoption behavior in a different organizational context. While this article was focused on project-based sectors, the model can be adopted for generalized EAS system acceptance and utilization.

f. Summary of all the models

There is a vast project management literature focused on EAS acceptance, success and failures. Researchers have looked at the problem of acceptance criterion that is likely to improve acceptance Researchers have developed sets of fundamental project success factors that can significantly improve project implementation chances (Pinto and Slevin 1987; Shenhar et al. 2002). Other researchers have identified the best practices and risks related to IS projects such as EAS implementation. (Akkermans and Helden 2002) provided success factors for EAS implementation based on a broad literature review followed by a rating of the factors by 52 senior managers from the U.S. firms that had completed EAS systems implementations.

Ferratt et al. 2006 validated these success factors through the empirical study of EAS projects. They also provided five outcome questions, which were shown to be significantly correlated and should, therefore, be combined to form a single outcome factor, effectiveness. Their regression analysis proved that all the success factors can affect the outcome significantly; therefore, these factors can be considered the representative success factors in EAS implementation. However, there continued to be dispersed literature and understanding of how EAS adaption works. Table 3 summarizes all the models discussed and primary variable of interests. It clearly shows that each study is focused on a specific area of the implementation without having a holistic view. Lack of a holistic view of the situation, fails to view an EAS implantation project from an all inclusive perspective and ignores the factors being directly impacted due to integration of multiple stakeholders.

Table 3: EAS acceptance models

Model name	Reference	Purpose	Primary validation criterion/Extension from parent model	Comments
TAM	Davis 1989	Behavioral acceptance by end users	Perceived usefulness and Perceived ease of user	First and most cited model in EAS acceptance model
DeLone and McLean	DeLone and McLean, 1992	Information system success model	User satisfaction, individual impact and organizational impact	First and most cited model in information technology success
TAM2	Venkatesh & Davis 2000	Behavioral - acceptance by end users	Introduced subjective norm with TAM variables	First extension of TAM model and very widely used
Negahban, Baecher, Skibniewski	Negahban et al., 2012	Decision making for acceptance of EAS		This is the first decision making model and based on short comings of TAM variables.
Chung, Skibniewski	Chung et al., 2008	Behavioral –	TAM2 variables were extended with	One of the primary models

and Kwak model		acceptance based on success criterion	project success and EAS benefits	in merged behavioral acceptance with success.
Kwak, Park, Chung and Ghosh	Kwak et al., 2012	Behavioral and acceptance model from end user's perspective	Added socioeconomic factors to TAM2 variables	The most recent model extended socioeconomic criterion to validate acceptance of EAS systems

2.3 Conclusions of prior research

A lot of research has been done during last decade about the success and failures of EAS implementations (Helo et al. 2008). Most data came from survey and case studies without going into fundamentals on impact of project management tools and techniques for EAS project. A theory of EAS implementation approach must address the integrity and application of a project management methodology, establish relationship with implementation partners and vendors and include strategies for empowerment, fairness, and accountability during the implementation life cycle. The result of that relationship should be that the project manager is rigorously in control and, simultaneously, management methodology is optimally established process and procedure to manage a project involving multiple partners without direct hierarchical reporting structure. Three main components affect the level of satisfaction of an EAS user: "interaction with the IT department," "pre-implementation processes," and "EAS product and adaptability (Longinidis and Gotzamani 2009).

Prior research has provided valuable insights into how and why employees make a decision about adoption and use of information technologies (ITs) in the workplace. From an organizational point of view, however, the more important issue is how managers make informed decisions about interventions that can lead to greater acceptance and effective utilization of IT (Venkatesh and Bala 2008). Project management has been dominated by the hard paradigm in which reductionist techniques such as work breakdown structures and critical path analysis are used to manage projects. These tools and techniques are fairly well suited to the management of single projects and it is therefore unsurprising that industry is overwhelmingly dominated by the single project paradigm (Aritua et al. 2009).

There is a need to study these implementations from an organizational perspective, extending end users' perspective. Technology acceptance model (TAM) (Davis, 1989) is one of the most robust models proposed to date to explore acceptance of information technology and several authors have extended TAM from a different perspective. Several authors extended the theory of acceptance based on beliefs (Karahanna et al. 2006) and likelihood of acceptance (Bhattacharya and Sanford, 2006). Several authors have also extended TAM into a specific aspect of technology acceptance, e.g. in the context of training (Sharma and Yetton, 2007), technology (Ghosh and Ghosh, 2003) or impacts made by consultants (Kwak, 2012). Despite their prominence as key constructs in the literature, possible relationships among these key constructs and mutual relationships has not been the subject of extensive investigation.

Often EAS implementations may require going against conventional wisdom to be successful (Luo and Strong 2004). However no further study has been done to established a new methodology to implement EAS systems. We also discuss EAS project as a complex adaptive system that all EAS projects are different and requires project governance and management in place to adapt to interconnectedness, communication and control over different stakeholders involved with any non-hierarchical relationship.

Prior research has outlined the conceptual revisions needed to extend the new project management approach from its current linear way of looking into project management of EAS projects (Ghosh and Skibniewski, 2011). Prior research also suggested that the choice of project management approach is a matter of reviewing at the complete ecosystem rather than of functional goals of the EAS implementation. The acknowledgement of pluralism broadens distributive concerns in project management decisions to issues such as the distribution of complexities and project management impacts.

Consistent with our approach of project governance and management of EAS projects, we propose that three additional research phases are necessary to complete the study:

1) Confirming a structure of EAS complexities model, 2) parsing information model to understand different elements of EAS identified in this chapter and 3) assessing the consequentiality of EAS governance and management complexities in EAS project execution.

Future research can address how near real time governance and management can be incorporated in the project management and governance process and develop a system to capture and analyze problems.

Chapter 3

Acceptance of EAS system implementation:

A risk based decision-making model

3.1 Technology acceptance models

Over the last two decades, EAS systems have evolved from a location focused automation tool to a global transaction process system for some of the global enterprises (Ghosh, 2002). Consequently, as part of the implementations, EAS have integrated multiple business groups, process and countries – introducing additional stakeholders. The challenge of EAS project for successful implementation is that the project team needs to “institutionalize” across multiple boundaries – within EAS adopter, EAS vendor, consultants, training and other support organizations. Streamlining a governance and management structure that satisfies all stakeholder, involves multiple organizations within a given time period, and is a difficult task.

“A number of researchers have attempted to systematically understand the risks of EAS projects (Aloini, et al., 2007; Camara, Kermad, & El Mhamedi, 2006; Huang, et al., 2004; O‘Leary, 2000; Sumner, 2000a). An earlier study by Sumner (2000) examines risk factors in enterprise-wide/EAS projects through case studies with organizations implementing EAS. Aloini et al. (2007) presents a comprehensive review of the literature in risk management in EAS project introduction, in which 19 risk factors are listed based on the frequencies of their appearance in literature. Since the review is one of the latest and deemed comprehensive, it could be a reference point for the EAS risk enumeration in project-based firms. These risk factors are basically generic and high-level, each of them a summarization of a series of lower level risk elements that share certain common characteristics" (Zhen, 2010).

There is no comprehensive study to understand how TAM variables can impact risk mitigation in EAS implementations. Adopting and implementing risk management principles, tools, and techniques (Kwak, 2009) to manage enterprise wide information technology programs and projects is one of the most important management decisions for managing such projects effectively (Kwak and Lee, 2008). While there have been many studies investigating and identifying individual key risk factors in the EAS domain, there have been very limited studies in investigating how those key risk factors have effect on each other.

The major phases in the risk management processes is to understand the context, which involves understanding the multi-partner, multi-product, multiple resource group domain of interest establishing the basis upon which risks will be understood, and planning the remainder of risk management processes. While the existence of risks in any multi-stakeholder group environment is expected, risks can be mitigated through early diagnosis and understanding possible sources. Understanding of risk management and sources plays a very important role in enabling organizations to perform the mitigation. Many models have been developed in recent years to address the need of a more effective risk management, most of them typically used an iterative approach to risk management problems (Aloini, et al., 2007; Keizer, Halman, & Song, 2002; PMI, 2008).

Risk management strategy consists of two approaches: reducing risky circumstances and dealing with risk treatment after a risk appears (Aloini et al, 2007). The challenge with proactively reducing risky circumstances is related to environment variables, e.g. inadequate selection of application (Tuner, 2007; Wright and Wright, 2001) happens before a project manager is assigned to the project and therefore cannot be controlled by the project manager.

Successful fulfillment of project deliverables is critically dependent on the involvement and support of project stakeholders. Different stakeholders, external or internal, often have different or sometimes conflicting requirements and expectations. Ignoring their influence is likely to be detrimental to project success. The need to achieve project objectives that fully address stakeholder expectations throughout the project lifecycle has been stressed in previous studies (Bourne & Walker, 2005; Cleland & Ireland, 2006). With regard to EAS projects, stakeholders not only include those participants in the implementation processes, but also include the stakeholders in the projects carried out by the organization during and after the implementation. It is these projects that bring profits to the firm and make the EAS adoption worthwhile. Examples of such key stakeholders include major clients of the company, as well as suppliers, regulators, and collaborating partners. According to a study by Hartman & Ashrafi (2002), one of the major reasons for project failures in the IT industry is the lack of a clear definition or a common view of what constitutes success among key stakeholders, or in the presence of a clear vision; it is neither effectively communicated nor well understood. This leads to conflicts between departments, scope creep, inappropriate measurement, churn in developments, specification changes, delays, and other issues (Hartman & Ashrafi, 2002). Therefore, maintaining the relationships with stakeholders and involving key stakeholders including, but not limited to, in-house users into the implementation process should be considered as a success factor of EAS projects; in other words, inadequate stakeholder involvement and relationship management would be a critical risk factor. There is little evidence, however, that multiple stakeholders have increased risk sharing despite widespread discussions on individual risks. Conventional wisdom suggests that dealing risks together would reduce idiosyncrasies involved in the implementation. It is proposed that the key to understanding this puzzling observation is that conventional wisdom assumes frictionless interaction between multiple stakeholder groups, while implementations are far from frictionless.

3.2 New scales for two variables related to risks of EAS acceptance

Anticipating consequences of one group of stakeholder's action and evaluating the desirability and consequences (values) to other stakeholder groups pose particular problems if the consequences are complex and uncertain, and the values contested and controversial. Following Dietz et al, 1989; Fiorino, 1989; Hagendijk and Irwin, 2006, and Renn and Schweizer, 2008, it can be argued that in dealing with EAS implementation, which is complex, often uncertain and ambiguous outcomes lead to the emergence of project conflicts. Although everyone may agree on the overall project goals and objectives, precisely what that goal entails and precisely how that particular risk originated due to complex interaction may evoke substantial project disagreement. So hypothesized that the integration of knowledge and values can best be accomplished by involving those actors in the decision making process that will enable effective, efficient, fair and morally acceptable decisions about risk (Kemp, 1985; Warren, 1993; Tuler and Webler, 1995; Webler, 1995, 1999; IRGC 2005, Renn and Schweizer, 2008).

Each decision-making process has two major aspects: what and whom to include, and what and how to select (closure) (Hajer and Wagenaar, 2003; Stirling, 2004). Inclusion and closure are therefore the two essential parts of any decision- or policy-making activity. In this chapter it is intended to address the 'inclusion' part. To ensure that the right stakeholder groups are included, first is the need to identify who they are. Thomas and Worrall (1988) characterized that in an environment without commitment with one risk-averse agent and one risk-neutral agent creates a sub-perfect situation leading to different risk perceptions. Extending how risks are distributed across multiple stakeholders involved in EAS implementation, it is clear that the organization should possess assets, competencies, and practices to ensure that the organization is uniquely integrated to undertake new challenges. Asset resources are classified into four sub-categories: infrastructure, transactional, informational, and strategic (Weill and Ross, 2004). A variety of individual and organizational capabilities, assets, strategies, and processes may complement any EAS implementation; however, it is expected to look at the resources view to ensure that organizations can deliver and sustain any investments. The intention was to develop a model in two phases. First, identify all the elements that may impact technology acceptance that are currently present in the enterprise architecture.. Initially the identification of components is done with expert interviews and literature review, and then modified based on sample survey and statistical analysis.

Aral and Weill, 2007 proved that firms derive additional value per IT dollar through a mutually reinforcing system of organizational IT capabilities built on complementary practices and competencies. Assets are further classified into infrastructure, transactional, informational, and strategic components.. Infrastructure assets are expected to provide a foundation for all activities. From a transactional point of view of the company's business processes, therefore strategic renewal (Agarwal and Helfat, 2007) although critical for the sustained success of organizations, has received relatively little attention as distinct from the more general phenomenon of strategic change. Like all strategic issues, strategic renewal presents both opportunities and challenges for organizations. In this chapter, first define the term “strategic renewal” and then elaborate on important characteristics of this phenomenon. Also bring to bear evidence that suggests that strategic renewal has a critical impact not only on individual firms and industries but also on entire economies.

The resource based theory argues that durable competitive advantage emerges from the unique combination of resources and resource availability as well as the ability to deploy such resources, which would improve performance (Grant, 1996) and therefore adaptability and integration is not proper, then there is a possibility that all these entities may fail to work together. Therefore all known components in EAS implementation should be involved in a management decision process.

Therefore, it is argued that given the complexity of the relationship between different stakeholder groups involved in an EAS implementation, multiple type of warrants are necessary for building and understanding interactions. While proposing new measures, consider that if and when imperfect diversification and commitment across different stakeholder groups, risks are not diversified in a perfect way. In particular, it is essential to understand how these entities work together raising risks, which are in effect originated because of the integration of these various entities. To understand the framework of integration of these entities, propose to discuss the following:

What is integration? Any EAS implementation environment consists of assets and resources that each of the stakeholder group owns, and therefore any outcome of activities is lead and controlled by that stakeholder group. It can further illustrate with an example, consider example 1 from page 3, where multiple new models of tablets will not be able to handle Microsoft's new operating system. This example illustrates the lack of integration between the operating system and hardware. This example also illustrates that ownership of mitigation of this risk (i.e. a new operating system may work with an existing hardware) resides within the integrated framework of both the stakeholders involved.

EAS implementation environments comprise many interacting elements with different kinds and strengths of connections. There are direct and indirect connections, with some connections being more critical than the others, based on the phase of the implementation. Some connections can be hidden, subtle, distant or slow, and these are as important to recognize for EAS implementation management purposes.

What is interdependency? Aiken and Hage (1968) discussed cause and consequences of organizational interdependencies among a specific sector. The assumptions and hypothesis presented in the above mentioned paper forms the basis of stakeholder interdependencies. Adopting Aiken and Hage (1968) and using in project management context, the following assumptions forms the basis of interdependency risks in a multi-stakeholder environment (based on seven assumptions from Aiken and Hage (1968)).

A. Multi-stakeholder diversity stimulates project efficiency and increases the need for resources from all groups in the project.

B. As the need for resources intensifies, stakeholder groups are more likely to develop greater inter-dependencies with other stakeholders impacting project success in order to gain resources.

C. Stakeholder groups attempt to maximize gains and minimize losses in attempting to obtain resources.

D. Heightened interdependence increases problems of internal control and coordination.

E. Heightened interdependence increases the internal diversity of the organization.

Dynamism, context and scale: Projects are developed based on the assumption that scope is fixed during the entire lifecycle of the project. Change and evolution are inherent in any environment, and an EAS implementation in no exception. Different EAS implementations and different adopters of EAS system have different implementation boundaries, or ranges, over which they can be changed until being unable to return to their steady state. An EAS implementation runs over a wide range of spatial as well as temporal scale. Small perturbations can have a large effect when repeated over a life cycle of a project. So, changes can be set off larger-scale effects at a project phase level or during the entire duration of the project. In a pluralist society, knowledge claims about potential consequences of actions as well as criteria for judging the collective acceptability of options are contested.

Based on the above discussions, it is clear that the complexities of EAS implementations are high, and ability to predict its behavior with certainty decreases. Therefore, EAS implementation management requires probabilistic thinking. Managers must learn to expect the unexpected, avoid creating irrevocable trends, and develop approaches so that they can learn, and make changes as they proceed in the face of uncertainty. This leads to studying risks in the EAS context. Therefore it is defined that complex connection related risks as 'integration risks' of EAS system and dynamism, content and scale related risks as 'inter-dependency risks' of EAS implementation.

3.3 Hypotheses related to EAS implementation acceptance model

The measures 'integration' and 'inter-dependency' risks can be easily justified using shared risk theory. Holmstrom (1979) characterized the optimal compromise between the conflicting goals of efficient risk sharing and efficient work incentives. The misallocation of risk is justified by the gains from improved work incentives. Unfortunately, the communication process between EAS stakeholders is complex. First, often there is no common communicator between several stakeholders, e.g. it is possible that hardware vendors of EAS system implementation may not have any direct communication with the training vendor. Second, some stakeholders may not be predisposed to exercise central or peripheral objectives of the implementation. It may rather depend on the message itself whether it can trigger central interest or not. Therefore, as shared risk theory stipulates, in a complex relationship, there is a need to identify strong influencers. Based on this discussion, developed the hypothesis as:

Hypothesis: 1. INDR and INTR will be positively associated with the new solution.

3.3.1 TAM variables

End users are primarily responsible for efficient use of the system by incorporating business processes with transactional screens in the system. Therefore, to understand how transactions are efficiently completed, should understand the compatibility between end users and the new application system, and thereby understand perceived usefulness and perceived ease of use. The extensive theoretical construct was developed based on theoretical definitions and empirical derived dimensions (Ramiller, 1994). Therefore, the tacit knowledge base exists in perceived beliefs in specific technology acceptance. However, the tacit knowledge base of the IT adopters is required to fit innovation with adopters’ existing values, previous experiences, and current needs (Taylor and Todd, 1995). To develop proper infrastructure in place for the innovation of adopting a new application, practical compatibility and value of compatibility should be pre-existing (Harrington and Ruppel, 1999).

Karahanna et al (2006) identified the following four components: 1) Compatibility with preferred work style, 2) Compatibility with existing work practices, 3) Compatibility with prior experiences and 4) Compatibilities with values; 2, 3 and 4 has direct impact on the perceived usefulness and perceived ease of use. Therefore, for our study, these three criterions are treated as the bases of considering perceived acceptance. Therefore extended the belief component also to extend to perceived availability of functionalities (Chung, 2007) offered by a specific product or solution that is being implemented.

Successful innovation requires tracking your partners and potential adopters as closely as you track your own development process (Adner, HBR). For any technology to be acceptable, sustainable and eventually to be called a successful implementation, proper support structure should be in place. Support components are identified into three components:

a. Perceived support from the internal support organization
b. Recruiting a consulting organization to support the implementation and may extending to provide post production support and thereby perceived usefulness
c. Perceived support from the product selected in the process

Hypothesis 2a. PE will be positively associated with ITER.

Hypothesis 2b. PU will be positively associated with INDR.

3.3.2 Variables introduced by subjective norms

Informational variables can be categorized into product knowledge and industry knowledge, e.g. Best practices, reporting, decision support, planning, control, analysis, and optimization. External consultants bring that informational support into the implementation. Consultant support which has also been identified as one of the critical factors for EAS implementation projects in previous studies (Akkermans & van Helden, 2002; Chung et al., 2008; Ferratt et al., 2006; Gattiker, 2002; Somers & Nelson, 2001). Typically, EAS is classified into the most demanding type of innovations due to its complex and knowledge-intensive characteristics (Ko et al., 2005; Swanson, 1994). With these characteristics, EAS implementation projects can be easily jeopardized due to severe knowledge asymmetry (Rus & Lindvall, 2002) and high knowledge barrier (Attewell, 1992). And the problem can be more serious when accompanied by the lack of in-house expertise (Smith, Mitra, & Narasimham, 1998). For these reasons, scholars have argued that transfer of knowledge is important especially in the context of EAS (Ko et al., 2005; Soh, Kien, & Tay-Yap, 2000). Indeed, it is known that firms spend a large portion of budget on using consultants (external experts) when implementing EAS system (Chung, 2007). Also, SAP annual report states that consulting service about 26% of its revenue (SAP, 2005). Hence, it seems that determining whether or not consultant supports is significant is especially relevant in the context of EAS system implementation.

The perceived degree to which consultant support helps to make EAS implementation successful varies (Chung et al., 2008; Ferratt et al., 2006). This variable is different from trainin. That is, the goal of consultant support goes beyond the implementation success of a new system and encompasses ongoing operation, keeping up with changing technologies, etc. (Ko et al., 2005), whereas the purpose of training is enabling users to acquire basic skills at the initial stage (Fichman, 1992). As noted above, EAS system is a complex and knowledge-intensive system. Moreover, most of the users are non-IS specialists who lack technical knowledge (Bancroft et al., 1998). Therefore, expect that consultant support enable these users to increase ability to adopt a new system (Cohen and Levinthal, 1990) by lowering the knowledge barrier involved in the acceptance of complex information system (Attewell, 1992). And in a similar vein to training, which is expected to increase the perception of usefulness and to decrease the perception of efforts; it is possible to argue that consultant support would influence those two constructs.

To find evidence that supporting the relationship between consultant support and IT implementation success refer to the works of Leonard-Barton (1987) and Soh et al. (2000). In the study on the adoption of Structured Systems Analysis (SSA) by individual system developers, Leonard-Barton (1987) argued that perceived accessibility of consulting moderately discriminated adopters from non-adopters.

Soh et al. (2000) also reported that knowledge transfer from consultants to business users is a critical success factor for EAS implementation projects. These studies allow us to argue that consultant support may facilitate the user acceptance of EAS system. Compared to training, however, relatively less attention has been paid to consultant support in the EAS-related literature as well as technology acceptance literature. Based on the discussion, perceived usefulness and perceived ease of use will have meditational effects on the positive relationship between consultant support and the success of EAS system implementation. More specifically, consultant supports will positively affect perceived usefulness and perceived ease of use, respectively. Based on the discussion, developed the hypotheses as follows.

Hypothesis 3a. Consultant's product knowledge will be positively associated with INDR.

Hypothesis 3b. Consultant's product knowledge will be positively associated with ITER.

Hypothesis 3a. Consultant's industry knowledge will be positively associated with INDR.

Hypothesis 3b. Consultant's industry knowledge will be positively associated with ITER.

Next logical item to consider ensuring team development for EAS is training, which should address all aspects of the system, and be continuous and based on knowledge transfer principles wherever consultants are involved (Davenport, 1998). This section of variables is introduced based on Kwak et al. (2002) model. Successful knowledge transfer can be one of the most effective guarantees for EAS implementations. Efficient knowledge transfer among various actors in an EAS system is not an easy job either, which gives rise to knowledge management in EAS systems. Following Sharma and Yetton, the effect of training on implementation success is contingent on both technical complexity and task independence.

Organizational culture facilitates (or inhibits) the acceptance of the EAS implementation within the company. It has been suggested that corporate transformation requires a readiness to change, a vision of the future within the employees (Stoddard and Jarvenpaa, 1995). Open communication and information sharing can promote a common culture and innovative behavior in the organization; so also can cross functional training and personnel movement within the organization (Guha et al., 1997). An EAS implementation more often than not would necessitate a change in the way people do things, or even their views of what they really need with the introduction of an EAS system. This means taking into full account users views on objectives concerning themselves and their business environment. Therefore, establishment of a participatory culture and cross functional training is critical.

IT enablers identified training to be a critical component (Sharma and Yetton, 2007) to ensure success, primarily in the packaged software market segment.

Packaged software are conceptualized, developed and marketed by a vendor without specific input from the implementing organization. The above mentioned theory therefore evaluated in practical purposes to ensure the key measures of success in training. Keeping it simple, cost was perceived to a critical component of training activity. Training costs organizations in two different ways, losing immediate productivity, and loss of value producing hours and cost of the training itself. Borrowing from Sharma and Yetton, IT adopters identified that depending on the stage of the project, some of the key end users or power users may be trained by external trainers with an expectation that these selected individuals would become solution champions in the organization and play a critical role in the project. These individuals would then act to train the other end users who are not power users. Based on the above discussion, following hypothesis are proposed:

Hypothesis 4a. Training will be positively associated with INTR.

3.3.3 Infrastructure related variables for technology acceptance

These types of variables provide a foundation of shared IT service, and provide a flexible base for future business process. Application service providers (ASPs) are third party service firms that deploy, manage and may also remotely host remotely located servers and application through a central location. Internal support organizations are the specialized division, department of group of individuals within the same organization who are entrusted to support the specific application. Several existing literature on ASP has identified the participants of the ASP model are identified as a) solution developer, b) customer, c) business service provider and d) platform enabler (Gurbaxani, 1996).

ASP support is also the direct consequence of globalization and organizations looking for metanational advantage (Doz et al.) However, there is a coordination and inter-dependency problem related to technical, temporal or process oriented (Espinosa et al 2007). Software as a service is also a model that has gained recently growing interests in the market segment. Ekanayaka et al. (2003) established that ASP support consists of multiple areas as documented in the following table 1.

Table 1: ASP areas to be considered for Complex IT implementations (Ghosh and Skibniewski, 2010)

Source	**Type of Complexity**	**Project Management Responsibilities**
Security (Currie and Seltsikas, 2001)	Structural and technical	Physical security Security of data and applications Backup and restore procedure Disaster recovery plan
Ability to Integrate (Greg, 2000)	Directional and technical	Ability to share data between applications, automatically populating one application with data from another application
Pricing (Gerrit and Gunther, 2000)	Structural and temporal	Effect of TCO

		Hidden costs/Charges Return on investment
Customer Service	Structural	Help desk and training Support for administration of accounts
SLA Monitoring and Management	Structural	Clearing defined monitoring procedure
Reliability, Availability and Scalability	Temporal	24X7 supports

Ghosh and Ghosh (2003) proposed that executives need to have a complete understanding of the architecture challenges involved in adopting a new enterprise wide system and proposed that the three elements to consider are, a) network upgrade, b) hardware upgrade and c) providing global support. Now most of the implementations are at global level due significant advancement of telecommunications in the recent past and advancement of Internet technology. Using this systematic approach will facilitate evaluation of technical requirements pre-requisites of the EAS implementations. This will also help identify the critical success factors and where executive sponsorships are most required. Obviously each situation being unique, it requires different evaluation. Also the ability to take advantage of metanational advantage and outsourcing will change the overall ROI (Doz et al., 2001). However, unlike business process challenges that are subject to government and other regulations, technical challenges could be resolved internally with proper executive sponsorships, planning and efficient project management and availability of appropriate resources. Executives are required to judge each of the aspects separately and at the end match all the three to make the decision of which complex IT system application package to adopt. For current research, purely from an infrastructure perspective, it is considered that network and hardware as a single items and application support is considered as a separate item.

Hypothesis 4a: Technology will be positively associated with INDR.

3.3.4 Conceptual EAS implementation acceptance model

Figure 6 shows the proposed model, referred to as the conceptual model. As discussed earlier sections, EAS models can be classified into three categories 1) adoption model, e.g. TAM, 2) success model, e.g. D&M's IS model and 3) decision making model e.g. Neghaban's model. Each of these models is based on individual aspect, end user acceptance, individual and organizational success or decision process to adopt. Adopting the resource based theory perspective and applying it to information technology also makes it clear that the organization should possess assets, competencies, and practices to ensure that the organization is uniquely positioned to undertake new challenges. Asset resources are classified into four sub-categories: infrastructure, transactional, informational and strategic (Weill and Ross, 2004). While understand how each of the above works, the literature is lacking any comprehensive approach to understanding risks associated with it.

The approach of the model has been to change the strategies and add a new perspective to coping with uncertainties. Rather than investing all effort to gain knowledge about different components of uncertainty, develop better ways to co-exist with uncertainties by studying mutual dependencies and impacts. The new approach is based on resilience and vulnerability management and similar concepts (Collinridge, 1996; Klinke and Renn, 2002). According to these concepts, EAS implementation is driven by making the system more adaptive to surprises, and at the same time allowing interventions to be managed through mutual discussions and co-existence (O'Riordan and Cameron, 1994; Stirling, 1999. The proposed integrated success model is based on the premise that EAS implementation can be successful if all the entities involved in the implementation work together.

Table 2: Summary of Instrument Variables for the survey

No	Variable	Name of the var.	Reliability (α)	Type of Variable	Source of Items
1	Business Process(BU)	BU	0.843	Independent	Elena Karahanna et al.(2006)
2	Consultants - Product Knowledge	CPR	0.72	Independent	Chung(2007)
3	Consultants - Industry Knowledge	CIN	0.76	Independent	Chung(2007)
4	Security		0.87	Independent	Ekanayaka(2003)

5	SLA	SLA	0.90	Independent	Ekanayaka(2003)
6	RAS	RAS	0.96	Independent	Ekanayaka(2003)
9	Hardware and Network	UP	0.766	Independent	Ghosh and Ghosh(2003)
7	Training Availability	TR	0.81	Independent	Sharma and Yetton (2006)
8	Competition	PUR	0.842	Independent	NA
9	Perceived usefulness	PU	0.911	Dependent	Davis (1989), Venkatesh and Davis (2000)
10	Perceived Ease of Use	PE	0.899	Dependent	Davis (1989) and Venkatesh and Davis (2000)
11	Adopt a new Solution	NEW	0.842	Dependent	Pilot
12	Sunset Existing Solution	SUN	0.90	Dependent	Pilot

3.4 Validation of the proposed model

The selection of an appropriate research design is the subject of considerable IS research. Orlikowski and Baroudi (1991) identified three broad research paradigms centering on positivist, interpretive, and critical methodologies.

Positivist research, which is most prevalent in the literature, is comprised of formal propositions, quantifiable measures of variables, hypothesis testing, and the drawing of inferences from a sample to a stated population (Lee, 1991). Interpretive research does not explicitly state independent and dependent variables, but instead, attempts to understand a phenomenon based on the meanings that people attribute to the situation – or opinion based on the attitude they have about the situation.

"When forming an attitude, an individual can put forth varying levels of effort in the service of one or more motivations or goals (Kruglanski 1989; Fazio 1990; Fazio 2007). A motivation (or goal) is a “cognitive representation of a desired endpoint that impacts evaluations, emotions and behaviors” (Fishbach and Ferguson 2007, 491). Striving to obtain a goal motivates particular actions; the goal of forming an “accurate” preference means that an individual takes actions with the hope of generating a preference that is the “correct or otherwise best conclusion” (Taber and Lodge, 2006)" (Druckman, 2012). Taber and Lodge (2006) offer a powerful case for the prevalence of directional reasoning that aims not at truth, but at the vindication of prior opinions. Theorists posit that a public—unlike a mass of individuals—forms opinions through awareness of multiple viewpoints (Nir, 2011). Therefore the survey conducted based on opinions from professional responsible for making relevant decisions and that in turn would result in actions, which validates the purpose of the survey.

3.4.1 Research setting, sample and data collection

In surveys in which the primary sampling units consist of individual elements each of which is listed in the sample frame, a simple random sample is appropriate. However, it is impossible to obtain a complete list of the sample frame and high costs associated with obtaining a complete list in management related surveys. A web based survey was conducted for large multinational corporations. In any survey employing complex designs, clustering, stratification, disproportionate sampling, and samples with multiple stages, the standard errors are much larger than a simple random sample of the same size. The difference between the variances produced when treating a complex sample as a simple random sample and the correct variance is called the design effect and can be calculated. Simple regression is also most commonly used forecasting method used in the literature (Amoako-Gyampah and Salam 2004; Flitman, 2003), and in this chapter also discuss weighted regression and logistics regression as alternative methods to ensure that proper representation of the number of users impact per response in accounted for. This research employs a positivist methodology, but uses variables from both positivist and interpretive (qualitative) research domains to create a robust and parsimonious model of adoption.

The population of interest is key stakeholders in EAS implementations who are directly involved in implementations. To test our hypothesis, the target respondents were drawn from various EAS implementation related sources – trade magazines, Linkedin profiles with documented EAS related responsibilities and EAS related websites/groups etc. Data were collected both online and direct email to target respondents. The online survey was developed in www.surveymonkey.com. All responses were collected in Likert scale of 1 to 7, where 1 meant strongly disagree and 7 meant strongly agree.

The characteristics of the respondents are as follows: a total of 365 responses have been received. Missing elements, mostly longitudinal in nature are present in the data set, which are treated on case by case basis. 47% of respondents reported more than 5 years in the industry. The average number of employees in the implementation is reported as 460 and the average number of users per implementation is reported as 360, implying that most of the respondents represent high volume implementations. Professional services, financial services and other federal, state and local government are most represented, with 15 out of 17 industry classes (US Bureau of Industries Classification) represented. All the 6 continents are represented in the data set. A majority of the respondents are in executive and management level with designations as Vice President, Owner, Project Director and Solution Architects. From the name of organization respondents representing, the largest identified has $18B USD in company revenue and smallest one is inferred at $40M USD per year revenue. Financial management system represented 53% of the total respondents, 13% from the Human Resource Management System and rest of responses is from other applications, such as Delphi. Primary vendors are as follows: Oracle represented 26%; Microsoft 18% and SAP 17%.

3.4.2 Key measures from validation of EAS implementation acceptance model

Proposed model based on hypothesis 1-5 are presented in the survey items were based on well-validated instruments in all the existing studies. Table 1 provides detailed information about the survey items. All analysis was done using SAS 9.1 and a correctly specified variance model for the probability sampling design. The analysis were also weighted to account for the number of users of each of the responses, so that each response can properly represent how much each impacts the total population relative to the total population.

3.4.2.1 Business process related variables

EAS implementation may require the business process to change to ensure the adopter's business process is implementable. Business process related questions were adopted from Elena Karahanna et al.(2006). The objective of these questions were to understand compatibility of existing business process and if any changes are required.

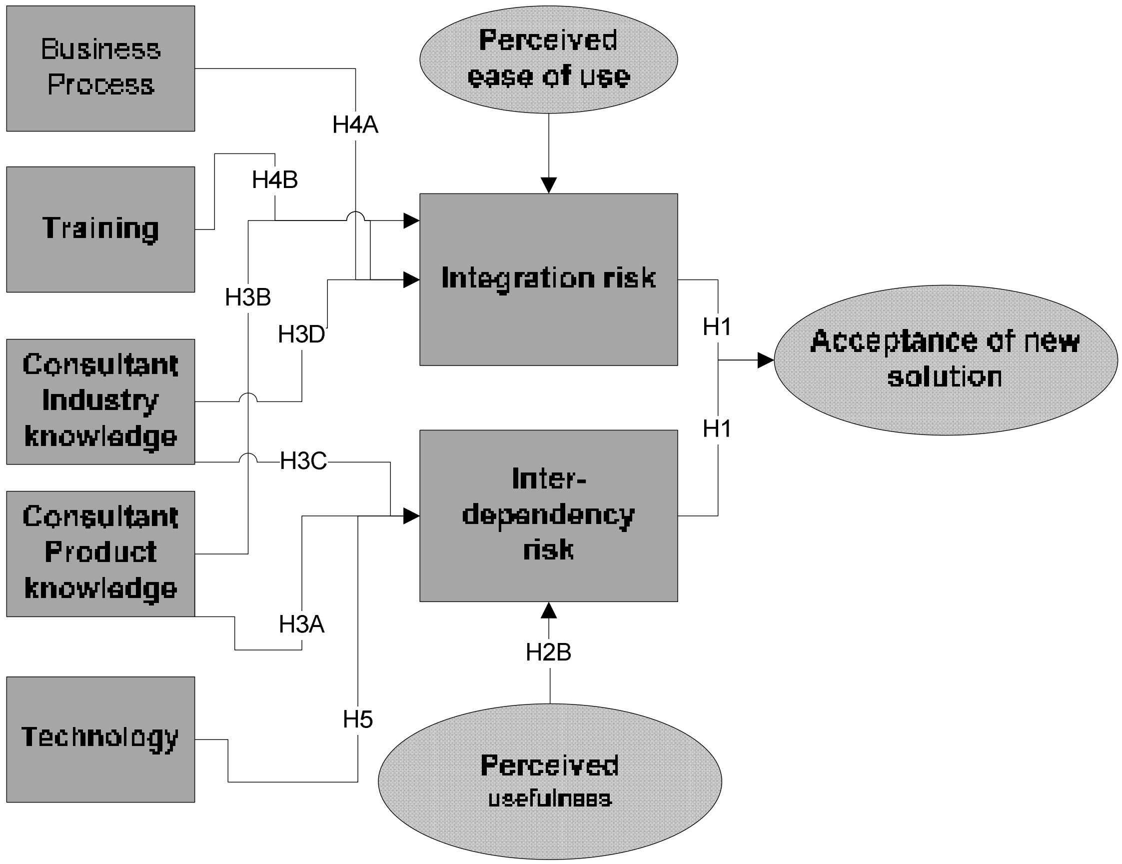


Figure 1: EAS acceptance model based on risk based measures

3.4.2.2 Value and strategy

There were 3 questions to measure compatibility of the new application with company's values/strategy. This set of questions ensures that the EAS selection was not mis-aligned. The questions were selected from Elena Karahanna et al.(2006).

3.4.2.3 Experience

There were 3 questions adopted from Elena Karahanna et al.(2006) to understand the compatibility of the new application you with your company's employee’s prior experience. Since previous experience from a strong user base is likely to make a positive impact on the implementation.

3.4.2.4 Consultants related variables

4 questions from Chung (2008) adopted to understand the need consultant's help to support your new application implementation. The questions covered the consultant’s knowledge about the EAS product and industry.

3.4.2.5 Training related variables

Sharma and Yetton (2006) covered two typical training scenarios – direct training and train-the-trainer scenarios to understand how much success impacts training provided in a successful implementation. There are 4 questions related to training.

3.4.2.6 Technology related variables

There are 7 technology related variables to cover hardware, software and network. These questions are adopted from Ghosh and Ghosh(2003).

3.4.2.7 Perceived usefulness related variables

This item was accessed using four kinds of items based on works of David and later modified by Venkatesh and Davis.

3.4.2.8 Perceived ease of use related variables

This item was accessed using four kinds of items based on works of David and later modified by Venkatesh and Davis.

3.4.2.9 Risks related variables

There are 4 risk related variables based on literature review and as justified in the earlier section of the chapter.

3.4.2.10 New software acceptance related variables

There are three questions asked on primary reason for organizations selecting a new application. Cronbach's Alpha based on standardized items between the three responses was 0.806, indicating the questions asked are very reliable. 74% of the respondents agreed that market/competition is the primary reason. 78% or better expressed agreement that replacement of legacy systems are required and 67% agreed that lacking analytical abilities is the reason for selecting the new system.

3.4.2.11 Descriptive statistics

Table 3: Descriptive statistics

Variable	N	Mean	SE Mean	StDev	CoefVar	Anderson-Darling*
Process	155	4.02	0.16	1.98	49.18	2.45
ConInd	150	4.98	0.13	1.60	32.07	3.61
ConProd	150	5.51	0.14	1.74	31.50	9.8
Tech	150	4.25	0.12	1.43	33.61	2.47
TRA	149	4.25	0.15	1.83	43.12	1.41
TTT	149	4.84	0.13	1.57	32.44	1.92
PU	129	5.45	0.15	1.71	31.32	6.78
PE	127	4.52	0.15	1.68	37.12	2.71
INDR	128	4.52	0.14	1.63	36.16	3.29
ITER	128	4.66	0.15	1.74	37.31	3.49
NEW	119	5.00	0.15	1.60	31.86	1.97

Cronbach's Alpha = 0.87
* all p<.005

Table 4: Correlation coefficients

	Proc	Con-Ind	Con-Prod	Tech	TRA	TTT	PU	PE	INDR	ITER
Con Ind	0.23									
Con Prod	0.30	0.49								
Tech	0.08**	0.30	0.37							
TRA	0.68	0.20	0.33	0.17						
TTT	0.49	0.32	0.30	0.15*	0.60					
PU	0.18	0.34	0.49	0.53	0.15**	0.25				
PE	0.52	0.25	0.45	0.43	0.50	0.23	0.70			
INDR	0.36	0.22	0.41	0.41	0.38	0.36	0.57	0.55		
ITER	0.26	0.29	0.36	0.36	0.37	0.28	0.54	0.57	0.74	
NEW	0.27	0.39	0.46	0.39	0.35	0.23	0.29	0.35	0.30	0.32

3.5 Discussions

3.5.1 Regression equations

Table 5: Regression analysis of integration risk

Term	Coef	SE Coef	t value	Pr > |t|	90% CI	VIF
Process	-0.04	0.09	-0.43	0.67	(-0.20, 0.11)	12.23
ConInd	0.21	0.08	2.68	0.01	(0.08, 0.34)	11.53
ConProd	0.12	0.09	1.45	0.15	(-0.02, 0.27)	16.23
TRA	0.18	0.10	1.80	0.08	(0.01, 0.35)	14.81
PE	0.50	0.10	5.19	0.00	(0.34, 0.66)	14.11
		R-Sq(adj) = 92%				
		F= 302.86 (p= 0.00)				
ITER = -0.04 Process + 0.21 ConInd + 0.12 ConProd + 0.18 TRA + 0.50 PE						

Table 6: Regression analysis of inter-dependency risks

Term	Coef	SE Coef	t value	Pr > |t|	90% CI	VIF
PU	0.45	0.10	4.68	0.00	(0.29, 0.60)	21.01
Tech	0.20	0.10	2.06	0.04	(0.04, 0.37)	14.40
ConProd	0.18	0.08	2.22	0.03	(0.05, 0.32)	16.16
ConInd	0.03	0.08	0.32	0.75	(-0.11, 0.16)	12.39
		R-Sq(adj) = 92%				
		F= 375.649 (p=0.000000)				
INDR = 0.45 PU + 0.20 Tech + 0.18 ConProd + 0.02 ConInd						

Table 7: Regression analysis of acceptance of new solution

Term	Coef	SE Coef	t value	Pr > |t|	90% CI	VIF
INDR	0.52	0.14	3.64	0.00	(0.28, 0.75)	16.74
ITER	0.50	0.14	3.64	0.00	(0.27, 0.73)	16.74
		R-Sq(adj) = 88%				
		F= 437.160 (p= 0.00)				
NEW = 0.52 INDR + 0.50 ITER						

3.5.2 Hypothesis testing

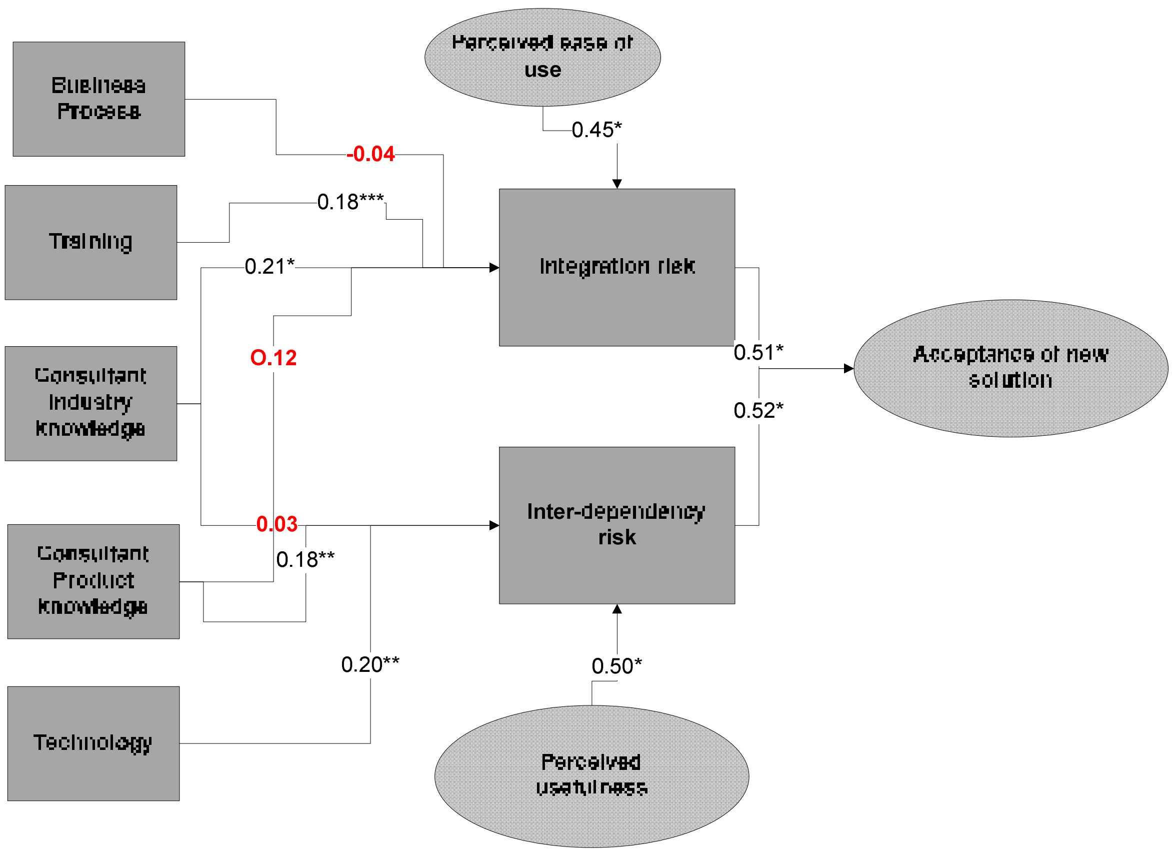


Figure 2: Results of hypothesis testing (* significant in 10%, **=5%, *=1%)**

3.5.3 Analysis

The main purpose of this study was to investigate the effects of project management variables on EAS system implementation success from the perspective of user acceptance. Our key findings are as follows:

A. Integration and inter-dependency risks influence positively and equally on acceptance of new application. This study also shows that integration and inter-dependency risks should be managed simultaneously.

B. Consulting industry knowledge, training, and perceived ease of use seem to be factors directly influencing integration risks.

C. Adopter's business process and consultant's product knowledge seems to be not impacting integration risks

D. Adopter's technology, consultant's product knowledge and perceived usefulness seem to be factors directly influencing inter-dependency risks.

E. This empirical study of a complex and mandated information system also provides support for original TAM. The main constructs theorized in TAM are significant in the context of EAS system but extended TAM to a new dimension by introducing risk factors as part of the evaluation.

F. There are two important contributors without any direct impact to perceived usage – training and hardware. However, the result regarding training and hardware provides us potential for future research.

It is expected that perceived ease of use will positively influence integration risks, and similarly perceived usefulness will likely reduce inter-dependency risks. In addition, in this study, hypothesized perceived ease of use and perceived usefulness as aggregate variables which are likely provide cognitive factors in the literature which attempted to extend TAM. As found in our results, however, risk based factors that had been selected based on evaluating identified EAS risks have significant impact on acceptance of the new system. The study would provide a basic mechanism for predicting successful EAS implementation from multidimensional perspectives.

In addition, this analysis provides additional evidence that perceived ease and usefulness have predictive power and re-establishes TAM in a complex and mandatory context. In the existing literature, some scholars argued that TAM is not valid in mandatory (Marler et al., 2006) or field (Lucas et al., 1999) settings, whereas others such as Amoako-Gyampah et al. (2004) provide support for TAM even in the EAS context. For these reasons, it was difficult to reconcile the validity of TAM in terms of the significance or explanatory power. However, the EAS success model proposed here validated that the belief constructs (i.e. perceived usefulness and perceived ease of use) were not only significant but also having similar level of explanatory power to extend in the risks context.

3.5.3.1 Validation of integration risks

Table 5 represents the influence of business process, consultant's industry knowledge, consultant's product knowledge, training and perceived ease of use on integration risk. With respect INTR, we hypothesized that Process, ConInd, ConProd, TRA and PE would have unique positive effect on INTR. Table 5 shows that Consultant's industry knowledge (with $p=0.01$), training ($p=0.08$) and PE ($p<0.01$) shows significant positive relationship with INTR. The results does not support that process ($p=0.67$) and consultant's product knowledge ($p=0.15$) has significant positive relationship with INTR. Finally R-square (adjusted) for this model is 92%, F statistics = 302.86 ($p < 0.001$), hence we can state that independent variables can discussed model can explain 92% of variance in INTR and regression model is significant.

The responses clearly indicates that analytical ability is the least critical requirement for selecting a new application but replacement of legacy systems is most critical. Analyzing the market trends, life cycle of applications are typically 5 to 7 years. Most of the organizations changed corporate systems during year 2000. Currently IT industry is going through another boom period and establishes the current market trend. The primary reasons for selecting a new application have a high correlation with primary benefits for selecting the new application. Obviously this finding raises a key question – are EAS implementations driven by a technical driver instead of a business need.

A. Adopter's business process

A key issue in enterprise resource planning (EAS) implementation is how to find a match between the EAS system and an organization's business processes by appropriately customizing both the system and the organization (Luo and Strong, 2004). EAS application is a product developed by a specific vendor which is likely to be used by multiple industries. Now each of the organization has its own business process, and more matured business process the organization has, it is likely to be impacted more. Since EAS implementation is likely to introduce business process changes (Su, 2008), it validates that perception. So managers responsible for EAS implementation must access how much internal business process changes it may require. There are two factors here – the more the business processes change, the more the need for change management. And secondly, the business process change will be required for users to adopt the new process quickly, which will likely impact perceived ease of use. Lui and Chan hypothesized the human dimension involved in the implantation which is confirmed with this validation.

B. Best practices following consultant's industry and product knowledge

Soh et al. illustrates that the so-called "industry best practices" embedded in EAS systems is hardly universal. Therefore, if a consultant's industry knowledge may not align with the business process EAS offers, it may lead to a negative impact on the implementation's integration. Finally, it seems appropriate to address the results associated with the consultant support. It was originally hypothesized to have a significantly positive contribution by external support through best practices by consultants in integration and inter-dependency risks respectively. With respect to integration risks, research hypothesis related to consultant's industry knowledge is accepted. In the case of consultant's product knowledge contributing to integration risks, however, the result could not satisfy our hypothesis with the directionality or the significance. One possible implication is that consultants deliver the knowledge on the mechanics without convincing potential end-users the need to accept the EAS system. Or, it may imply the unit-of-analysis issue. That is, the role of consultant support might vary according to groups or organizations rather than to individuals. Our reasoning is based on the mechanism of knowledge transfer which starts from outside consultants to small number of client representatives and then, the representatives are serving as trainers for the majority of users (Ko et al., 2005). The investigation of its role would be one of the meaningful topics in future research because it is expected to have the greatest potential, but has earned the least attention in the EAS literature (Ferratt et al. 2006).

3.5.3.2 Validation of inter-dependency risks

Table 6 represents the influence of perceived usefulness, technology, consultant's product knowledge and consultant's industry knowledge on inter-dependency risks. With respect INDR, we hypothesized that PU, Tech, ConProd and ConInd would have unique positive effect on INDR. Table 6 shows that PU($p<0.001$), TECH ($p=0.04$) and consultant's product knowledge($p=0.03$) shows significant positive relationship with INDR. The results does not support that consultant's industry knowledge (with $p=0.75$) has significant positive relationship with INDR. Finally R-square (adjusted) for this model is 92%, F statistics = 375.649 ($p < 0.001$), hence we can state that independent variables can discussed model can explain 92% of variance in INTR and regression model is significant.

Technology seems to have a negative impact on inter-dependency risks. And it can possibly be explained by the same argument as before. For analysis, reviewed the list of respondents and nature of implementations. From the primary list of companies, most are global organizations, where hardware is typically not required for upgrades but due to multiple international locations, networking upgrades are required. To take meta-national advantages, most of the organizations are using resources from low expense countries. Based on this analysis, recommended that networking and hardware infrastructure be used independently since those may not be directly related to perceived usage of the application.

For infrastructure related variables, ASP, SLA and RSA are reported to have loadings where as hardware and networking did not provide significant predictive information. After taking a closer look at these two variables and the way questions are asked, upgrade is consisting of two primary elements (networking upgrades and hardware upgrades). For analysis, went back to the list of respondents and nature of implementations. From the primary list of companies, most are global organizations, where hardware is typically not required for upgrades but due to multiple international locations, networking upgrades are required. To take meta-national advantages, most of the organizations are using resources from low expense countries. Based on analysis, it is recommended that networking and hardware infrastructure be used independently since those may not be directly related to perceived usage of the application.

3.5.3.3 Validation of acceptance of new solution

Table 7 represents the influence of inter-dependency risks and integration risks on acceptance of new technology. With respect NEW, we hypothesized that INDR and INTR would have unique positive effect on NEW. Table 7 shows that INDR($p<0.001$), INTR ($p=0.04$) shows significant positive relationship with NEW. Finally R-square (adjusted) for this model is 88%, F statistics = 437.16 ($p < 0.001$), hence we can state that independent variables can discussed model can explain 88% of variance in NEW and regression model is significant.

Since INTR and INDR influence positively and equally on acceptance of new application. This study also shows that integration and inter-dependency risks should be managed simultaneously.

3.6 Scenario analysis of input from less and more experienced respondents

Table 8: Descriptive statistics

	Mean		SE Mean		St. Dev		Mann-Whitney Test	
Variable	**More Exp.**	**Less Exp.**	**More Exp.**	**Less Exp.**	**More Exp.**	**Less Exp.**	**ETA1-ETA2**	**p value**
Process	4.29	4.68	0.30	0.25	2.44	1.84	0.00	0.56
ConInd	4.97	5.15	0.20	0.20	1.67	1.50	0.00	0.59
ConProd*	5.94	5.25	0.18	0.24	1.51	1.87	0.00	0.04
Tech	4.36	4.37	0.17	0.18	1.38	1.35	0.00	0.85
TRA	4.34	4.20	0.28	0.19	2.23	1.46	0.49	0.46
TTT	4.99	4.72	0.22	0.19	1.81	1.48	0.34	0.22
PU	5.63	5.54	0.19	0.18	1.59	1.41	0.00	0.44
PE	4.65	4.45	0.20	0.22	1.60	1.68	0.01	0.43
INDR*	4.43	4.76	0.20	0.18	1.64	1.41	-0.43	0.07

ITER	4.66	4.82	0.22	0.19	1.80	1.47	0.00	0.92
NEW*	5.39	4.55	0.19	0.21	1.50	1.58	0.77	0.00

Table 9-10-11: Regression analysis comparison between respondents from less and more experience

Regression analysis for acceptance of new application								
	Less experience group				More experience group			
Term	Coef	SE Coef	t value	Pr > |t|	Coef	SE Coef	t value	Pr > |t|
ITER*	0.83	0.19	4.38	0.00	0.16	0.18	0.91	0.37
INDR*	0.09	0.19	0.49	0.63	0.98	0.19	5.07	0.00
	R-Sq(adj) = 89%				R-Sq(adj) = 89%			
	F= 227.227 (p= 0.00)				F= 274.651 (p= 0.00)			

Regression analysis for integration risks								
	Less experience group				More experience group			
Term	Coef	SE Coef	t value	Pr > |t|	Coef	SE Coef	t value	Pr > |t|
Process	-0.10	0.11	-0.95	0.35	- 0.03	0.15	-0.21	0.83
ConInd*	0.43	0.13	3.35	0.00	0.12	0.10	1.21	0.23
ConProd	0.03	0.12	0.26	0.80	0.07	0.12	0.54	0.59
TRA*	0.49	0.13	3.68	0.00	0.01	0.15	0.08	0.93
PE*	0.18	0.12	1.50	0.14	0.79	0.15	5.23	0.00
	R-Sq(adj) = 94%				R-Sq(adj) = 92%			
	F= 189.729 (p= 0.00)				F= 153.751 (p= 0.00)			

Regression analysis for inter-dependency risks								
	Less experience group				More experience group			
Term	Coef	SE Coef	t value	Pr > |t|	Coef	SE Coef	t value	Pr > |t|
PU*	0.56	0.15	3.80	0.00	0.23	0.15	1.49	0.14
Tech*	0.27	0.13	2.12	0.04	0.19	0.16	1.16	0.25
ConProd*	0.02	0.14	0.13	0.90	0.43	0.11	4.01	0.00
ConInd	0.06	0.16	0.37	0.71	-0.04	0.09	-0.41	0.68
	R-Sq(adj) = 92%				R-Sq(adj) = 93%			

	F= 180.427 (p= 0.00)	F= 220.410 (p= 0.00)
* - different results between less and more experienced respondents		

This research divided the respondents accordingly to their experience into two different groups: respondents who have up to 10 years of experience and over 10 years of experience. These two groups can be defined to “less experienced group” and “more experienced group” respectively. Approximately 78% of respondents answered with their years of experience, and both groups have similar sample size: up to 10 years group has 52%, and over 10 years group has 48% responses. The detailed result of this test can be found in the attached table.

An interesting finding here was that all the means of responses for consultant’s product knowledge, inter-dependency risks and acceptance of new system from more experienced group were statistically significantly different for less experienced group in variables. It indicates that respondents in more experienced group consider consultant’s product knowledge more than consultant’s industry knowledge. It is also confirmed by the fact that so they would more inclined to use their EAS system and believe EAS benefits are higher than the less experienced group does; this validates existing literature (Chung 2008). The same trend was observed by giving higher scores in technology related variables compared to less experienced respondents. The reason is that they were possibly responsible for their ERP implementation since many of this group were senior managers or higher level that are focused to big-picture, while less experienced respondents are more focused one specific area of the implementation, e.g. EAS system itself or training, but not both.

Also performed Mann-Whitney test between samples from less experiences and more experienced groups, and showed significant differences between the two for some of the variables. The variables which are significant at 10% level are only three. It indicates that the understanding of organizational adoption of the new systems is different for more experienced group compared to less experience groups. Followed up with subject matter experts and other project directors, and it can be explained from the fact that higher experiences resources are in management positions who understands the strategic directions of the project – while resources with less than 10 years are more project managers and not strategic thought leaders who understands the purpose. Many of resources with less than ten years are not in a position to interact with stakeholders from outside the organization and their understanding is still evolving and not matured enough to understand the strategic directions. Project managers are responsible for management of the project but project directors interact with other stakeholder groups like vendor relations and have direct interaction.

The main regression relationships in both the less experienced and more experienced respondents are not same and require some discussions. This section compares these two groups, describing the main differences based on the regression analysis associated with each dependent variable. Figure 9-10-11 summarizes the comparison of these two samples in the regression analysis on each dependent variable.

The main purpose of this study was to investigate the effects of project management variables on EAS system implementation success from the perspective of user acceptance. This study shows that integration and inter-dependency risks should be managed simultaneously however more experienced respondent's perceived view of success is different from that of the less experienced resources. Perceived ease of use will positively influence integration risks, and similarly perceived usefulness will likely reduce inter-dependency risks, which it did for experienced respondents but nor for less experienced resources. This requires further analysis. This is the first study to focus on respondent's experience level, and it may require instrument to be further changed.

Table 9 represents the influence of integration and inter-dependency risks on acceptance of new solution for less and more experiences respondents. With respect NEW, we hypothesized that INTR and INDR would have unique positive effect on NEW. Table 9 shows that INTR($p<0.01$) has significant positive relationship with NEW for more experienced respondents but not significant ($p = 0.63$) relationship for less experienced respondents. INDR($p<0.001$) has significant positive relationship with NEW for less experienced respondents but not significant ($p = 0.37$) relationship for more experienced respondents. Finally R-square (adjusted) for this model for less experienced respondents is 89%, and for more experienced respondents is also 89%. F statistics are 227.23 and 274.65 ($p < 0.01$) respectively, hence we can state that independent variables can discussed model can explain 89% of variance in NEW and regression models are significant.

Table 10 represents the influence of process, industry experience, product knowledge, training and perceived ease of use on integration risks for less and more experiences respondents. With respect INTR, we hypothesized that Process, PE, TRA, ConProd and ConInd would have unique positive effect on INTR. Table 10 shows that PE($p=0.14$) has significant positive relationship with INTR for more experienced respondents but not significant ($p = 0.14$) relationship for less experienced respondents. Training($p=0.04$) has significant positive relationship with INTR for less experienced respondents but not significant ($p = 0.93$) relationship for more experienced respondents. Product knowledge ($p=0.80$) does not have significant positive relationship with INTR for less experienced respondents and not significant ($p =0.59$) relationship for more experienced respondents. Training ($p<0.01$) does have significant positive relationship with INTR for less experienced respondents and no significant ($p =0.93$) relationship for more experienced respondents. Process ($p=0.35$) does not have significant positive relationship with INTR for less experienced respondents and neither for more experienced resources. Finally R-square (adjusted) for this model for less experienced respondents is 94%, and for more experienced respondents is 92%. F statistics are 189.73 and = 153.75 (p <

0.001) respectively, hence we can state that independent variables can discussed model can explain 94% and 92% of variance in INTR and regression models are significant.

Table 11 represents the influence of perceived usefulness, technology, consultant's product knowledge and consultant's industry knowledge on inter-dependency risks for less and more experiences respondents. With respect INDR, we hypothesized that PU, Tech, ConProd and ConInd would have unique positive effect on INDR. Table 11 shows that PU($p<0.001$) has significant positive relationship with INDR for less experienced respondents but not significant ($p = 0.14$) relationship for more experienced respondents. TECH($p<0.04$) has significant positive relationship with INDR for less experienced respondents but not significant ($p = 0.25$) relationship for more experienced respondents. Product knowledge ($p<0.90$) does not have significant positive relationship with INDR for less experienced respondents but significant ($p < 0.001$) relationship for more experienced respondents. Industry knowledge ($p<0.71$) does not have significant positive relationship with INDR for less experienced respondents and not significant ($p =0.68$) relationship for more experienced respondents. Finally R-square (adjusted) for this model for less experienced respondents is 92%, and for more experienced respondents is 93%. F statistics are 180.437 and = 220.41 ($p < 0.001$) respectively, hence we can state that independent variables can discussed model can explain 92% and 93% of variance in INDR and regression models are significant.

In addition, this analysis provides additional evidence to extend TAM based analysis that perceived ease and usefulness have predictive power to influence risk management in the project.

Perceived usefulness and perceived ease of use are most widely used measures of success in technology acceptance research. A key issue in EAS implementation is how to find a match between the EAS system and an organization's business processes by appropriately customizing both the system and the organization (Luo and Strong, 2004). EAS application is a product developed by a specific vendor which is likely to be used by multiple industries. Now each of the organization has its own business process, and more matured business process the organization has, it is likely to be impacted more. Since EAS implementation is likely to introduce business process changes (Su, 2008), it validates that perception. So managers responsible for EAS implementation must access how much internal business process changes it may require. There are two factors here – the more the business processes change, the more the need for change management. And secondly, the business process change will be required for users to adopt the new process quickly, which will likely impact perceived ease of use. Lui and Chan hypothesized the human dimension involved in the implantation which is confirmed with this validation.

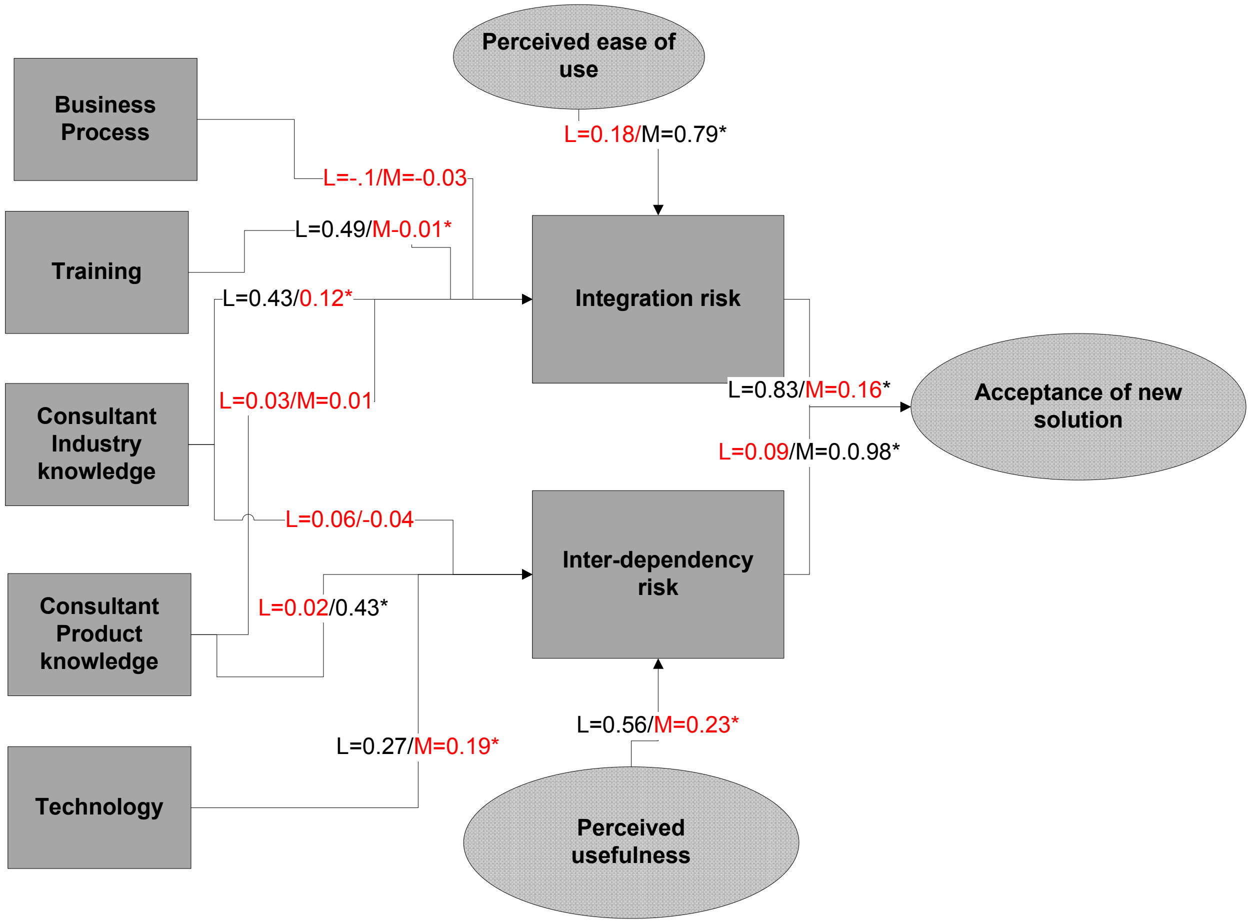


Figure 3: Comparison of regression coefficients between less and more experienced resources (* = significance levels are different between the two groups)

Integration risks are perceived differently between less and more experienced respondents. Integration risk is defined as the conflict arises at the detailed level on how to manage individual tasks. More experienced resources are concerned about the strategic integration and alignment of objectives between stakeholder groups, and therefore are not concerned at the detailed level disagreements which integration risk is expected to measure.

Inter-dependency risks are perceived differently between less and more experienced respondents. Inter-dependency risk is defined as the conflict arises at the strategic level when a particular stakeholder's action without consultations with other stakeholder will project negatively. More experienced resources are concerned about the strategic integration and alignment of objectives between stakeholder groups, and therefore are concerned at the tactical level disagreements which inter-dependency risk is expected to measure.

Consultant's industry knowledge also has different results between the two groups. Consultant's industry knowledge provides standardized process and industry level best practices. Best practices continue to provide specific guidance in EAS success. While less experienced respondents consider consultant's product knowledge is important minimizing integration risks, it is consultant's industry knowledge is more critical for more experiences respondents. This can be explained by the fact that more experienced respondents are not on daily project management but more on strategic direction setting. Also more experienced respondents are more likely to corporate executives or can view the big picture where as less experienced resources are more focused on daily project management. Technology seems to have an impact on inter-dependency risks. And it can possibly be explained by the same argument as before and went back to the list of respondents and nature of implementations. From the primary list of companies, most are global organizations, where hardware is typically not required for upgrades but due to multiple international locations, networking upgrades are required. To take meta-national advantages, most of the organizations are using resources from low expense countries. Based on this analysis, it is recommended that networking and hardware infrastructure be used independently since those may not be directly related to perceived usage of the application.

3.7 Scenario analysis of input from business and technical application implementers of EAS

Table 12: Descriptive statistics comparison between business and technical application based responses

Variable	Mean		SE Mean		St. Dev		Mann-Whitney Test	
	Bus	Tech	Bus	Tech	Bus	Tech	ETA1-ETA2	p value
Process	4.40	4.35	0.20	0.32	2.12	1.96	0.00	0.83
ConInd	5.16	4.49	0.15	0.25	1.58	1.58	0.55	0.24
ConProd*	5.74	4.87	0.15	0.30	1.63	1.89	1.00	0.01
Tech	4.28	4.16	0.14	0.20	1.48	1.28	0.17	0.49
TRA*	4.49	3.55	0.19	0.18	1.97	1.12	1.00	0.00
PU*	5.51	5.30	0.17	0.30	1.68	1.79	0.00	0.57
PE*	4.69	4.09	0.17	0.30	1.63	1.74	0.50	0.06
INDR	4.49	4.59	0.17	0.30	1.60	1.75	-0.39	0.35
ITER	4.59	4.86	0.18	0.29	1.76	1.70	0.00	0.94
NEW	5.09	4.73	0.17	0.27	1.61	1.532	0.46	0.25

Table 13-14-15: Regression analysis comparison between respondents from technical and business applications implementers

Regression analysis for acceptance of new application								
	Business application				Technology applications			
Term	Coef	SE Coef	t value	Pr > |t|	Coef	SE Coef	t value	Pr > |t|
INDR*	0.72	0.20	3.58	0.00	0.29	0.19	1.51	0.14

ITER	0.33	0.19	1.72	0.09	0.67	0.19	3.59	0.00
		R-Sq(adj) = 88%				R-Sq(adj) = 89%		
		F= 313.80 (p= 0.00)				F= 130.07 (p= 0.00)		

Regression analysis for inter-dependency risks								
	Business application				Technology applications			
Term	Coef	SE Coef	t value	Pr > |t|	Coef	SE Coef	t value	Pr > |t|
PU	0.40	0.11	3.83	0.00	0.52	0.23	2.24	0.03
Tech*	0.06	0.11	0.54	0.59	0.49	0.21	2.31	0.03
ConProd	0.28	0.09	3.08	0.00	-0.10	0.19	-0.52	0.61
ConInd	0.07	0.10	0.69	0.49	0.04	0.13	0.28	0.78
	R-Sq(adj) = 92%				R-Sq(adj) = 93%			
	F= 286.77 (p= 0.00)				F= 110.07 (p= 0.00)			

Regression analysis for integration risks								
	Business application				Technology applications			
Term	Coef	SE Coef	t value	Pr > |t|	Coef	SE Coef	t value	Pr > |t|
Process*	0.07	0.10	0.74	0.46	-0.49	0.19	-2.57	0.02
ConInd*	0.25	0.09	2.76	0.01	0.02	0.17	0.13	0.90
ConProd*	0.05	0.09	0.61	0.55	0.40	0.18	2.26	0.03
TRA*	0.09	0.11	0.87	0.39	0.90	0.25	3.61	0.00
PE*	0.48	0.11	4.46	0.00	0.33	0.22	1.52	0.14
		R-Sq(adj) = 94%				R-Sq(adj) = 93%		
		F= 268.90 (p= 0.00)				F= 90.80 (p= 0.00)		
* - different results between business and technical applications								

Enterprise application being of different kinds and some focusing purely on technical aspects of an enterprise, this section focuses on applications which are technical in nature. Our key findings are as follows:

- Consultant's product knowledge, training, technology, perceived ease of use and perceived usefulness are viewed differently between respondents from business based applications and technology applications

- Integration risk, inter-dependency risks and acceptance of new technology are statistically same for both the user groups
- Details of descriptive statistics in tabulated in table 11. Mann-Whitney test was conducted to test significant difference in mean between two group of respondents and following variables have p=values less than 0.10 are consultant's product knowledge, training, technology, perceived ease of use and usefulness.

Figure 12-13-14 summarizes the comparison of these two samples in the regression analysis on each dependent variable. Table 12 represents the influence of integration and inter-dependency risks on acceptance of new solution for respondents from business and technical EAS implementers. With respect to NEW, it was hypothesized that INTR and INDR would have unique positive effect on NEW. Table 12 shows that INTR ($p=0.09$) has significant positive relationship with NEW for more business application implementers and also significant ($p < 0.001$) relationship for less technical application implementers. INDR($p<0.001$) has significant positive relationship with NEW for less business application implementers but not significant ($p = 0.14$) relationship for more technical application implementers. Finally R-square (adjusted) for this model for business application implementers is 88%, and for technical application implementers is also 89%. F statistics are 313.8 and 130.1 ($p < 0.001$) respectively, hence we can state that independent variables can discussed model can explain 89% of variance in NEW and regression models are significant.

Table 14 represents the influence of process, industry experience, product knowledge, training and perceived ease of use on integration risks for business and technical application implememters. With respect INTR, it was hypothesized that Process, PE, TRA, ConProd and ConInd would have unique positive effect on INTR. Table 14 shows that PE($p<0.001$) has significant positive relationship with INTR for business application implementers but not significant ($p = 0.14$) positive relationship for technical application implementers. Training ($p=0.39$) does not have significant positive relationship with INTR for business implementers but significant ($p <0.001$) relationship for technical application implementers. Product knowledge ($p=0.55$) does not have significant positive relationship with INTR for business application implementers and significant ($p =0.03$) relationship for responses from technical application implementers. Industry knowledge ($p<0.001$) does have significant positive relationship with INTR for responses from business application implememters and no significant ($p =0.90$) relationship for responses from technical application implementers. Process ($p=0.46$) does not have significant positive relationship with INTR for responses from business application implementers and significant positive relationship for responses from technical application implementers. Finally R-square (adjusted) for this model for less experienced respondents is 94%, and for more experienced respondents is 93%. F statistics are 268.9 and = 90.8 (p <

0.001) respectively, hence we can state that independent variables can discussed model can explain 94% and 93% of variance in INTR and regression models are significant.

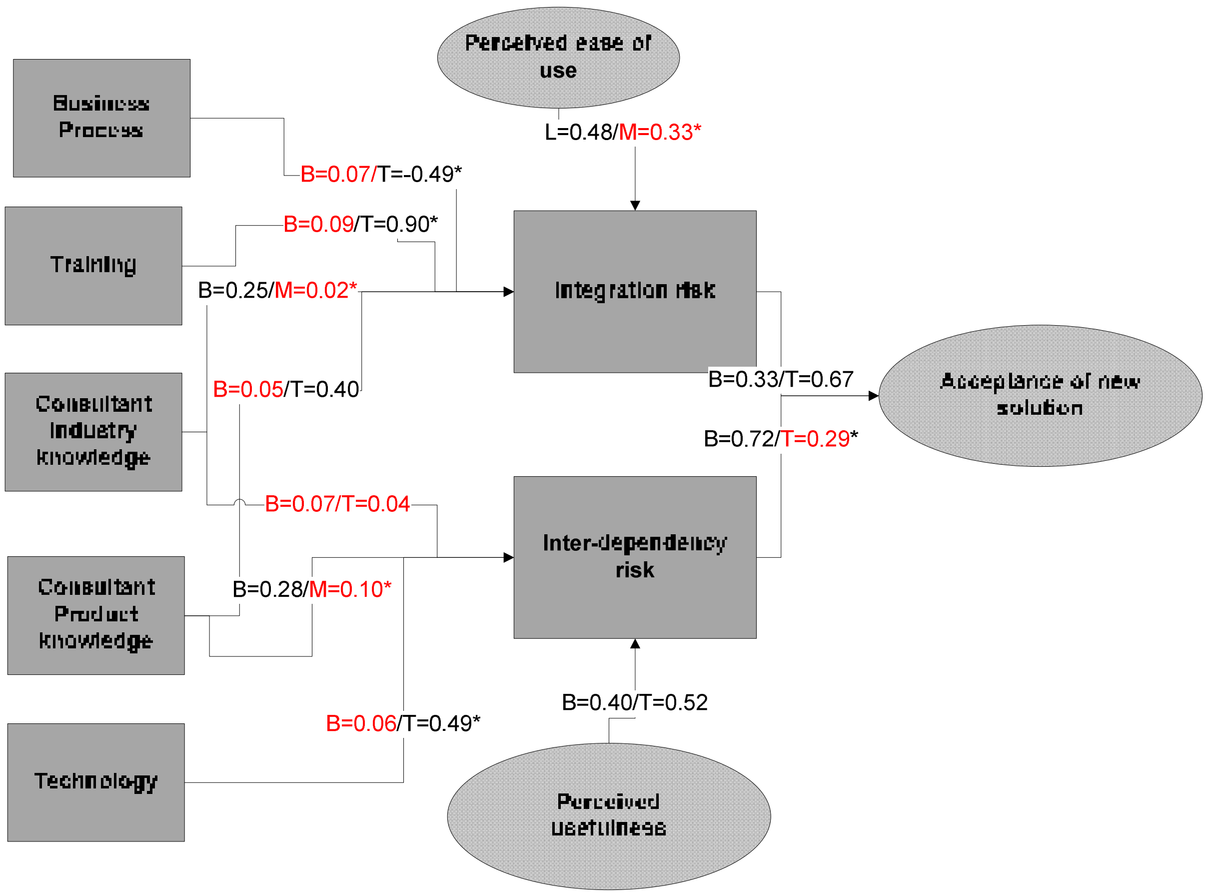


Figure 4: Comparison of regression coefficients between business and technical applications (* = significance levels are different between the two groups)

Table 13 represents the influence of perceived usefulness, technology, product knowledge and industry knowledge on inter-dependency risks for responses from business and technical application implementers. With respect INDR, we hypothesized that PU, Tech, ConProd and ConInd would have unique positive effect on INDR. Table 13 shows that PU($p<0.001$) has significant positive relationship with INDR for responses from business application implementers also significant (p = 0.03) relationship for responses from technical application implementers. TECH(p=0.59) does not have significant positive relationship with INDR for responses from business application respondents but significant (p = 0.03) positive relationship for more technical application respondents. Product knowledge (p<0.0.01) does have significant positive relationship with INDR responses from technical application implementers but does not have significant (p =0.61) relationship for responses from technical application implementers. Industry knowledge (p=0.49 and 0.78) does not have significant positive relationship with INDR either groups. Finally R-square (adjusted) for this model for less experienced respondents is 92%, and for more experienced respondents is 93%. F statistics are 286.77 and = 110.07 (p < 0.001) respectively, hence we can state that independent variables can discussed model can explain 92% and 93% of variance in INDR and regression models are significant.

Results related to the consultant's product knowledge are expected to reduce integration and inter-dependency risks, which supports existing literature. This leads to the same concern that was already discussed as part of the overall discussion.

For infrastructure related variables, after taking a closer look and the way questions are asked, upgrade is consisting of two primary elements (networking upgrades and hardware upgrades), reviewed the list of respondents and nature of implementations. From the primary list of companies, most are global organizations, where hardware is typically not required for upgrades but due to multiple international locations, networking upgrades are required. To take meta-national advantages, most of the organizations are using resources from low expense countries. Based on analysis, it is recommended that networking and hardware infrastructure be used independently since those may not be directly related to perceived usage of the application.

It is expected that perceived usefulness would impact inter-dependency risks which is validated using data. Also expected that perceived ease of use would reduce integration risks, which is true but that is confirmed by the study. In addition, in this study, it is hypothesized that perceived ease of use and perceived usefulness as aggregate variables which likely provide cognitive factors in the literature which attempted to extend TAM. This study shows that perceived ease of use and perceived usefulness are not an ultimate measure for all enterprise applications. While perceived ease and usefulness are valid measures for business applications, it is not for technical or infrastructural applications, raising a fundamental and basic question – if the questions should be asked differently. One possible explanation could be that the questions framed and respondents are more from the business side leading to a situation that has responded to the question. The technology part of any ES implementation is unlikely to have direct end user impact and therefore leading to negative results.

This study shows that integration and inter-dependency risks should be managed differently from business applications compared to how those risks are managed for business applications. However this does provide a valuable insight in the decision making process for managers - risk based factors which had been selected based on evaluating identified EAS risks have significant impacts on acceptance of the new system, but a very different degree compared to business applications. It is believed that this study would provide a basic mechanism for predicting successful EAS implementation from multidimensional perspectives.

Consultant's industry and product knowledge, training and business process are all having a positive impact in reducing integration risk. The responses clearly indicates that analytical ability are least critical requirement for selecting a new application but replacement of legacy systems are most critical. Analyzing the market trends, life cycle of applications are typically 5 to 7 years. Most of the organizations changed corporate systems during year 2000. Currently IT industry is going through another boom period and establishes the current market trend. The primary reasons for selecting a new application have a high correlation with primary benefits for selecting the new application. Obviously this finding raises a key question – are EAS implementations driven by a technical driver instead of a business need.

Following variables are showing different results between business and technical applications:

A. For mitigating integration risks, consultant's product knowledge is significant for business applications but not for technical applications. This can be attributed to the fact that technology is industry independent and very rarely change based on the industry.

B. For mitigating integration risks, consultant's industry knowledge is significant for business applications but not for technical applications. The purpose of this question is to understand how much best practices knowledge is important for the implementation. Best practices are business process best practices and that's why it is significant for business but not for technical applications.

C. Technology is significant for technology applications and not for business. Business users have no visibility of underlying technology.

D. Percevied ease of use is significant for business applications and not for technical applications. Questions related to perceived ease of use are business process and ease of entering transactions focused questions. Also business users the application every day but technical applications provide back-end support.

E. Inter-dependency risks is significant from business applications but not for technical applications.

3.8 Summary of EAS implementation acceptance model

There were two sets of questions where the response rate was poor, related to technology impact and sunset of the application, which raises different concern areas. First, related to technology questions, it was evaluated affiliation of the respondents and most are from large multinational corporations. In a large multinational, very often EAS implementation team is separate from the technology group who is responsible for maintenance of enterprise capacity planning, backup, network and other information resource needs. The survey was more focused towards business users, leading to the fact that business users are unable to respond to those questions. Therefore researchers might need to focus a study entirely on technology aspects of EAS implementation separately.

Second, the sunset of the application question was setup as a confirmatory question for the adoption question. It was expected that respondents, being senior management would be equally concerned about sunset of the application as much as regarding the old application, which turned out to be not the case. The explanation of this phenomenon can be only attributed to attitude towards the legacy system, and that only a select group of individuals are concerned while rest may be not, leading to poor response.

3.8.1 Practical implications of EAS implementation acceptance model

This is the first study that has extended perceived ease of use and perceived usefulness as primary measure of technology adoption to include risks as a measure. This research carries considerable implications in the context of risk profiling, considering, the proposed model is based on two objectives: added integration risk and inter-dependency of risks. This study would facilitate projects to have a macro perspective of the environment. This chapter extends the concept of pluralism to the project management as well. By embracing pluralism, project management research may be better equipped to explore and explain difficulties in project execution (Söderlund, 2011). The relationship between multiple stakeholder groups into three key factors: organizational structure, governance functions, and project rules. It provides all comprehensive structure that can be extended to an executable model.

From a project management perspective – the practical implications are as follows:

A. Project executives can understand group of stakeholders who can contribute risks in the implementation

B. Project executives can assign resources proactively to mitigate those risks

C. Project executives can assign resources to mitigate technical risks originating from security, backup and recovery, ability to integrate hardware and pricing of the hardware as potential factors in the implementation

D. Provide project executives' with specific directions on risk mitigation plan for business applications compared to technical applications

E. Provide less experienced and more experienced resources to specific responsibilities

3.8.2 Theoretical implications of EAS implementation acceptance model

The chapter illustrates the need for an inclusive framework, which is very useful for two distinct reasons. First, it can generate conciseness about the surroundings and institutionalize a structured way to capture knowledge from the stakeholders. The inclusive framework also provides an opportunity for stakeholders with relatively poor visibility (Renn 2005). Strategically, this should ensure capture of best practices. Second, an inclusive framework or "new institutionalism" generates awareness about the project and product or service produced in collective action and is likely to have better chances to ensure knowledge capture is complete. The approach also opens up an opportunity for the project owning organization to do many things, e.g. understanding pre-assessment of risks in the areas with least visibility, pre-emptive evaluation of a changing project situation, implementing regulatory changes early etc., and accordingly plan with impacted project resources for achieving other corporate goals and re-alignment.

EAS literature has extensively covered project complexity, risk mitigation, value creation, project conceptualization, practitioner and vendor development, and end user acceptance. However current literature is fragmented and underdeveloped to consolidate thoughts and there is no study to understand all variables that impact an implementation and the relative importance of interactivity between stakeholder groups. Modeling ecological or environmental problems has potential to provide an overall understanding of the environment and understand environment variables to indicate how to better manage them. The purpose of this chapter is to characterize environmental variables involved in a complex enterprise information technology (IT) system acceptance.

The study contributes in developing an understanding about risk on EAS implementation due to the ability of multiple stakeholder groups to work together. The study also has broad implications in extending the scope of TAM from adopting a new solution to understand risks associated with it from integration and inter-dependency purposes. The current study also provides a comprehensive list of different actors of the technology society that directly or indirectly impacts the implementation and therefore acceptance. Therefore, academic contributions of this study can be found in a deliberate attempt to formulate a complex system implementation success model based on inclusive risk approach.

Chapter 4:

Sustainability characteristics of EAS implementations: A project governance approach

4.1 Theory of Planned Behavior

The Theory of Planned Behavior (TPB) (figure 1) was proposed by Ajzen (1985) stipulates that end users of EAS do not have complete control of their behavior, and hence, is limited. TPB provides a conceptual determinant of the adoption of new technology. The TPB consists of three conceptual determinants of the adoption of new technology. The first is the attitude towards the behavior, and refers to the degree to which a person has a favorable or unfavorable evaluation of the technology in question. The second predictor is a social factor, termed subjective norm; it refers to the perceived social pressure to use or not to use the technology (Fishbein and Aizen, 1975). The third antecedent of intention is the degree of perceived behavioral control, which refers to the facilitating conditions such as availability of government support and technology support to use the new technology (Aizen and Madden, 1996). The absence of facilitating resources represents barriers to usage and may inhibit the formation of intention and usage (Taylor and Todd, 1995).

“Nevertheless, Rogers‟ theory has been criticized (see e.g. Brancheau and Wetherby, 1990; Moore and Benbasat, 1991) in terms of its deficiencies in explaining the effect of adopters‟ demography on innovation adoption. The authors argue that Rogers‟ theory ignores the impact of demographic differences among adopters such as age, income, gender, and education, which have all been found to have a significant influence on users‟ attitudes towards the adoption of technological innovations. It is also argued that Rogers‟ theory is a simplified representation of a complex reality” (Cooper and Zmud, 1990).

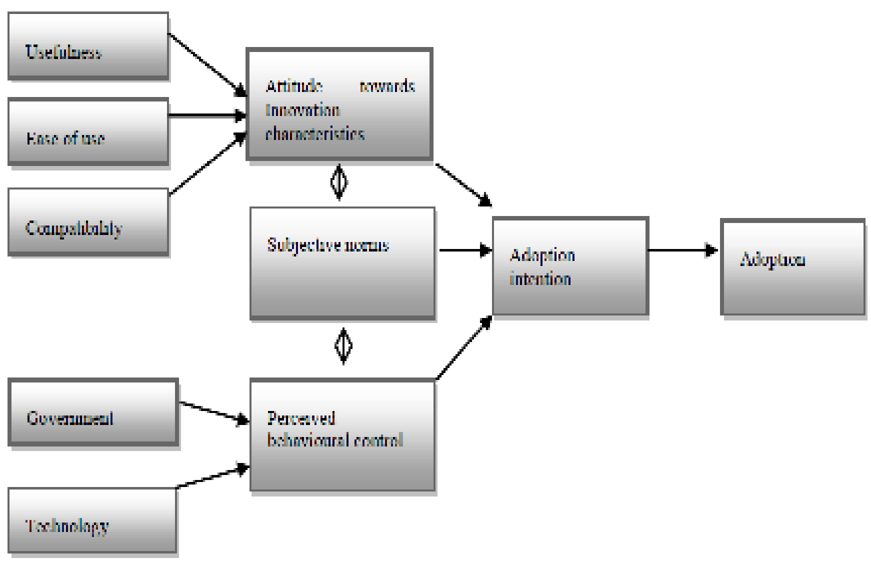


Figure 1: Theory of Planned Behavior (Ajzen, 1985)

Adopters of new enterprise wide information technology solutions get most benefit if and when the solution is not only accepted by the user community, but when it’s continued to be adaptable when business, environment or other organizational priorities change. The question that still remains unanswered in literature is how EAS system adopters can continue to use the system and not redeploy a new system in few years i.e. the implemented system is sustainable by adopting changing business environment, not how end users accepted the product immediately after the implementation. Recent literature has found that EAS adopted should have an organizational structure that offers flexibility and stability to absorb uncertainty (Melin, 2009), but literature have not addressed how adopter’s organization resides within the larger project environment and therefore the need for additional research. Given the large body of knowledge on the EAS projects, this is a significant void in the existing literature.

4.1.1 Sustainable development

“Sustainable development” is a social science terminology; the most frequently quoted definition is ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’ (Voss and Kemp, 2005; Brundtland Commission, UNCED, 1992). In this chapter, the intention is to borrow the above definition and apply on projects perspective to provide certain characteristics of sustainable implementation during later sections of the chapter. Sustainable implementation as a concept, deals with multiple stakeholders in different temporal and spatial scales (Chhotray and Stroker, 2009). The concept of sustainable implementation project requires that the implementation environment is viewed as a system, a system that connects space (‘here and there’) and a system that connects time (‘now and later’) (IISD, 2007).

The focus of technological innovation and globalization during last several decades has advanced the process of modernization due to integration which was earlier confined to one geography, product line or services. This has created an environment where changes are more rapid, businesses are venturing into new areas, geography or business areas or both. Therefore the demand of a project outcome to be sustainable is more visible and deterministic.

A project organization is built on the basis of unquestioned sovereignty of project sponsors and their ability to govern (and not just steer) – setting directions and ability to create an environment to create such a framework (Doom et al. 2010; Sauer and Reich, 2009). Governance conceptually can be defined as the processes through which project team members and project officials interact to express their interests, exercise their rights and obligations, work out their differences, and cooperate to produce goods and services. There are many formal definitions (Bowen, 2007) of project governance, for a detailed list of definition of project governance, readers are referred to Muller, 2009 (Muller, 2009).

4.1.2 Characteristics of Sustainability

The future orientation and the multidimensional character (Paavola, 2007) sustainable enterprise application implementation deployment make it a normative, subjective, complex and ambiguous concept. Based on De Kraker, et al., 2005, Zeijl-Rozema et al., 2007 we propose a set of sustainable implementation characteristics, documented as follows:

Characteristics 1: Normative principle:

The normative principle in the concept is that of inter- and intra-generational equity. Although this principle as such is broadly agreed upon in the social sciences, its interpretation varies due to localized nature of industry specific best practices, and consensus is often lacking when more specific standards are derived from this general principle, which are specific to areas of business and that any changes in the environment may impact the project and therefore sustainability requires project governance principles to adapt to changes in the environment (Zavrla et al., 2009).

Characteristics 2: Subjective nature:

The concept is also of a subjective nature since same results can be derived using multiple business processes and since optimization cannot be done, as in particular the interpretation of business needs depend on personal views or preferences. Business users are bound to differ in opinion as to what important needs are and when these needs are sufficiently fulfilled and these needs are often based on processes followed by the EAS adopter’s organization. As a consequence they will also differ in their choice of indicators and targets for sustainable implementation, and therefore during the lifecycle of the project stakeholders and actors may change or importance of stakeholders of actors may change (Šaparauskas and Turskis, 2006).

Characteristics 3: Complex project

The concept of project is complex, indicating that ‘everything is connected to everything (the solution is a totality concept and can only be successful if all the pieces of the solution work together), and requires the contribution of different actors from the environment. Because of this complexity there will always be the issue of diversity in scientific knowledge, and the fundamental question of uncertainty (Burinskienea and Rudzkiene, 2009; Roggeria et al., 2010).

Characteristics 4: Ambiguity

Finally, the concept of sustainable implementation is ambiguous, as it does not contain a clear statement on the relative priority or weight of the ecological, economical and behavioral aspects of the deployment. The ambiguity can be clarified using project management principles, in-conjunction with the above mentioned characteristics. Therefore basic project management methodologies like PMBOK, Prince will continue to provide implementation guidelines (Zavadskas and Turskis, 2008).

4.2 Sustainable EAS implementation – Illustrations

Since sustainable ES deployment is a new concept, intend is to analyze with some specific examples. Sustainable solutions deal with a temporal future; we should therefore be able to define that temporal future, for a specific domain, like IT solutions. We broaden the discussion of sustainable ES deployment projects with three specific criterions that an ES adoptee may use to consider. The solutions as sustainable which are described are as follows:

1. The concept of *upgradeability*: in particular it is the essential needs of the future release of the solution (both process and content, along with software and hardware) to incorporate business, technological, legal changes; and ability to meet present and future needs. The upgradability criterion can be normative. While each new release brings additional functionalities in the product, all new functionalities may be useable for the solution adoptee and may change the current business process. This is true in any case of enterprise solution deployment – while the solution adopter gets the solution needed, the solution vendor also has interests in having a reference client which is critical in winning future business. Collective choice governance will ensure the relationship between multiple stakeholders makes a collective decision and that the rules of governance ensure that informed and preemptive decisions are made. Upgradeability is also a joint decision between Business, IT, and Change Management, and the existence of governance functional alignment will help resolve such difference.
2. The concept of *scalability:* in particular it is the ability to support changing business interests and ideologies (including compliance with legal and statutory reporting changes), business process changes, support

acquisition, and divestiture of business and technology; through the ability to support new business and technical requirements. Implementing new and changed business process implementation is joint activity. Scalability is a normative and ambiguous concept, since the idea of scalability can change overtime due to non-defined ideas of what the system should be scalable too. Similarly, the existence of multiple layers of governance, and of pre-defined set of rules would incorporate a structured methodology of adding additional solutions to make ES systems scalable.

3. The concept of *integration:* in particular it is the ability to integrate with other solutions present in the corporate IT architecture. In *co-governance* we see that all the actors from the ecosystem have equal responsibility to ensure the solution is sustainable. Integration can be normative, subjective and ambiguous. Requirements change overtime to incorporate business process changes, new IT-solutions and requirements, and to meet legally mandated requirements. Existence of workflow, application interfaces, and other known technology can help the process. What should be integrated and how is a governance decision, layered multi-governance process will ensure such process.

EAS implementation should be considered successful from the organizational perspective if the “system add values to an organization in terms of business performance” (Kwak et al. 2011). However it is argued that it’s not enough, the implemented system should continue to add value over a continued period of time. While organization adaptation (Upadhyay et al. 2011; Zhu et al. 2010; Milis et al., 2010) is attributed to the post EAS implementation success, academic literature did not discuss what EAS adopter would expect in the post implementation time line for the system to continue to evolve in the changing environment. However current EAS literature has not embraced pluralistic approach is explained governing of EAS projects (Söderlund, 2011) incorporating multiple stakeholders. Acceptance of pluralistic approach in explaining EAS projects will help better understand the project environment and issues with implementations.

However adopting pluralistic approach requires working with multiple stakeholders, beyond control of the immediate project management organization which is a more realistic representation of the situation (Ghosh et al. 2011). Even though projects are meant to be short term with specific objective and focus, the value of time's impact on project environment is lost in the traditional definition of project management and approaches. Therefore, return on investments of the solution, which, from a strategic perspective ensures sustainability of the solution implemented is valued by continuous acceptance. Changes in governance are needed to deal with directional change of from end user acceptance to sustainability, adapt to it, shape it, and create opportunities for positive transformations of project-ecology systems (Chapin, 2009).

EAS research has reached certain maturity (Schlichter and Kraemmergaard 2010), still the success rate is very low (Kwak et al. 2011; Zajek et al., 2009). Research focus has moved from analysis of risks (Aloine, 2007) to organizational climate and structure (Ifinedo, 2011; Upadhyay et al., 2011). There are two specific research questions:

1. What are the challenges in minimizing integration and inter-dependency risks for EAS implementation to be continued to be adaptable?
2. What are the prohibitory factors for an implemented system to be not sustainable from the adopter's perspective?

Therefore, project governance principles (organizational environment changes to provide directions and controls) as population of interest in this chapter and seek to understand how project governance practices are interrelated with organizational perspective and thereby make system sustainable. This chapter deals with the linking of two complex concepts, project governance and sustainability of enterprise-wide projects.

This framework of discussion in this chapter is built around the notion of the project environment (Grabher 2002a, b, c, 2004; Skibniewski and Ghosh, 2009, Ghosh and Skibniewski, 2010). The chapter focuses on the macro aspect of the project or environment in which the project resides and not on the micro aspect of project management principals, e.g. stakeholder management, risk management or other related project management topics.

4.3 To understand a sustainable implementation – A case study

The financial institution studied here was formed in the early nineteenth century as a small brokerage firm. Within few years, it was extended to checking and depositing services. The bank got a major boost within few years, when the central government assigned the financial institution to be the only federal depository in the country's capital. The financial institution continued to invest in major infrastructure projects including financing multiple wars and expansion of the statehood by including other states. Other notable financing included the significant scientific discoveries of the time and expansion of government building. The financial institution was converted to banking institution (BI from now) in mid-nineteenth century by virtue of the charter by the central government. This helped BI to twice the size within a short few decades.

Throughout the early 20th century, the bank continued to flourish and support multiple patriotic efforts. And eventually BI established a new savings deposit system as a result of the large deposit boom during the previous decade. Throughout the Great Depression, several of BI's managers were part of central government's advisory committee. While all of these things were occurring, BI was also strategically expanding its clientele by opening branches in different areas.

4.3.1 Case study methodology

Case study is a methodology when a holistic, in-depth investigation is needed (Feagin et al. 1991). Hall and Day (1977) consider three uses of models: understanding, assessing, and optimizing. In this chapter, an understanding model is developed which is assessed using information gathered from reviewing project documents and based on the analysis performed on those. The case study was conducted based on semi-structured interviews with relevant stakeholders – project manager, business owners and solution integrators. Internal design and project documents related to research are reviewed for the case study. The interviews and reviewed documents address a wide range of topics including evaluation of organization's structure (organizational and relationship), strategy (long term and short term), maturity (skills, process and leadership) and resource (both human and infrastructure) situation that may impact success of the project. The interviews also provide details regarding implementation readiness, organizational governance practices and institutional leadership and relationship between different stakeholder entities. Results were validated using triangulation method.

4.3.2 Choice of a case study – BI financial implementation project

A. Mission statement

BI 's project mission is to: establish ability to accommodate a dynamic organization structure with complex reporting requirements in the implementation and design of the enterprise software applications. Establish application based business flows and processes to improve reporting, reconciliation, timeliness, and confidence in reported data. Establish the framework for an implementation of core business applications. Minimize the time and expense to accomplish this mission and utilize BI's resources to minimize the expense of this implementation.

B. Objectives.

This project (figure 1) for BI is to provide the foundation for the following objectives:

- Establish application based business flows and processes to improve reporting, reconciliation, timeliness, and confidence in reported data
- Utilize BI resources to minimize the expense of this implementation
- The deployment of a credible, consistent and timely account level profitability reporting system that enables broader customer and organization reporting
- Develop a risk management process and improve the interest rate risk measurement and simulation process by using account level data where appropriate
- Allow business analysts to focus on critical strategy development and decision making designed to improve the overall position of BI
- Provide an integrated database and data management process to support budgeting and planning and performance and customer measurement efforts
- Implement a budgeting and forecasting system that generates balance sheet projections using cash flow based processing, inclusive of transfer pricing results consistent with measurements applied to actual expense.

C. Scope:

The scope of the project includes applications from ESoftware's core financial suite and ESoftware's Financial Services Applications and integrates with the following business areas: customer relationship management, deposits, loans, web banking, automatic teller machine, bank teller, platform for regular banking, foreign exchange, jersey, trust, advent/investments/portfolio management and wires. ESoftware modules include general accounting, assets management, purchasing, payables and associated workflows. Software applications to support banking industry includes : Financial Data Manager, Funds Transfer Pricing, Performance Analyzer, Risk Manager and Forecasting.

ESoftware will be integrated with the following supporting applications**:** 1) Alltel (ACBS, ALS, IMP, STA, CIS), 2) Metavante (Trust), 3) Weiland (Customer Analysis), 4) Dovenmuele (Mortgage), 5) Federated (Broker/Dealer), 5) Carreker (Reserve Swepp), 6) Realtime (Electronic Trading Solution), 7) AFS (Items Processing), 8) Concord/STAR (ATM), 9) Harte Hanks (Householding Identifieers), 10) FiServ (Brokerage), 11) First USA (Credit Cards), 12) Data Pro (Letters of Credit), 13) SPOT System/FETS (Foreign Exchange), 14) Online Resources (Electronic Bill Payment), 15) Morvision (Mortgage Originations), 16) Homeside (Mortgage Servicer), 17) Norwest (Mortgage Servicer), 18) PHH/US (Mortgage Servicer), 19)First Union (Mortgage Servicer and 20) ADP (Payroll System).

4.3.3 Questionnaire used for case study

The questionnaire for the case study was primarily developed from the relevant previous research related to validation of EAS related studies. Details of the question sources are discussed in table 1.

Table 1: Questionnaire for the case study

Area of governance	**Question**	**Source**
Working in a multi-stakeholder environment	How was the process of gathering business process understanding across multiple sub-systems?	Seddon et al., 2010
	Who was exactly involved from the client's side in creating the process documentation? How was process documentation created for integration with multiple systems?	Venkatesh and David, 2000
	How could it have been facilitated in advance by the client?	Trkman, 2010
	In order to achieve inter department cooperation the company identified stakeholders outside the immediate business units representatives as well who were the owners of the impacted areas of change and involved them in the implementation. Can you provide some examples for that?	Maguire et al., 2010
	In order to achieve inter department cooperation the company identified stakeholders outside the immediate business units representatives as well who were the owners of the impacted areas of change and involved them in the implementation. Can you provide some	Somers and Nelson, 2004

	examples for that?	
	How can client ensure that no relevant stakeholder is left un-included?	Somers and Nelson, 2004
Change Management	What was the client's strategy/approach to change management? How could it have been improved?	Kemp and Law, 2008
	Who was involved in the process of developing it?	Brown and Vessey, 2003
	Was it developed with consultant's input? Was it successful?	
Consultant/Vendor management	Were there any diverging interests between the client executives and the consultant sides?	Gargeya and Brady, 2005
	How was consensus achieved between the client and consultant about what was the scope of work and schedule of implementation? Was it difficult to reach this consensus? Was there anything lacking in the process that led up to this consensus building? Were any gaps or difficulties identified at later stages relating to scope and schedule of the implementation? How could this process have been improved?	Kwak et al., 2012
	How client can better govern their relationship with consultant/vendor to remove the "stress creators" between consultants and clients? Like the stress creating from clients labeling the consultants as "experts". Was such a situation faced in this project?	Ferratt et al., 2006
	Was training details specified in the contract?	Marler et al. 2006

	How can client bridge the gap between consultants and the users?	Kwak et al., 2012
	What role did a "communication plan" play in this project? Was it helpful or not? Could it have been improved or better executed?	Amoako-Gyampah and Salam, 2004
	What are the most critical elements of a communication plan?	Amoako-Gyampah and Salam , 2004
Risk management	How was mitigation strategies developed when risks involved multiple stakeholder entities?	Ghosh and Skibniewski, 2010 and Zeng, 2010
	Was the risk identification sufficiently done? Did any risks occur? Improvements/Suggestions?	Renn, 2005
Knowledge management	Are there any gaps in capabilities and infrastructure required to support a knowledge capture in a multi-stakeholder framework?	Ghosh et. al, 2012

4.3.4 Observations from the case study

The key findings are documented as observations from the project. Implementing an enterprise application integrating with twenty eight sub-subsystems is major initiative; project governance model did not understand the full impact of the changes EAS implementation will bring to the organization and therefore should have spent effort to understand and better manage business process and organizational changes. Since impact not understood by the end users, any changes required extensive re-testing and re-validating all the possible business processes leading to increased cost of total ownership and apprehension about changing the process and incorporate best practices. Additional customizations outside the base product contributed to additional loss of product value and increased total cost of ownership. The business was working closely with EAS vendor to understand documentations provided by the EAS vendor. Each of the 28 vendors provided documentations in different level of details under unique nomenclature. Therefore the business process was not scalable between environments due to lack of understanding how changes would impact other business areas. Lack of uniform and consistent documentation didn't resolve ambiguity and introduced subjectivity in a complex integration process. This issue validates that business process scenarios should be managed and stored in a structured and retrieval format to ensure drive process improvement (Sadiq, 2007; Weske, 2007). There was no project governance process identify appropriate level of inter-department coordination. The complexity of the project was underestimated. The choice of project management approach is a matter of reviewing at the complete environment rather than of functional goals of the EAS implement. The acknowledgement of pluralism broadens distributive concerns in project management decisions to issues such as the distribution of complexities and project management impacts.

A. Ambiguous mission and objectives of the project

Mission statements were not specific enough that can be executed by the project team; there was no measurable critical success factors documented in the project. List of deliverables does not include any deliverable that discussed integration between different sub-systems. Reviewing the organization chart, there was no project management office (PMO) or program office responsible for integration of all the vendors implementing system independently. All the integrations were discussed and dealt between two vendors without any PMO supervision leading to documentations with inconsistent standards. Inconsistent documentations could become prohibitory factors for upgrading the product when a new version of the product is released.

B. Project organization structure

Implementation organization was not setup to incorporate best practices from consultants. Culture of EAS adopter was not open to embrace best practices from outside and organization did not nurture such practices either. It appears that best practices were not followed, and therefore maintenance was difficult for the adopter. Inter-organizational equity provided by the consultants was lost. Consultant can provide positive effect on the perceived ease of use of the system, providing support to resolve socio-environmental factors (Kwak et al. 2011; Princely, 2008). Consultants were not integrated properly with the team and were not considered as partners in the implementation. Impact – business practices were not followed which introduced subjectivity in the project organization. Projects should establish changes through a comprehensive realization of internal and external threats and opportunities, benchmarking internal and external practices, identifying the business visions in the targeted areas, and consolidating all that in a well-planned strategy.

C. Change management:

Change management has direct ties in with organizational strategy for the specific EAS implementation and should be done at a strategic level versus tactical. Impact – the project organization was not ‘inclusive’, inability to understanding changing environment, both inside and outside the project organization, resulting into a ‘reactive’ to issues rather than ‘proactive’. Interdependencies make team members more vulnerable to each other which constitute a collective good resulting into higher productivity (Foss and Michailova, 2009).

Project setting direction and controls of the project, governance methodology was not setup to acquire and share knowledge management between groups. There was also no communication between solution vendor and EAS adopter to discuss future upgrades and therefore users were not aware when initial functional gaps identified will be resolved.

Due to lack of inclusive framework within which all stakeholders worked and EAS vendor and EAS adopter was considering each other a vendor instead of a partner. Therefore project governance failed to create an inclusive frame of organization effectiveness leading to lost opportunities, there was no forward looking planning impacting EAS adopter to maximize benefits from the system and consulting resources Effective inclusive governance structure establishes defined responsibilities that include, but are not limited to; recommending policies and procedures involves implementation environment which is typically a multi-partner environment, and also establishing policies and approving the strategic plan, and managing inter-organization teams effectively (Ghosh et al. 2011; Renn, 2005).

D. Knowledge management

Knowledge transfer can be attributed in two different areas. First, knowledge transfer in this particular project was not managed very well. The client side was not satisfied with the level of knowledge transfer that was done. Although the consultant had spent 8-10 weeks with the client side users and they considered that to be knowledge transfer but the client side expected more formalized training after this time period without extra payment. So knowledge transfer needs to be explicitly and adequately defined in the contract and governed and managed very strictly. Nothing should be “assumed” when it comes to knowledge transfer it should all be in a pre-defined collateral. What knowledge transfer needs to be done and at what level should be detailed in the contract. There is a limit as well as to how much capacity building can be done by the consultants. They can “show” the users how they did it but they cannot actually teach someone how to program etc unless it is explicitly stated and a contractual agreement is set up for that kind of training.

Second, the knowledge transfer from environment factors, e.g. any changes originated from regulatory authorities (table 1). Office of the Comptroller of the

Currency (OCC) and the national banking system begins in 1863, when the National Currency Act was passed by Congress and signed into law by President Abraham Lincoln. The law was a response to the mishmash of local banks, local money, and conflicting regulatory standards that prevailed before the Civil War. Banking systems varied from state to state. Some states required a special act of the legislature before prospective bankers could obtain an operating charter. Other states adopted “free banking,” under which charters were granted to all applicants that met established conditions. In such states as Indiana and Tennessee, banks were state-operated and -owned; elsewhere, ownership was vested in public-private partnerships. And in states like Ohio, several of these institutional arrangements were in use at the same time.

Table 2: OCC regulations related to banking industry (www.occ.gov)

No	Date	Alert no	Description
1	9/3/2003	OCC 2003-38,	Removal, Suspension, and Debarment of Accountants from Performing Annual Audit Services: Publication of Final Rule
2	8/11/2003	OCC 2003-36,	Liquidity Risk Management: Interagency Advisory on the Use of the Federal Reserve's Primary Credit Program in Effective Liquidity Management
3	8/7/2003	OCC 2003-33,	Customer Assistance Group: Notice of Address Change
4	6/24/2003	OCC 2003-27,	Suspicious Activity Report: Revised Form
5	6/19/2003	OCC 2003-26,	Expedited Funds Availability Act: Revisions to Routing Numbers and Check Processing Regions
6	6/12/2003	OCC 2003-25,	Debt Cancellation Agreements and Debt Suspension Agreements: Compliance Date Delay

7	6/3/2003	OCC 2003-22,	Bank Secrecy Act/Anti-Money Laundering (BSA/AML): Final Rule–Customer Identification Programs for Banks, Savings Associations, and Credit Unions
8	5/29/2003	OCC 2003-21,	Application of Recent Corporate Governance Initiatives to Non-Public Banking Organizations: Interagency Statement
9	5/21/2003	OCC 2003-18,	FFIEC Information Technology Examination Handbook: Business Continuity Planning and Supervision of Technology Service Providers Booklets
10	5/20/2003	OCC 2003-17,	Bank Secrecy Act/Anti-Money Laundering: Revocation of Designation of Ukraine as Primary Money–Laundering Concern; Proposed Rule Imposing Special Measures Against the Country of Nauru
11	4/23/2003	OCC 2003-15,	Weblinking: Interagency Guidance on Weblinking Activity
12	4/8/2003	OCC 2003-14,	Interagency White Chapter on Sound Practices to Strengthen the Resilience of the U.S. Financial System: Business continuity sound practices developed by the FRB, SEC, and OCC to ensure the continued functioning of critical financial services
13	3/27/2003	OCC 2003-13,	Telecommunications Service Priority (TSP) Program: Policy on Sponsorship of TSP for Private Sector Entities
14	3/17/2003	OCC 2003-12,	Interagency Policy Statement on Internal Audit and Internal Audit Outsourcing: Revised guidance on internal audit and its outsourcing
15	3/11/2003	OCC 2003-10,	Office of Foreign Assets Control: Final Rules Governing Availability of Information
16	2/25/2003	OCC 2003-9,	Mortgage Banking: Interagency Advisory on Mortgage Banking
17	1/22/2003	OCC 2003-3,	Bank Secrecy Act/Anti-Money Laundering: Final Rule — Anti-Money–Laundering

			Requirements for Foreign Correspondent Banks
18	1/8/2003	OCC 2003-1,	Credit Card Lending: Account Management and Loss Allowance Guidance
19	12/26/2002	OCC 2002-47,	Bank Secrecy Act/Anti-Money Laundering: Notice of Designation – Designation of Nauru and Ukraine as Primary Money Laundering Concerns
20	12/4/2002	OCC 2002-45,	Accrued Interest Receivable: Accounting for the Accrued Interest Receivable Asset
21	11/14/2002	OCC 2002-42,	Bank Secrecy Act/Anti-Money Laundering: Final Rule – Special Information Sharing Procedures to Deter Money Laundering and Terrorist Activity
22	10/16/2002	OCC 2002-41,	Bank Secrecy Act/Anti-Money Laundering: Final Rule – Anti-Money- Laundering Requirements for Foreign Correspondent Banks
23	10/16/2002	OCC 2002-40,	Debt Cancellation Contracts and Debt Suspension Agreements: Final Rule
24	10/16/2002	OCC 2002-39,	Investment Portfolio Credit Risks: Safekeeping Arrangements: Supplemental Guidance
25	7/23/2002	OCC 2002-33,	Government Emergency Telecommunications Service (GETS): FBIIC Policy on Sponsorship of GETS Cards for Private Sector Entities
26	6/17/2002	OCC 2002-28,	Prohibition Against Use of Interstate Branches Primarily for Deposit Production: Final Rule
27	6/17/2002	OCC 2002-27,	Homeownership Counseling: Notice of Statutory Requirement
28	5/28/2002	OCC 2002-23,	Electronic Banking: Final Rule
29	5/23/2002	OCC 2002-22,	Capital Treatment of Recourse, Direct Credit Substitutes, and Residual Interests in Asset Securitizations: Interpretations of Final Rule
30	5/23/2002	OCC 2002-21,	Covenants Tied to Supervisory Actions in Securitization Documents: Interagency

			Guidance
31	5/23/2002	OCC 2002-20,	Implicit Recourse in Asset Securitization: Policy Implementation
32	5/22/2002	OCC 2002-19,	Unsafe and Unsound Investment Portfolio Practices: Supplemental Guidance
33	5/17/2002	OCC 2002-17,	Accrued Interest Receivable: Regulatory Capital and Accrued Interest Receivable Assets
34	5/15/2002	OCC 2002-16,	Bank Use of Foreign-Based Third-Party Service Providers: Risk Management Guidance
35	4/23/2002	OCC 2002-14,	Parallel-Owned Banking Organizations: Identification, Risks, and Licensing of Parallel-Owned Banking Organizations
36	4/9/2002	OCC 2002-13,	Risk-Based Capital: Final Rule

E. Complex integration between different integration entities:

BI's technical team was supposed to provide the data extracts in the predefined format to integrate with 28 sub-systems. The conversion and integration team primarily consists of consultants was not responsible for any data cleanup but may need to implement data update for multiple segments. All data manipulation requirements will need to be identified before sign off of the document. The data extracted will be transformed and conform to BI's standards and conventions prior to being loaded into ESoftware. The process of validating the data extracted and converted will reside with BI and ESoftware Functional Resources. An exception handling strategy involving the detailed validation of data and flagging of records, and the generation of a detailed log exception report will be developed to ensure that only accurate information is transferred to the ESoftware system. All basic setups required for general ledger conversions are completed (i.e. Chart of Accounts, Calendars, open periods and other setup pre-requisites as identified on the document.) in the ESoftware Instance in which the interface scripts are executed. If there are any setup changes on the functional GL including, but not limited to the following will require changes in design and subsequently programs for this import: name of the set of books, chart of accounts, name of the calendar and period definitions and journal sources and categories.

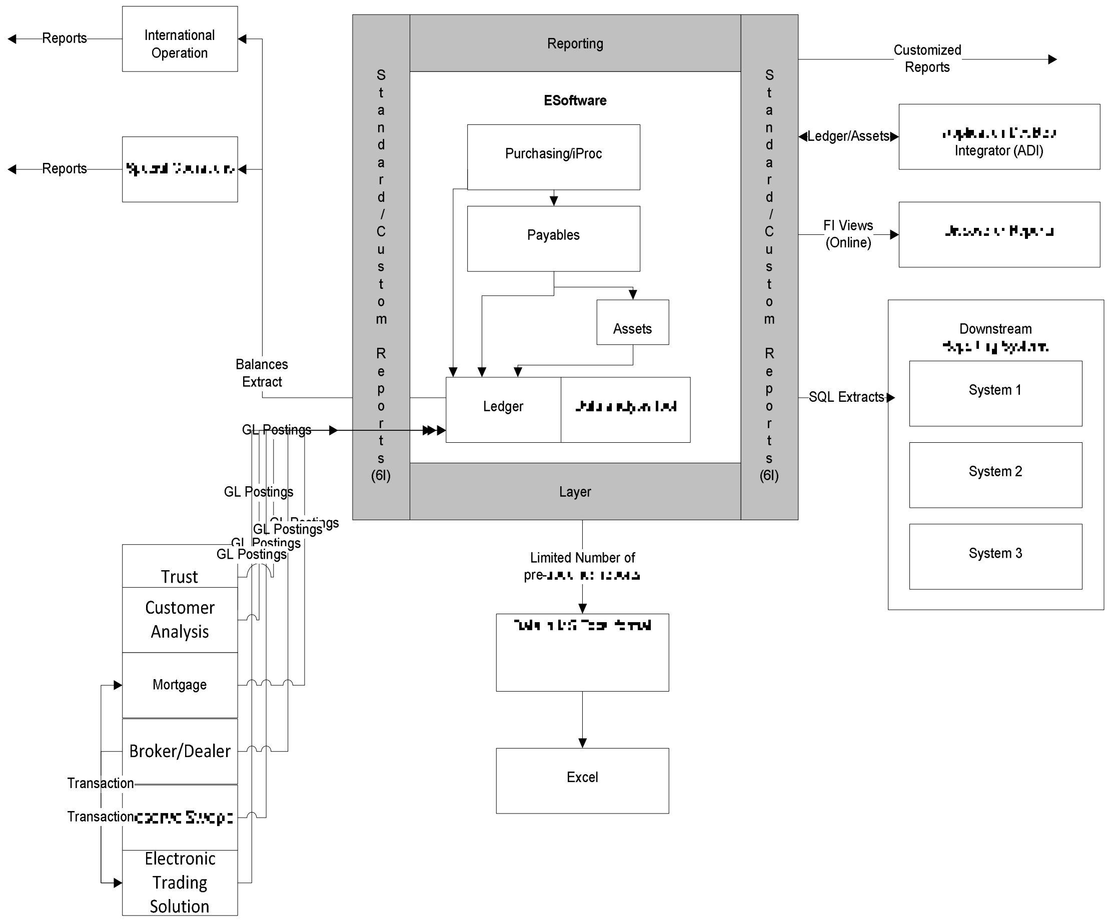


Figure 2: Data dependencies between application modules

F. Risk management

Risks can be raised by any project stakeholder, including project team members, the client, third-party integrators, or vendors. Complex Risks will be recorded in detail on a Risk and Issue Form. Risks will be entered into a Risk Management System and categorized by type and priority. A Risk response will be developed for the risk and a Risk owner will be assigned. The project followed PMBOK's risk management framework. However for the case study, few risks related to integration and impacts on mitigation are discussed in table 3.

Table 3: Risks from case study and impact on sustainability

Short summary of the risk	**Brief explanation**	**Sustainability impact**	**Risk impact assessment**
Customer relation representatives need to have portfolio view including of loan information that needs to be pulled from foreign exchange system.	Foreign exchange variation raises a dynamic situation, which change all the time. So the system will not provide real time data which may lead to inaccurate portfolio.	This raises a continuous data feed from external systems. This would increase subjectivity of integration since some of the customers may not be interested at increased level of detail.	Inter-dependency risks
How to dual control for certain activities (i.e. change of address) in the system?	For dual control requires two systems' business requirement are integrated. The success of integration will depend on coordination between two systems.	Complexity of a technology in the context of a group's technology adoption may be viewed as the "degree of difficulty that group members collectively anticipate in using and adapting to it" (Sarker et al. 2005	Integration risk
There is no solution available for synchronization with Outlook (tasks/calendar) – not currently done	This would require integration with the product that is not released.	As the degree of disconfirmation between increases, the negative effect on behavioral	Integration risks

with the systems.		intention. This would need to resolve ambiguity in the integration.	
Alliance automatically propagates address changes to all affected system. Statements for private banking are reviewed prior to being sent out to customers	For dual control requires two systems’ business requirement are integrated. The success of integration will depend on coordination between two systems.	Need to adopt a non-reductionist, multilevel lens, and provide a preliminary empirical assessment of whether this view is superior to a methodological individualist view for this particular context (Sarkar and Valacich, 2010)	Integration risks and Inter-dependency risks

The above example highlights a number of challenges: first, the amount of inter-dependency to make the system work is significant as most of the risks are mitigated when multiple user groups work together. Perceptions of process and solution satisfaction were captured at the individual level, and analyzed at the individual level, even though the solution resides on groups. Second, it indicates that such inter-dependency often causes conflict within a group, which in turn prevents us from adopting an inclusive framework. However, as argued by Sarkar and Valacich (2010) since such uniformity often does not exist, it is important to theoretically treat inter-dependency as distinct from individual-level phenomena.

4.4 Analysis of case study

Project management approach followed in the case had a strong focus on methodology within the domain of the product implemented ignoring other factors contributing to the implementation, and treated the environment largely as a "black box". While EAS implementation was a strategic initiative, it made an incorrect implicit assumption that all issues related to the project will be resolved by project managers and measured in terms of time, budget and quality (Mahaney and Lederer, 2009). The case should be analyzed in complexity perspective - indicating that 'everything is connected to everything (the solution is a totality concept and can only be successful if all the pieces of the solution work together), and requires the contribution of different actors from the environment. Because of this complexity there will always be the issue of diversity in scientific knowledge, and the fundamental question of uncertainty (Burinskienea and Rudzkiene, 2009; Roggeria et al., 2010).

Governance is the "organizational" capacity exercised by a board and/or executive management to authorize, control, direct and guide in addition to the singular nature of project management as exercised by the project manager (Grembergen, 2007). The project governance approach adopted ignored and under-emphasized (Mähring, 2002) the contextual influences (organizational/social and historical) on the project. A theory about management of complex environments should encompass not just project management (Williams, 2002) but the impact of organizational and environmental aspects. The contextual influences were ignored and incorrectly recognized that different stakeholders at the project can have divergent interests (Chen et al. 2009). Therefore the need for an inclusive governance is seen by the author as the interaction between project, organization and environment and thereby protection of project objectives. It shows that in this project project executives were required to make decisions and take actions under considerable time pressure, with incomplete information and often faced by conflicting and non-standard collateral which caused a knowledge deficit situation leading to lack of understand to integrate and how to resolve inter-dependencies. In the following sections the case will be analyzed and discussed based on theories covering the project governance and sustainability, presented above.

4.4.1 Making decisions in a knowledge deficit situation

The project ran in a self-organizing interaction between different sub-systems. Now this self-organizing co-management offers flexibility that can work in a specific situation. However adaptive co management relies on the collaboration of diverse set of stakeholders, operating at different levels, often through mutual relationship. Mission management and system management areas of project governance (Renz, 2007) were not addressed properly on the case study. To understand the demands and requirements of governance, there is a need to understand the difference between government and governance. The case study focused on the methods of governance, rather than government itself (Muller, 2010). Both government and governance consists of a rule system, of steering mechanisms through which authority is exercised. Table 4 describes the scope of improvements as discussed in the case study section and how proposed model could have helped in ensuring a structured approach in ensuring sustainability.

Table 4: Mapping between major case observations and sustainability characteristics

No.	Observation from the Case	Perceived Governance Problem	Discussion	Sustainability characteristics failures*
1	Business process was not well documented and governance did not encourage documented business process standardization and reengineering.	This will impact integration with other new sub-systems	The process encouraged ambiguity by not documenting all the process and therefore made is subject to interpretation.	Adoptability of strategies
2	Implementation team did not have actionable critical success factors	This will impact project management success measures to be measured in a ambiguous way	Project management should be measured in a objective way based on pre-defined measure.	Adoptability of strategies
3	Implementation organization was not setup to incorporate best practices from consultants.	Inability to make credible commitments to include all resources means that cooperation	Normative principle of sustainability was broken by not maximizing contributions from consultant.	Anticipation of effects of action strategies

		cannot be sustained		
4	Implementation team was not aligned to externalities	Inability to react to changes which is mandatory for project success.	The financial institutions are one of highly regulated industry. Without any direct project assignment with regulatory body could impact ability to continue to use the application	Anticipation of effects of action strategies
5	Governance model did not understand the impact of changes EAS implementation will bring to the organization and therefore should have spent effort to manage business process and organization changes.	Information and accountability are misaligned and as a result actors lack responsibility to each other and join up	Complexity of the project was ignored by not accounting for structural and temporal complexities of the project.	Participatory strategy and tactics formulation
6	Governance process failed to identify appropriate level of inter-department teams.	Structural inequalities and ingrained power relations block path to effective governance	This was due to lack of maturity is thinking how critical and important inter-department and inter-organization relationships are in the governance process and thereby ensuring	Adoptability of integration

			project success.	
7	Consultants were not integrated properly with the team and were not considered as partners in the implementation.	Trust and legitimacy are not present in the governance setting and as a result the effectiveness of governance arrangements is compromised	This was due to a non-openness culture in the organization to accept changes proposed by outsiders.	Adaptability of integration
8	Governance methodology was not setup to acquire and share knowledge management.	The lack of hegemonic influence of key ideas may lead to uninformed agreement rather than shared ownership and commitment of challenges	Governance model was not helping to nurture knowledge management and its importance in the project success. Therefore not able to 'here and there' losing the opportunity to be sustainable.	Adoptability of strategies
9	There was no communication between solution vendor and system adopter to discuss future upgrades and therefore users were not aware when initial functional gaps identified will be resolved.	Can impact attitude towards using and behavioral intention to use	Governance cannot ensure end user satisfaction, unless the satisfaction. Since satisfaction is often subjective, ensure that perceived satisfaction should be measured accordingly.	Iterative strategy development

10	EAS vendor and EAS adopter was considering each other a vendor instead of a partner.	Governance cannot ensure that implemented solution is sustainable.	Governance was restricted to operational governance only and building relationship.	Anticipation of effect of action strategies

***Adopted from Voss et al. 2006**

Although there are also several known information technology (IT) project governance methodologies and approaches available none were adopted. This has caused project governance failed to provide directions and controls to protect corporate body's strategic goals and objectives in the project (Deheza et al. 2010; Weill and Ross, 2005). It was also obvious that stakeholder were not managed properly which also has several draw backs; including diverting attention from creating business success to concentrating on who share its fruits (Ambler and Wilson, 1995). Due to lack of structured methodology, some stakeholders became more important than the others in the project. This will influence in the organization including influencing resources inappropriately among others (Jensen, 2010).

There are twenty eight sub-systems being integrated with primary EAS. This project was originally planned for thirteen months however it took eventually more than seventeen months. This validates existing studies of making decisions in a week knowledge situation in a highly fragmented project-based setting where multiple stakeholders are at different phases of the project life cycle, various stakeholders take ownership of different aspects of an implementation project

(Somers, Nelson 2004; Becker, Praest 2005). However, there is a lack of understanding of knowledge creation among different members of the eco-system (Skibniewski, Ghosh 2008; Helo et al. 2008). The lack of proper use of organizational memory leads the organization to waste resources in rediscovering old solutions they applied years ago (Leonardi 2007).

4.4.2. Making decisions in a week project governance situation

During the implementation, there were 4 major releases on the primary EAS vendor happened. Due to improper planning, when the project went live, the product was 5 releases behind the latest version of the software, and therefore any major issue found in the system may require an immediate upgrade to the latest version of the software. Any major upgrade may impact disruption in supporting the project.

Governance of any major change in an organization is critical to the success of the change effort, but governance of EAS programs is even more critical (Weill and Ross, 2005). ERP implementations change technology, business processes, ways of doing business, and job responsibilities. This level of change requires the organization to understand the implications and be prepared to make tough decisions. Making those types of decisions requires executive sponsorship and governance at the most senior levels of the organization (Chhotray and Stoker, 2009).

The concept is also of a subjective nature since same results can be derived using multiple business processes and since optimization cannot be done, as in particular the interpretation of business needs depend on personal views or preferences. Business users are bound to differ in opinion as to what important needs are and when these needs are sufficiently fulfilled and these needs are often based on processes followed by the EAS adopter's organization. As a consequence they will also differ in their choice of indicators and targets for sustainable implementation, and therefore during the lifecycle of the project stakeholders and actors may change or importance of stakeholders of actors may change (Šaparauskas and Turskis, 2006). The understanding of the impact on changes in the system due to environment transformation requires knowledge about possible changes. There were no process in place to react accordingly; to react, the governance should have been an inclusive approach. The dependency between implemented system, adopter business process and changing business environment is a complex and uncertain process (Jawahar and McLaughlin 2001). The ongoing transformation may be more subtle and often a continuous process, which requires continuous adaption in the system. Therefore although the project was successful based on meeting the triple constraints but failed to be sustainable.

4.4.3 Making decisions to minimize integration and inter-dependency risks

The challenge to minimize integration and inter-dependency risks is related inter- and intra-generational equity. Although this principle as such is broadly agreed upon in the social sciences, its interpretation varies due to localized nature of industry specific best practices, and consensus is often lacking when more specific standards are derived from this general principle, which are specific to areas of business and that any changes in the environment may impact the project and therefore sustainability requires project governance principles to adapt to changes in the environment (Zavrla et al., 2009). Integration and inter-dependency work has become a routine part of organizational life; yet, in a large proportion of multi-stakeholder-related investigations within the EAS discipline, the dominating paradigm has been that of methodological individualism, which, may have provided incorrect or questionable conceptualization and empirical results in many cases. There are several authors a highlighted problem associated with adopting inter-dependencies within the EAS discipline, but also provides an in-depth understanding of the technology adoption. This issue has not been investigated, even though technology adoption (by individuals) has remained one of the most widely explored topics within the IS research community. It is therefore proved that there is much to know about technology adoption by multi-stakeholders and on suitable approaches for conducting such research, and that this study provides a useful approach for future investigation.

4.5 Summary of case study

The case established that project governance, as a totality, therefore did not institute a decision making process involving all actors from the environment (Wang and Chen, 2006). For good governance project organization needs empowered resources (which may include project resources and resources from outside the project) to execute governance decisions. There is a need to feed project based interactioninto an inclusive framework. This will ensure that in a resource constraint environment, shared multi-tasking responsibilities can be institutionalized and risk can be reduced (Ghosh et al., 2011).

However, the reality is that project environment is not static, each of the twenty eight sub-systems would have its change during the implementation and therefore there is an impact of integration and inter-dependency over time, which should be managed, or least want to mitigate risks associated with it. Since integration is a co-evolution process, requiring adaptation of multiple changes – in configuration, business process or new software version released by the vendor, managing this inter-depency requires governance innovation and project embedding of the new controls and directions during entire life cycle of the project. This management of integration and inter-dependency is a multi-actor process which entails interaction between several stakeholders or stakeholder groups. Therefore our study focuses not on any particular levels of hierarchy, but at the organization level. The study exceeds the boundaries set within the current project management literature where it is expected that project managers would resolve all issues related to the project. The conclusions can be summarized regarding enterprise sustainability of system as follows:

4.5.1 Theoretical implications from the case study

A. Integration and inter-dependency of stakeholders:

Sustainability problems require integrated concepts due to several components should be working together. In a project, the implemented system can become not sustainable due to changes in business or technical environment, integration not scalable or lack of cohesive dependency between stakeholder groups (as in the case study each of the sub-systems). The governance process should empower project organization to work with the environment and understand the impact in the implementation. This can be achieved using social and organizational inclusion in the process which involves knowledge networks and communities-of-practice (Butelr, 2008). Other way is to include outside expects as part of the initial phase of the process and continue at logical decision points (Kwak et al., 2011).

B. Strategy development of distributed influence

This is the challenging part and in-direct contradiction with traditional project management methodologies which advices frozen scope during the entire life cycle of the project. Goal formulation is also challenging due to conflicting vendor priorities of a new version of the system (Ghosh, 2003) and other technology changes. Therefore sustainability goals cannot be defined objectively and not project management methodology but project governance process (which will align multiple stakeholders into a common understanding) should be instituted to include risk assessment and trade-offs of scope should it change and which should be aligned with corporate priorities. Goals should be revised regularly to adapt changing business environment.

4.5.2 Practical implications from case study

The analysis of the case makes several contributions to the understanding of project success and how it relates to the appropriate components of project governance in a changing environment. The chapter proposes that project organization, lead by the managers should be empowered to work with multiple actors of the environment and proper governance should be in place to create an inclusive working atmosphere. This does elevate project managers to business managers with an objective to implement corporate strategies, align with project execution going beyond the definition of project management. There does, however, appear to be inconsistent application of the project management tools and techniques, which has contributed to the underwhelming benchmarks in EAS implementation failures.

The characteristics of sustainable implementation outlined in the chapter are very useful for two distinct reasons. First, it can generate awareness and prepare the project governance process that is inclusive is environment conscious. Second, since project governance with a strategic alignment is a new concept that would be inclusive. That opens up opportunity for the project government to define tasks associated.

A generic definition of sustainable implementation was provided in this chapter, it can be very specific to the project (product or services created by the project) or industry and therefore future domain or industry specific research is required or industry practitioners can define sustainable implementations in its specific context and customize proposed characteristics' of sustainable implementations. Also there should a deployable model that practitioners can use.

Chapter 5

How to make an EAS deployment sustainable?

5.1 Strategy development for sustainable EAS implementation

There are three models regarding adoption theories commonly used in literature that explains the individual and the choices individuals' make to accept or reject a particular EAS implementation (Roger, 1979). First, EAS implementations are often selected out of any business or technical concern, but may not totally justifiable when that concern is addressed by the implantation, how sustainability can be described. The other two models are Universal Technology Adaption and Use Theory (UTAUT) and TAM. TAM seeks the relationship because it is the most relevant to this research as well as the most reliable from a theoretical point of view. TAM regards perceived usefulness and perceived ease of use as major determinants of IS usage. Based on TAM, numerous studies have attempted to identify external factors that affected core TAM variables. Most of the studies, however, have been mainly focused on relatively simple systems such as email or office automation (Amoako-Gyampa and Salam, 2004; Hong et al., 2001; Igbari et al., 1997; Lewis et al., 2003; Lucas and Spitler, 1999). There are recent extensions of TAM dealing with the EAS system have focused on the internal managerial practices such as training (Amoako-Gyampah et al; 2004), or incorporated cultural (uncertainty avoidance) and cognitive (enjoyment) factors to TAM (Hwang; 2005). There has also been an attempt to relate product quality and organizational characteristics to EAS users' cognitive responses (Uzoka et al., 2008).

TAM (Davis, 1989), based on perceived usage and acceptance of the system explains behavioral attitude of the end users (Chung et al. 2009; Bueno and Salmeron, 2008). Therefore it is essential to understand such aspects as why some individuals adopt (Roger, 1979) a solution while another resist. In reality, an organization can adopt some cutting edge technology but under-utilize it. The problem with user acceptance based approaches to success is defined using user's perceived attitude towards the solution, completely ignoring the organization perspective, and how the implemented solution can respond to organizational and business environment(e.g. acquisition of new business, opening operations in new country) changes (Ghosh et al, 2012). However continued utilization and diffusion of new solution in changing business environment has not been discussed. In concept, adoption of a system does not guarantee utilization. Literature on technology acceptance does not provide any guidance to desired utilization, nor does it ensure the adopted solution can continue to be utilized in the changing business environment, e.g. acquisition of new business units.

There are recent studies in EAS deployment literature moving beyond dichotomous "acceptance versus non-acceptance" (Rajapaksha and Singh, 2010; Françoise et al. 2009), and link actual use to value creation (HassabElnaby et al. 2012). These studies also included efficiency gained in processing business transactions (e.g. how much time it takes to create an accounts payable invoice in the system) (Ghosh et al. 2012) as an important determinant for EAS usage, and together with collaboration and business analytics (reports of transactions), contribute to firm performance. Hence, these empirical results show only that relationships exist among the EAS use and value determinants, however cannot explain empirically on the issue of whether value is sustained in a changing environment. The purpose of this chapter is to develop a decision-theoretic model of individual's firm adoption and diffusion behavior of enterprise application implementation. The chapter will bridge a gap in the literature by providing a possible extension of TAM from sustainability of technology.

The concept of continued utilization gets even complicated since in a multi-partner project execution and application management support model, many existing studies report inherent challenges and complexities related to multi-partner collaboration (Dietrich et al., 2010) where interaction is required on multiple-levels. Continued utilization has future orientated and multi-dimensional characteristics, which is also normative and subjective in nature. In addition organizations must develop and maintain its ability to integrate newer business and technologies into their scalable solution. As more and more organizations attempt to integrate sustainability issues imbedded in the implementation and adoption process, the existing knowledge gap becomes wider and more apparent. Balancing these dimensions requires a rigorous oversight model and well defined executive level of oversight.

Any enterprise implementation resides in a dynamic environment – e.g. vendor releasing new versions of the software, changing business environment or impact of globalization among others. As argued by Collyer and Warren (2009), a separate approach is needed to address project which involve dynamic environments. PMBOK and PRINCE2, two most often used project management methodologies had disregarded institutional and organizational factors involved in execution of the project (Grey, 1995; Callegari and Bastos, 2007, Patel, 2009; Seyedhoseini and Hate, 2009, Tayebi et al. 2010) in a dynamic environment. While these approaches refer to environment variables as input to some of the deliverables, there are not institutionalized processes to ensure project environment as represented in all the phases of the project lifecycle. These are process-driven ("what" but little in the way of "how" and "why"), focusing on process, components and techniques, but not on strategies and very limited view of economics or other environment variables or environment system involved in the project (Bohm, 2009 and Zhang, 2007).

So far, very limited theoretical research has been done to investigate the enterprise solution's sustainability from the adopter's perspectives and meet adopter's long term strategic objectives. By neglecting organization perspectives of the adopted system, it is likely to bring about their perfunctory utilization of the system and, consequently, this may hinder organizations achieving what they expected from an expensive ES system in the long term. There is a large body of knowledge in enterprise related projects, but this is a significant void in existing literature.

This chapter is developed adopting project governance school approach (Söderlund, 2011) and addresses the following three issues for this research. First, based on the literature review, and using the socio-economic development theory, discuss the nature of sustainable projects. Second, develop an understanding of organizational readiness to manage sustainable projects to be improved by utilizing a governance framework and validated using empirical studies. Third, develop conceptual governance topologies that can be utilized for ES implementations and illustrate with a proposed topology. The objective of the current chapter is to understand how project governance strategy and practices (Mahring, 2002; Bernroider, 2008; Turner and Muller, 2009) – which will bridge organization objectives with project execution, should be incorporated in the life cycle that will bring sustainability in the future stage.

5.2 Development of conceptual model and hypotheses

Working in a dynamic environment requires a total understanding of 'the totality of theoretical conceptions on stakeholder interactions', and defining process as the totality of interactions in a dynamic environment. Empirical evidence suggests that governance equilibrium related to ES implementations can be treated as a multi-dimensional construct (Wang and Chen, 2006).

Based on relationship responsible to communication and bridging the gap between solution adopter, solution provider and support organization, the following variables are defined in Table 1.

Table 1: Explanation of variables used

Variable	Items	Key Reference
SUP	• Concept of long term support of the deployed solution sufficiently clear and understood • Concept of maintenance of the deployed solution sufficiently clear and understood • Concept of future upgrade of the deployed solution sufficiently clear and understood	Ekanayaka(2003) Karahanna et al.(2006)
ACT	• It is well understood by change management if the adopted solution is sustainable • It is well understood by corporate training if the adopted solution is sustainable • It is well understood by human resource if the adopted solution is sustainable • There is a clear commitment at the highest level of the strategic management on sustainability of the solution	Sharma and Yetton(2006)
ORG	• There is a strong institutional catalyst in charge of enforcing sustainable development strategies • Sustainable deployment strategies are integrated with corporate budget process • Sustainable deployment strategies are integrated with procurement process	Venkatesh & Davis 2000
EFF	• Defined mechanism exists between solution adopter and solution provider • Defined mechanism exists between solution provider and support organization • Defined mechanism exists between solution adopter and solution provider • Defined mechanism exists between all the three organizations • Transparency mechanism are strongly reinforced at different levels of stakeholder's management process	Aloine et al., 2007 Skibniewski and Ghosh, 2007
BUS	• Flow of information between business stakeholders and decision makers is efficient and effective • Flow of information between information	Dezdar and Sulaiman, 2009

	technology stakeholders and decision makers is efficient and effective • Flow of information between information technology stakeholders and business stakeholders	

5.2.1 Functional objectives of EAS implementation project organization

Any EAS implementation is primarily driven by two groups for the adopter – resources providing technical and product knowledge – known as technical, information resource. The individuals in this group belong to the chief information officer's organization. This group of resources is focused on hardware, network, bandwidth, availability, failover, back-up and restoration of the system.

The second group of resources provides business and industry knowledge. The resources providing business and industry knowledge includes - best practices, reporting format and frequencies, decision support, planning, control, requirements and analysis of business process. External consultant also brings that informational support and best practices into the implementation. Typically, EAS is classified into the most demanding type of innovations due to its complex and knowledge-intensive characteristics (Ko et al., 2005). With these characteristics, EAS implementation projects can be easily jeopardized due to severe knowledge asymmetry (Rus and Lindvall, 2002) and high knowledge barrier (Attewell, 1992). And the problem can be more serious when accompanied by the lack of in-house expertise (Smith et al., 1998). Hence, it seems that determining whether or not the two primary adopter's stakeholder can support the implementation is significant and especially relevant.

The question that still remains unanswered in the literature is how the adopters of new application can continue to use the system and not redeploy a new system in few years, i.e., how the implemented system is sustainable by adapting to the changing business environment, not how end users accepted the product immediately after the implementation. Recent literature has found that adopted should have an organizational structure that offers flexibility and stability to absorb uncertainty (Melin, 2009), but the literature has not addressed how the adopter's organization resides within the larger project environment, and therefore the need for additional research. The understanding of the impact on changes in the system due to environment transformation (e.g. a new version of the software) requires knowledge about possible changes. There were no processes in place to react accordingly; to react, the governance should have been an inclusive approach – include all the stakeholders, i.e. understand what the version of software changes. Therefore the dependency between the implemented system, adopter business process, and changing business environment is a complex and dynamic process (Jawahar and McLaughlin 2001). The ongoing transformation may be more subtle and often is a continuous process, which requires continuous adaption in the system. Therefore based on the discussion above, we expect that business stakeholders clearly understands adoption of the system, information technology stakeholder clearly understands adoption of the system and project sponsors clearly understands adoption of the system. Also expect that key decision makers (business, IT and project sponsors) is positively related to long term support of the deployed solution

This level represents the lowest level of the project organization consists of key stakeholders from three departments of the adopter involved in the project consists of business (end users of the system), IT (provides support of the system) and project sponsors (responsible of key project decisions).

H1A: SUP will be positively associated with ORG

H1B: BUS will be positively associated with ORG

5.2.2. Sustainability of EAS implementation

Sustainable solutions deal with a temporal future; it should therefore be able to define that temporal future, for a specific domain, like EAS. The discussion of sustainable EAS deployment projects with three specific criterions that an ES adoptee may use to consider. The solutions as sustainable which are described are as follows:

EAS vendor releases a new version of the software either to fix issues in the system, or bring new functionalities. Therefore it is expected that the implemented system should be upgradeable without a new and full implementation. The system should be upgradable so that the future release of the software to bring new features (e.g. to incorporate new business, technological, legal changes) to meet present and future needs. The upgradability criterion can be normative. While each new release brings additional functionalities in the product, all new functionalities may be useable for the solution adoptee and may change the current business process. This is true in any case of enterprise solution deployment – while the solution adopter gets the solution needed, the solution vendor also has interests in having a reference client which is critical in winning future business. This requires collective choice in project governance will ensure the relationship between multiple stakeholders makes a collective decision, informed and preemptive decisions are made. Upgradeability is also a joint decision between business, IT, and change management, and the existence of governance functional alignment will help resolve such difference.

Secondly, in particular the software should be able to support changing business interests and ideologies (including compliance with legal and statutory reporting changes), business process changes, support acquisition, and divestiture of business and technology; through the ability to support new business and technical requirements. Implementing new and changed business process implementation is joint activity. Scalability is a normative and ambiguous concept, since the idea of scalability can change overtime due to non-defined ideas of what the system should be scalable too. Similarly, the existence of multiple layers of governance, and of pre-defined set of rules would incorporate a structured methodology of adding additional solutions to make ES systems scalable.

And thirdly, the EAS system should be able to integrate with other solutions present in the corporate IT architecture. Integration can be normative, subjective and ambiguous. Requirements change overtime to incorporate business process changes, new IT-solutions and requirements, and to meet legally mandated requirements. Existence of workflow, application interfaces, and other known technology can help the process. What should be integrated and how is a governance decision, layered multi-governance process will ensure such process.

One of the most important determinates in projects success is project's stakeholder's environment (Artto et al., 2007). In a multi-partner project execution model, many existing studies report inherent challenges and complexities related to multi-partner collaboration (Dietrich et al., 2010) where interaction is required on multiple-levels. In addition organizations must develop and maintain an ability to integrate newer business and technologies into their scalable solution. As more and more organizations attempt to integrate sustainability issues imbedded in the implementation and adoption process, the existing knowledge gap becomes wider and more apparent. This can be known as a knowledge deficient situation.

This layer consists of those additional stakeholders who are responsible for continued success of the system (change management, training and human resources) or making the system sustainable from operations perspective. This group of stakeholders is responsible for process and resources required for continued maintainability of the system and support the system for production. The success of this group of stakeholders is impacted by corporate sponsorships. It is therefore expect that there is a strong institutional catalyst in the charge enforcing sustainability of the application within the adopter organization. Therefore sustainability strategies are integrated with corporate functions: i) budget, ii) procurement, iii) human resources and iv) strategic evaluation activities.

H2A: SUP will be positively associated with ACT

H2B: BUS will be positively associated with ACT

5.2.3 Corporate objectives of EAS implementation

The field of project management has been dominated in planning operational activities with end result in mind. This approach assumed that constraints resulting from project environmental changes can be resolved or mitigated using existing project management tools and techniques available e.g. risk or issues management process. This also assumed that current trends can be easily extrapolated to future (Floricel and Miller, 2001). Lenfle and Loch (2010) argues that "the current discipline of project management is based on the model of the project life cycle or phased stage-gate approach to executing projects. This implies a clear definition of mission and system are given at the outset (to reduce uncertainty), and subsequent execution in phases with decision gates". Therefore governance is an emerging theme that has been associated with projects (Grembergen, 2007; Crawford and Helm, 2009) to bridge organizational objectives with the execution mechanism, which is executed using project management techniques. While the current definition of project management is a hierarchical execution model (Turner, 2009), the definition of project governance emphasizes looking back at the roots of the program/project to ensure that management will adopt an approach not only based on top-down project life cycle, but also include interactions with the environment since success of the project can be driven by those interactions. So therefore there should exist a relationship (consists of documented guideline, process and procedures) between solution adopter, solution provider and solution support organization for future changes in business process and software release. There exists a transparency on sustainability of the adopted solution.

H3A: SUP will be positively associated with ACT

H3B: BUS will be positively associated with ACR

Based on the above set of set of hypothesis, the model is presented in figure 1.

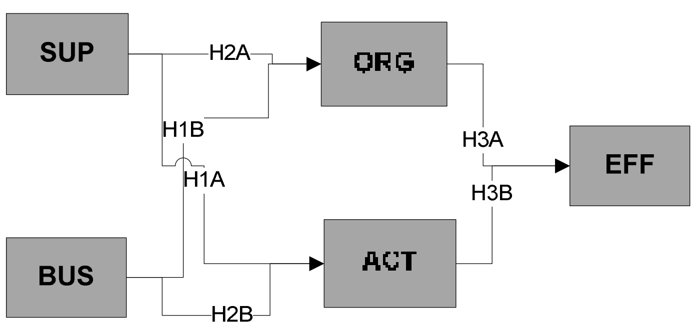


Figure 1 EAS sustainability model

5.3 Hypotheses related to sustainability of EAS implementation

For this study, set the project managers and project executives to gather additional information, thus the population of interest is stakeholders of large enterprises who are currently using any enterprise systems in their working environment. To test the hypotheses, the target respondents were drawn from various project management and project governance professional sources such as trade magazines, Linkedin (linkedin.com) and other professional web-groups, etc. The data had been collected by both online and offline survey during the period between Jan 10, 2011 and Oct 10, 2011. Initially, the questionnaires were emailed to a total of 4000 individuals to top managements; vice presidents, senior project managers, project sponsors and project manager had been contacted. As a result, a total of 117 responses had been used in the regression analyses with 2.9% success rate.

The characteristics of the respondents are as follows. 15% using customer relationship management, 20% using enterprise resource planning, 14% using human resource management and rest are evenly distributed between network management, security system and other technology enterprise technology solutions (figure 2). The responses came from project managers (45%), program managers (27%), project executives (10%), vendors and partners (8%) and rest from other stakeholders and decision makers (figure 3).

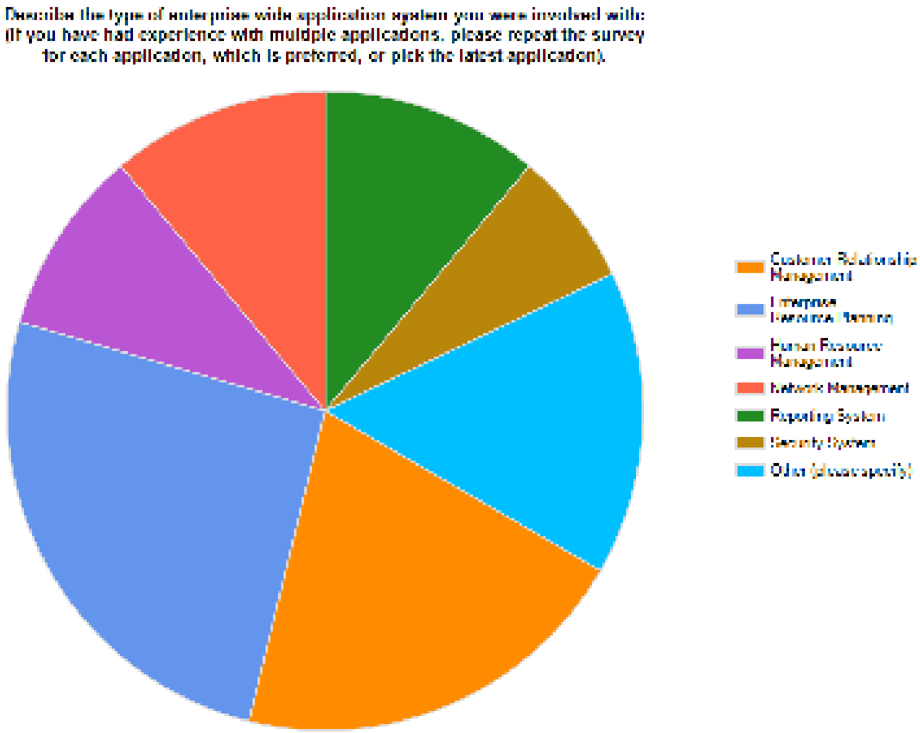


Figure 2: Responses by user types

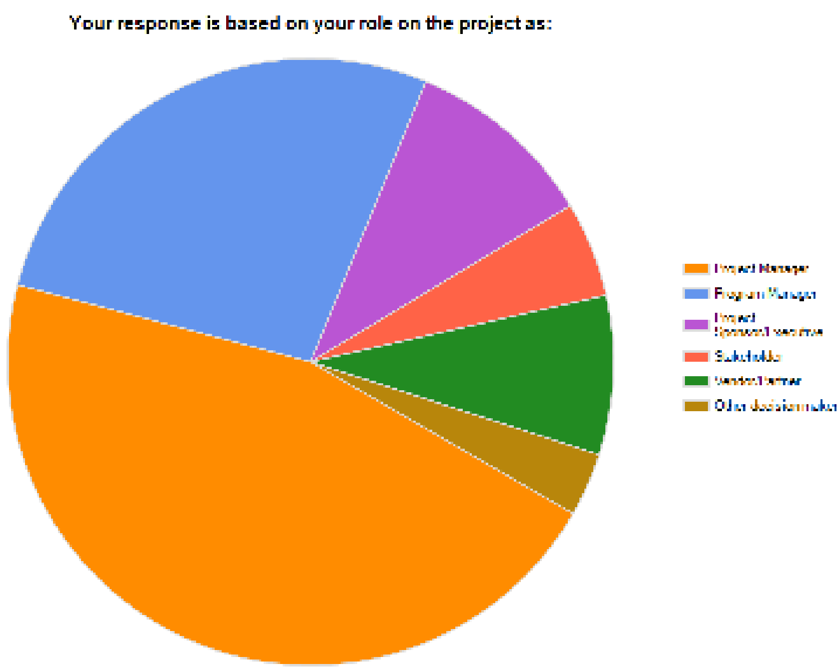


Figure 3: Profile of respondents

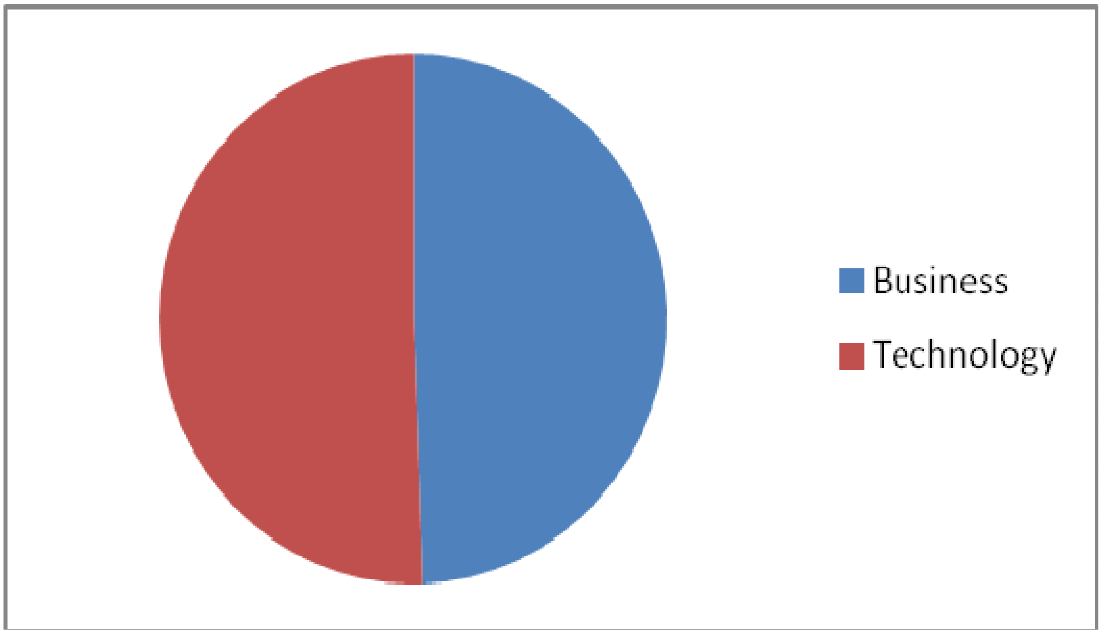


Figure 4: Distribution of respondents from business and technical enterprise applications

The average number of experience is 12.5 years. Finally the representation was from all five continents and using both business and technical applications (figure 4).

5.3.1 Key measures related to hypotheses

Table 2: Description statistics of key measures

Va	Mean	SE of Mean	SD	Var.	Co.Va.	Min	Q1	Med	Q3	Max
SUP	4.67	0.23	2.21	4.90	47.42	1.00	2.67	5.33	7.00	7.00
ACT	4.77	0.21	2.07	4.27	43.32	1.00	2.88	5.50	6.63	7.25
ORG	4.57	0.20	2.00	4.00	43.76	1.25	2.25	5.00	6.25	7.25
EFF	4.83	0.21	2.01	4.04	41.61	1.00	4.00	5.40	6.40	7.00
BUS	4.78	0.22	2.08	4.31	43.37	1.00	3.00	5.00	7.00	7.00

Table 3: Covariance of key measures

	SUP	ACT	ORG	EFF	BUS
SUP	4.89				
ACT	4.10	4.27			
ORG	3.15	3.05	4.00		
EFF	3.84	3.74	3.63	4.03	
BUS	3.74	3.62	3.55	3.62	4.30

Table 4: Correlation coefficient of key measures

	SUP	ACT	ORG	EFF
ACT	0.90			
ORG	0.71	0.74		
EFF	0.85	0.89	0.92	
BUS	0.80	0.83	0.87	0.87

All the survey items were based on well-validated instruments of existing studies. The items were also validated by the interviews with field expert. All the items were measured using a seven point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The descriptive statistics and correlations of variables are presented in table 2 and detailed information on the survey items are presented in table 3 and 4.

A. Support

There were 3 questions asked related to supporting an enterprise solution to understand how management perceives supporting and maintaining an enterprise system. The questions were based on Ekanayaka (2003) and Karahanna et al. (2003) with Cronbach's alpha of this measure is equal to 0.83.

B. Adoption

There are four questions related to adoption of the enterprsie system to understand management's adoptability of enterprise continued to be useful in changing business scenarios. Items were developed using Sharma and Yetton (2006), with Cronbach's alpha of 0.73

C. Organization

There are total of three items derived from Venkatesh and David (2000) to measure organizational commitment to ensure the enterprise system is continued to be successful. These items were also recorded with high reliability statistics of Cronbach's alpha of this scale is 0.90

D. Effective communication was also measured if it exists between different entities responsible for supporting the enterprise system. Five items were used to measure these characteristics which were derived from Aloine et al. (2007) and Skibniewski and Ghosh (2007). These items also provided a high reliability rating of 0.87.

E. Business alignment

3 items were used to measure business and information technology is working together. This scale has reliability with Cronbach's alpha of 0.83.

5.3.2 Analysis procedure

The aforementioned hypotheses were tested using simple regression model. As mentioned earlier, four hypotheses were tested. Regression equation was used to study relationship between variables (figure 5).

5.4 Results of hypotheses testing

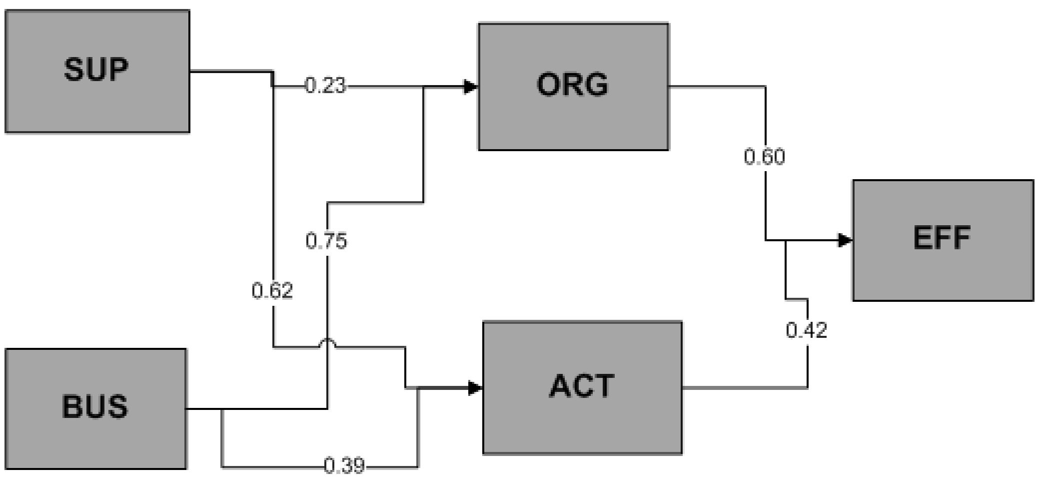


Figure 5: Results of testing of hypotheses (coefficients, full sample)

5.4.1 Functional objectives of EAS implementation project organization

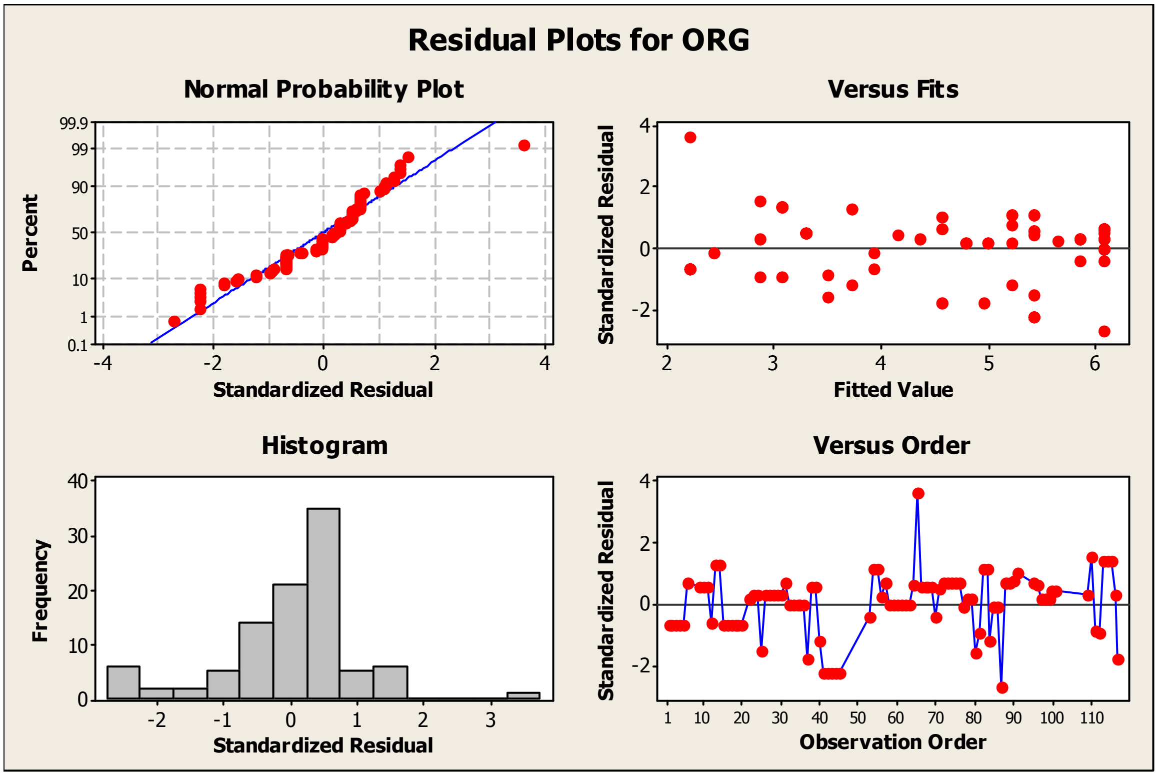
Table 5: Regression test of hypothesis for functional tier variables

Regression analysis of ORG						
Term	Coef	SE Coef	t value	Pr > |t|	90% CI	VIF
SUP	0.23	0.08	3.04	0.00	(0.10, 0.35)	14.65
BUS	0.75	0.07	10.10	0.00	(0.62, 0.87)	14.65
R-Sq(adj) = 96%						
F=1249.91 (p=0.00)						

The regression equation is ORG = 0.23 SUP + 0.75 BUS, with 98% of variation in ORG data. SUP is a significant coefficient (P = 0.00). BUS is a significant coefficient (p = 0.00).

The $\boldsymbol{R^2}$ is a statistic used in the context of statistical models whose main purpose is either the prediction of future outcomes or the testing of hypotheses, on the basis of other related information and provides a measure of how well observed outcomes are replicated by the model. For the intercept, estimate with 95% confidence that the mean is between (0.20, 1.18). Similarly 95% confidence interval for SUP is (0.10, 0.35) and for BUS is (0.62, 0.87). Also R(pred) indicates how well the model predicts responses for new observations. Predicted R can prevent overfitting the model. This statistic is more useful than adjusted R for comparing models because it is calculated with observations not included in model calculation. Larger values of predicted R suggest models of greater predictive ability.

Table 6: Residual plot of ORG variable for all respondents



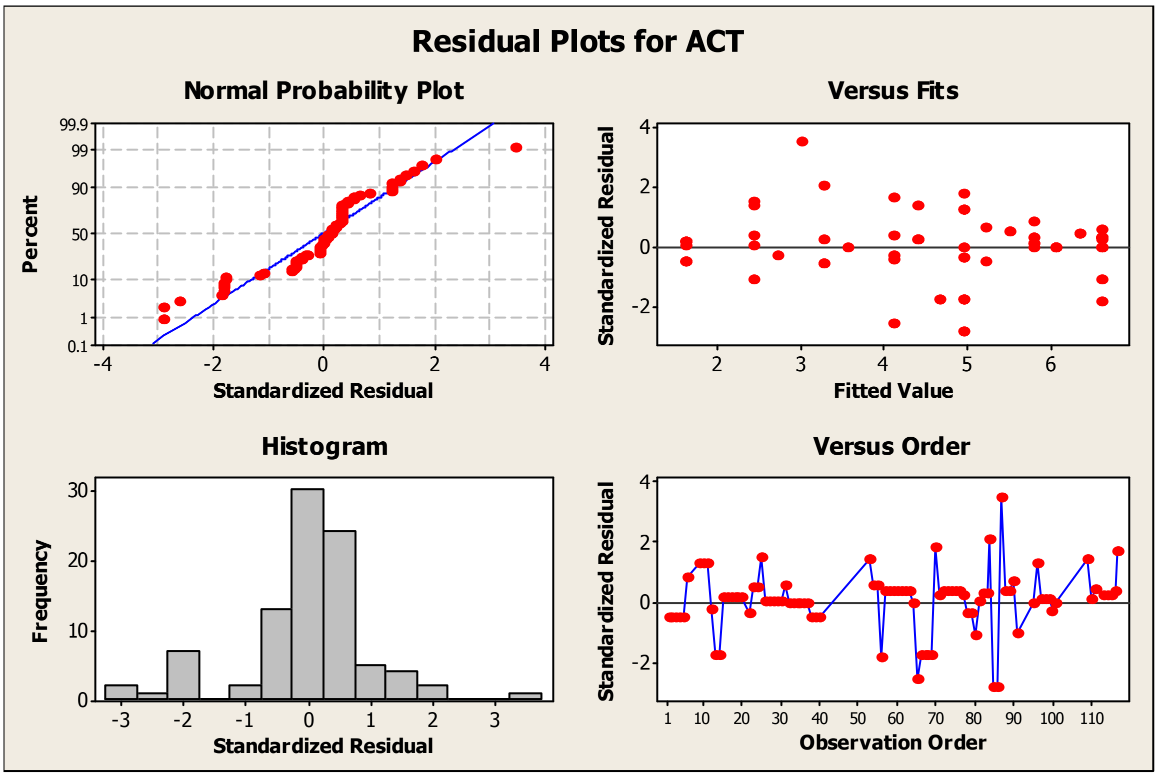
5.4.2 Sustainability of EAS implementation

The regression equation is ACT = 0.62 SUP + 0.39 BUS, with 92% of variation in ACT data. SUP is a significant coefficient (p = 0.00). BUS is a significant coefficient (p = 0.00). S is measured in the units of the response variable and represents the standard distance that data values fall from the regression line. For the current regression model, a low S indicated a better prediction of the response. A high Durbin-Watson statistic also indicated no autocorrelation. Similarly 95% confidence interval for SUP is (0.50, 0.73) and for BUS is (0.28, 0.50)

Table 7: Regression test of hypothesis for governance function tier variables

Regression analysis of ACT						
Term	Coef.	SE Coef	t value	Pr > |t|	90% CI	VIF
SUP	0.62	0.07	9.16	0.00	(0.50, 0.73)	14.65
BUS	0.39	0.07	5.84	0.00	(0.28, 0.50)	14.65
R-Sq(adj) = 97%						
F = 1621.71 (p= 0.00)						

Table 8: Residual plot of ACT variable for all respondents



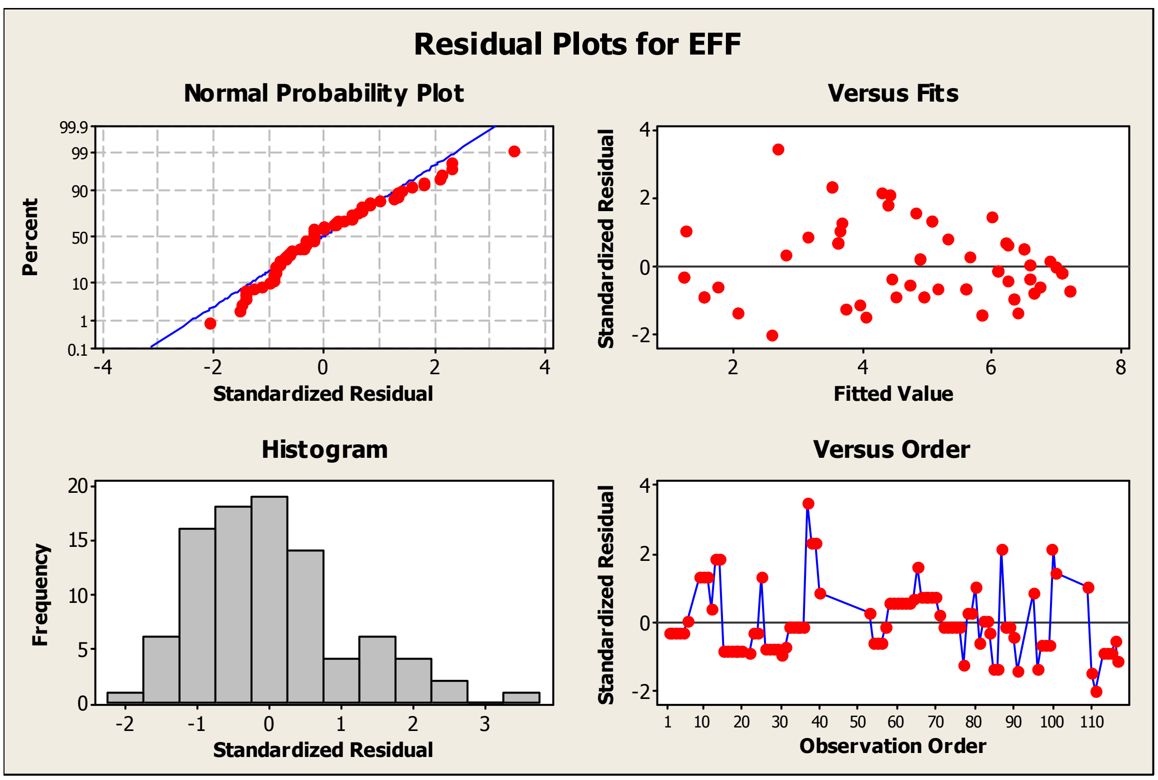
5.4.3 Corporate objectives of EAS implementation

The regression equation is EFF = 0.60 ORG + 0.42 ACT with 99% of variation in EFF data. ORG is a significant coefficient (P = 0.00). ACT is a significant coefficient (P = **0.00**). S is measured in the units of the response variable and represents the standard distance that data values fall from the regression line. For the current regression model, a low S indicated a better prediction of the response. A high Durbin-Watson statistic also indicated existence of autocorrelation. Similarly 95% confidence interval for SUP is (0.52, 0.67) and for BUS (0.34, 0.49).

Table 9: Regression test of hypothesis for project tier variables

Regression analysis of EFF						
Term	Coef	SE Coef	t value	Pr > |t|	90% CI	VIF
ORG	0.60	0.05	13.03	0.00	(0.52, 0.67)	15.52
ACT	0.42	0.05	9.25	0.00	(0.34, 0.49)	15.52
R-Sq(adj) = 99%						
F=3791.53, p=0.00						

Table 10: Residual plot of EFF variable for all respondents



Judged by the observations from the relationship found between different tiers of the larger project organization, it was clear that all the stakeholder organizations are not working together and there exists significant gap between different entities. The most significant relationship was found between SUP and ORG variables and they understood long term commitments to ensure continued success. This implies that project organization was aware of the long term direction and maintainability of the product and there are corporate directions and commitments to ensure that the installed application continue to be part of corporate directives. It can be concluded from here that corporate sponsorships (which are reflected by ensuring budget and procurement are aligned with continued expenses for maintenance of the application) exists with proper institutional catalysts. There is also a strong relationship between SUP and ACT variables. ACT signifies the presence of those departments within the adoptee responsible for process part of the implementation are also aligned with the future direction of the application and committed to supporting it. Therefore since implementation's strategic perspective, project management provides a unified framework for inclusive management (Ghosh et al. 2011) that seeks information from multiple but closely aligned sources. The SEM analysis demonstrate an awareness of the environment, the constituents that benefit and contribute to the services of the ES adopter, but does not establishes policies and structures to foster contributions from the environment.

Figure 4 also clearly shows significant relationship between BUS and ACT, and similarly between ACT and EFF and ORG and EFF. To make an application sustainable, there is a combined role of technology and organizational factors on business process that impacts the outcome. If there is a lack of the combined factors proves that a combination of these factors cannot produce the outcome (Karim et al., 2007) desired. IT usage cannot be considered as a voluntary factor and is strongly correlated with work compatibility (Suna et al. 2009) and communications in place between stakeholder organizations (Aloine et al.. 2007). Therefore, such an implementathion project would require a formalized governance structure which will not only ensure project related issues are immediately resolved but are also in keeping with the long term vision, documented and addressed with other stakeholders in the organization.

5.5 Scenarios analysis of input from less and more experienced respondents

This research divided the respondents in their years of experience into two different groups: respondents who have up to 10 years of experience and over 10 years of experience. These two groups can be defined to “less experienced group” and “more experienced group” respectively. Approximately 95% of respondents answered with their years of experience, and both groups have similar sample size: up to 10 years group has 29%, and over 10 years group has 71% responses. The detailed result of this test can be found in the attached table 12.

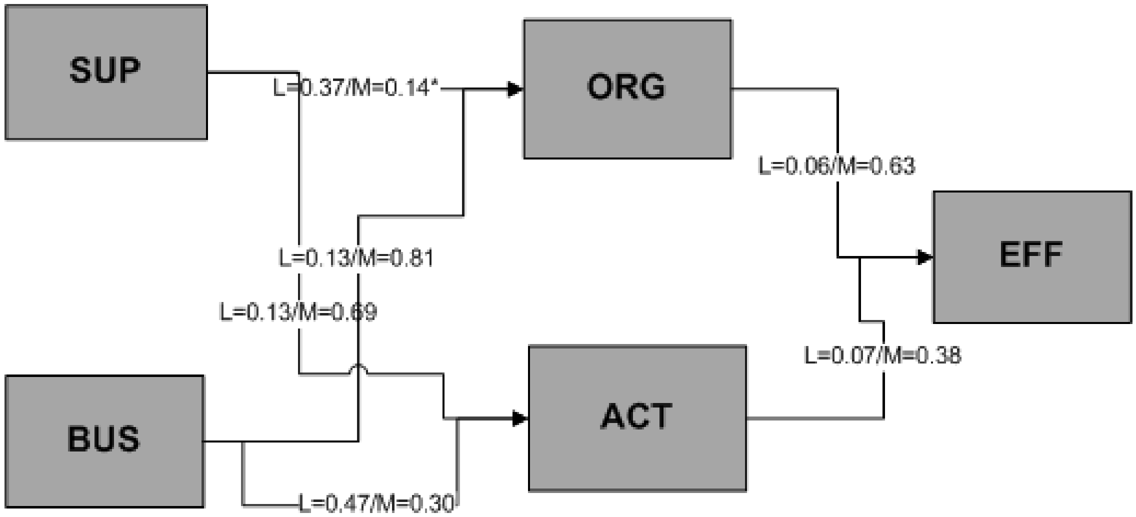


Figure 6: Comparison of regression coefficients between less and more experienced respondents * = results are not consistent between two groups

Table 11: Test of hypothesis for difference in descriptive statistics from respondents with less experience and more experience

Var.	**Mean** **More Exp**	**Mean** **Less Exp**	**SD** **High Exp**	**SD** **Less Exp**	**Z** **High Exp**	**Z** **Less Exp**	**T** **High Exp**	**T** **Less Exp**
SUP	4.85	4.21	2.37	1.73	0.67 (0.50)	-1.09 (0.28)	0.63 (0.53)	-1.39 (0.18)
ACT	4.84	4.60	2.23	1.63	0.29 (0.77)	-0.44 (0.66)	0.64 (0.52)	-0.23 (0.82)
ORG	4.47	4.81	2.17	1.50	-0.40 (0.69)	0.64 (0.52)	-0.37 (0.71)	0.85 (0.40)
EFF	4.79	4.92	2.56	1.33	-0.17 (0.87)	0.23 (0.82)	-0.15 (0.88)	0.34 (0.73)
BUS	4.88	4.61	2.30	1.53	0.36 (0.72)	-0.44 (0.66)		

*(test of Mu = Sample mean)

An interesting finding here was that all the means of responses from more experienced group were less than responses from less experienced group in variables with a significant difference. It indicates that respondents in more experienced group consider their EAS system as good and useful, so they would more inclined to use their EAS and believe EAS are higher than the less experienced group do, this validates existing literature (Chung 2008). The same trend was observed by giving higher scores in variables related to EAS implementation project. The reason is that they were possibly responsible for their EAS implementation since many of this group were senior managers or higher level. Also, another major observation is R^2 from all the regressions under less experience has a much lower value compared to regression equations from higher experience group. This confirms that less variability is explained by the regression equation (figure 6).

Z and t tests were performed between samples from less experiences and more expeirnced groups, and showed significant differences between the two. Also, while it can be assumed these samples follow Normal distributions, also tested under Chi-square and Bonnett tests as well to test inferences about a population mean based on the mean of a random sample.

It indicates that the average overall understanding of different governance criterion and communication discussed for EAS systems are higher for higher experience groups compared to less experience groups. This was followed up with subject matter experts and other project directors, and it can be explained from the fact that higher experiences resources are in management positions who understands the strategic directions of the project – while resources with less than 10 years are more project managers, and not strategic thought leaders who understands the purpose. Many of resources with less than ten years are not in a position to interact with stakeholders from outside the organization and their understanding is still evolving and not matured enough to understand the strategic directions. This contributed to the respondents in with less experience giving lower scores than the high experience respondents. This reason can also explain the difference in R-sqr value being consistently lower for all the regression equations. Evaluating the current project management scenario, can categorize respondents with less than ten years experience as project managers while respondents with more than ten years as project directors or executives. Project managers are responsible for management of the project but project directors interact with other stakeholder groups like vendor relations and have direct interaction.

The only difference is in EFF measures where mean is higher compared to high experiences respondents and lower standard deviation – implies a consistent response pattern. The questions related to EFF are focused on regular communication between solution provider and solution adopter – which includes understanding and triage of problems the EAS is facing and managed at the project management level and not on project director/executive level.

Table 12: Comparison of regression equations on respondents with less and more experience

Regression analysis of ORG								
	More experienced respondents				Less experienced respondents			
Term	Coef	SE Coef	t value	Pr > |t|	Coef	SE Coef	t value	Pr > |t|
HSUP*	0.14	0.09	1.54	0.13	0.37	0.14	2.65	0.01
HBUS	0.81	0.09	8.88	0.00	0.67	0.13	5.08	0.00
	R-Sq(adj) = 98%				R-Sq(adj) = 94%			
	F=1313.79 (p=0.00)				F= 206.35 (p=0.00)			
Regression analysis of ACT								
Term	Coef	SE Coef	t value	Pr > |t|	Coef	SE Coef	t value	Pr > |t|
HSUP	0.69	0.08	9.03	0.00	0.56	0.13	4.26	0.00
HBUS	0.30	0.08	3.87	0.00	0.47	0.12	3.84	0.00
	R-Sq(adj) = 98%				R-Sq(adj) = 94%			
	F=2002.50 (p=0.00)				F= 225.25 (p=0.00)			
Regression analysis of EFF								
Term	Coef	SE Coef	t value	Pr > |t|	Coef	SE Coef	t value	Pr > |t|
HORG	0.63	0.07	9.20	0.00	0.57	0.06	8.88	0.00
HACT	0.38	0.07	5.87	0.00	0.46	0.07	6.91	0.00
	R-Sq(adj) = 99%				R-Sq(adj) = 99%			
	F= 2785.38 (p=0.00)				F= 999.47 (p=0.00)			

The main hierarchical relationships of the regression model in both the less experienced and more experienced respondents are the same. However, the significance of each independent variable on the specific dependent variable is quite different between the two samples. This section compares these two groups, describing the main differences based on the regression analysis associated with each dependent variable. Table 13 summarizes the comparison of these two samples in the regression analysis on each dependent variable.

There are significant differences between less experienced resources and more experienced resources with respect to the regression on “ORG”. Similarly R-Sq(adj) = 97% for model on less experienced resources is significantly less predictive compared to model fit on more experienced resources of R-Sq(adj) = 94%.

Explaining the significance of model fitted on two samples of data, the main difference is that SUP is a significant factor for more experienced respondents while BUS is a significant factor for lower experienced resources. Reviewing the questions asked to validate SUP variable, are more focused towards long term support and future upgrades where as questions that contributed to BUS are focused towards communications between multiple stakeholder groups. As discussed earlier, communications still originates from project managers and not project directors/executives. Moreover project managers are responsible for daily communications and feeding of information and not so much on strategic directions of what normative future might bring. So the difference in mutual importance can be explained clearly based on how current project management organization works.

A regression analysis generally presents the relative importance of each independent variable on the dependent variable. The coefficient of each variable does not represent its absolute amount of effect on the dependent variable, so it can be changed depending on the number of independent variables or other more significant variables. For this reason, the relative importance of “SUP” was reduced by other significant variables, e.g. “BUS” in the more experienced sample.

The model to regress ACT over BUS and SUP shows similar trend on the model fit on sample from less experienced resources with R-Sq(adj)=98% compared to the model fit on more experienced resources R-Sq(adj) = 94%.

Regarding the regression of “ACT” the most important factor is BUS for the model fit on less experienced resources while none of independent variables became significant for the model fit on more experienced resources. The questions on ACT are focused toward other supporting entities with the organization, may or may not be under direct of the project managers, and therefore it was expected that both the dependent variable would become significant. It is hypothesized that this is due to un-structured project organization used in different projects. Often change management, involvement of human resources and corporate training is ignored within the project charter leading to project failures. This requires a structured and implementable methodology to ensure to bridge this gap.

The model to regress EFF over ORG and ACT shows different trend on the model fit on sample from less experienced resources and more experienced resources has R-Sq(pred) = 99%.

5.6 Scenarios analysis of input from business and technical application implementers of EAS

It is observed that all the means of responses from more technical application groups were higher than responses from business application group in variables with a significant difference. It indicates that respondents in more experienced group consider their EAS system as good and useful, so they would more inclined to use their EAS system and believe EAS benefits are higher than the less experienced group do, this validates existing literature (Chung 2008). The same trend was observed by giving higher scores in variables related to EAS implementation project. The reason is that they were possibly responsible for their EAS implementation since many of this group were senior managers or higher level.

Table 13: Test of hypothesis for difference in descriptive statistics from respondents from business and technical applications

Var.	Mean Bus	Mean Tech	SD Bus	SD Tech	Z	Z	T	T	Mann-Whitney
SUP	4.39	5.03	2.15	2.27	-0.95 (0.34)	1.05 (0.29)	-0.97 (0.33)	1.03 (0.31)	-0.33 (0.12)
ACT	4.66	4.92	2.04	2.12	-0.40 (0.69)	0.47 (0.64)	-.40 (0.69)	0.46 (0.65)	-0.250 (0.31)
ORG	4.42	4.77	1.91	2.12	-0.56 (0.57)	0.65 (0.51)	-0.59 (0.56)	0.61 (0.54)	-0.5 (0.22)
EFF	4.68	5.01	2.03	1.99	-0.53 (0.60)	0.58 (0.56)	-0.52 (0.60)	0.58 (0.56)	0.3557 (0.35)

BUS	4.72	4.89	1.99	2.23	-0.21 (0.83)	0.33 (0.74)	-0.22 (0.83)	0.31 (0.76)	0.47 (0.46)

Table 14: Comparison of regression equations on respondents from business and technical applications

Regression analysis of ORG								
	Business application respondents				Technical application respondents			
Term	Coef	SE Coef	t value	Pr > |t|	Coef	SE Coef	t value	Pr > |t|
SUP*	0.41	0.09	4.58	0.00	0.07	0.11	0.65	0.52
BUS	0.58	0.08	6.80	0.00	0.91	0.12	7.86	0.00
	R-Sq(adj) = 97%				R-Sq(adj) = 96%			
	F=945.13 (p=0.00)				F=489.44 (p=0.00)			
Regression analysis of ACT								
	Business application respondents				Technical application respondents			
Term	Coef	SE Coef	t value	Pr > |t|	Coef	SE Coef	t value	Pr > |t|
SUP	0.47	0.10	4.58	0.00	0.84	0.08	10.99	0.00
BUS*	0.55	0.10	5.69	0.00	0.14	0.08	1.73	0.09
	R-Sq(adj) = 97%				R-Sq(adj) = 98%			
	F=770.79 (p=0.00)				F= 1089.69 (p=0.00)			
Regression analysis of EFF								
	Business application respondents				Technical application respondents			
Term	Coef	SE Coef	t value	Pr > |t|	Coef	SE Coef	t value	Pr > |t|
ORG	0.67	0.08	8.98	0.00	0.55	0.06	9.44	0.00
ACT	0.34	0.07	4.71	0.00	0.46	0.06	7.90	0.00
	R-Sq(adj) = 99%				R-Sq(adj) = 99%			
	F= 2061.46 (p=0.00)				F= 1710.63 (p=0.00)			

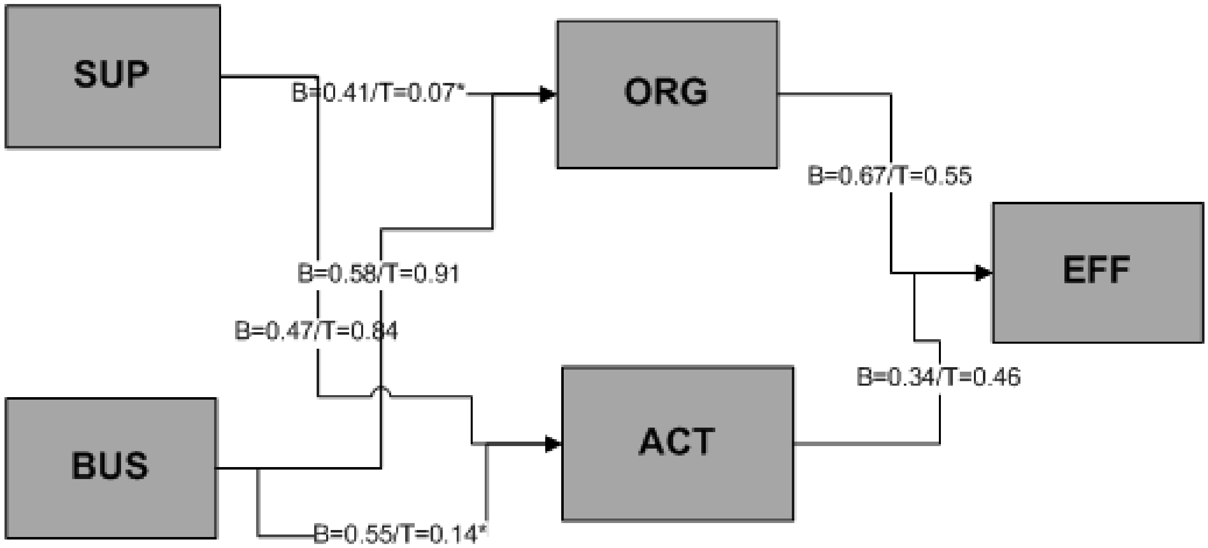


Figure 7: Comparison of regression coefficients between business and technical applications * = results are not consistent between two groups

The main hierarchical relationships of the regression model in both the less experienced and more experienced respondents are the same. However, the significance of each independent variable on the specific dependent variable is quite different between the two samples (figure 7). This section compares these two groups, describing the main differences based on the regression analysis associated with each dependent variable. Table 15 summarizes the comparison of these two samples in the regression analysis on each dependent variable.

There are significant differences between models fitted on responses based on business users and technical users with respect to the regression on “ORG”. The main difference is that for model fit based technical application based respondents have R-Sq = 96% compared to model fit on business application based responses with R-Sq(adj) = 97%. While the difference in predictive power is higher for one sample compared to other, the different is less significant.

Explaining the significance of model fitted on two samples of data, the main difference is that SUP is not a significant factor for more technical application based responses.

It can be concluded that it's the prior knowledge that respondents have for the situation may have impacted the outcome. It illustrates that resource implementing technical application is more informed compared to business application users. This substantiates current literature that business applications have higher level of complexities compared to technical applications.

A regression analysis generally presents the relative importance of each independent variable on the dependent variable. The coefficient of each variable does not represent its absolute amount of effect on the dependent variable, so it can be changed depending on the number of independent variables or other more significant variables. For this reason, the relative importance of "BUS" is higher for business based applications compared to technical based applications.

The model to regress ACT over BUS and SUP shows similar trend on the model fit on sample from business application based resources with R-Sq(adj) = 98% compared to the model fit on technical application based models R-Sq(adj) = 97% showing technical application users' based model have better predictive power, an interesting difference from ORG model.

Regarding the regression of "ACT" is the most important factor is BUS for the model fit on technical application based model while none of independent variables became significant for the model fit on business users based model. The questions on ACT are focused toward other supporting entities with the organization, may or may not be under direct of the project managers, and therefore it was expected that both the dependent variable would become significant. It was hypothesized that this is due to un-structured project organization used in different projects. Often change management, involvement of human resources and corporate training is ignored within the project charter leading to project failures. This requires a structured and implementable methodology to ensure to bridge this gap.

The model to regress EFF over ORG and ACT shows different trend on the model fit on sample from technical application based responses with R-Sq(adj) = 99%, compared to the model fit on more experienced resources R-Sq(adj) = 99%. Both the models shows very similar predictive powers.

The difference between the samples is the followings: first the intercept for model based on more experienced respondents is negative. Second, both the independent variables are significant in both the models which were expected. At this point, there are no valid explanation why the intercept for the model based on more experienced resources is negative.

5.7 Analysis of EAS implementation models

One approach to solve the problem is to break the structure into smaller, more meaningful components so that each can be distinctly attributed to a specific objective and therefore measured according to that objective. Balancing these three dimensions requires a rigorous governance model and well defined executive level of oversight. Therefore, governance implemented in such projects should include business, IT and change management, and may be other areas impacted like human resource, marketing and sales (Skibniewski and Ghosh, 2008).

Characteristics of sustainable projects showed that governance solutions implemented involve sponsorship from all stakeholders, and maturity to identify the actors from the environment to develop a comprehensive strategy. Therefore, following Paavola's, (2007), key argument of this section is that the project organizational design of governance solutions can be understood to have three core aspects: 1) functional and structural tiers 2) governance functions and their organization structure and 3) formulation and execution of key project rules. Proper understanding of the aforementioned core aspects bring our definition of governance, to include actors from the environment to be part of the governance process providing systematic attention to stakeholder interests, in totality. The approach defines a nested multi-level governance model where each level can be expanded during different times in the project to ensure proper guidance is provided, e.g. operational issues are more critical on a daily basis, while strategic direction setting can be more critical during solution selection phase of the project or during post implementation phase to ensure adopter solution can be upgraded for a changing business environment.

5.7.1 Functional objectives of EAS implementation project organization

Reviewing results of regression of ORG with SUP and BUS, have the following findings:

F1: There needs to project governance alignment to ensure that business and information technology, the two groups supporting an EAS implementation should understanding what needs to be done to ensure sustainability of the application (BUS-> OGR relationship)

F2: There should exist proper infrastructure (support, maintenance, inclusive of new version of the software) and aligned with organizational strategic objectives. (SUP-> ORG relationship)

F3: EAS adopter should have resources in place (planning, finance and procurement) to support sustainability (significance of ORG).

Adopting governance institutions have three functional tiers (Kiser and Ostrom,1980; Ciriacy- Wantrup, 1971), intend to extend the project governance framework to include operational, collective choice and constitutional. Table 16 describes functional tiers involved in sustainable IT governance implementation. As mentioned earlier in the chapter, current literature focuses only on the operational tier of the governance. Awareness of the environment and constituencies is a basic aspect of the governance's responsibility, but identification and agreement of stakeholders can be difficult. Table 8 indicates that each type of alignment will require governance board(s) to have specific composition and therefore decide who should own which portion of the governance process. Functional tiers of governance are identified as operational, collective choice and constitutional tiers, and definition and structure of each of the tiers are explained in table16.

Table 15: Functional tiers of sustainable IT governance

Functional tiers	Definition	Structure	Comments
Operational	This is the project steering committee, responsible for day to day operation of the project, includes but not limited to strategic direction setting of the project.	1. Consists of project executives and key stakeholders. 2. Primarily responsible for project governance – setting rules and directions 3. First escalation point for the project and liaison between constitutional and collective choice tiers	This structure will support F1
Collective Choice	This is the committee such that ES adopter can coordinate with external actors in a strategic setting and ensure ES adopter can ensure environment can support the system in future	1. Consists of liaison between all parties of the environment 2. Representation from all actors and works as primarily for the following activities: a. Liaison and Relationship b. Ensure sustainability of the solution and forward looking strategic linkage between the product and deployment c. Future trends and directions of the solution d. Provide feedback to ES vendor to	This structure will support F2

		influence for future releases	
Constitutional Organization	This is the ES Adopters internal governance board – consisting of decision making executives	1. Internal governance of the ES adopter covering the multiple focus areas: a. Industry alignment b. Product strategy c. Roll-out roadmap d. Benchmarking with industry standards	This structure will support F3

Constitutional and operational levels (from Table 17) may exist both at the ES adopter and supporting actors' level and/or separately, however collective choice levels will bring the separate operational levels together. Multi-level governance solutions may therefore emerge because an upper level of governance is established to coordinate between lower-level solutions, or because lower levels of governance are established to implement higher-level strategies. Higher level strategies focus on relationships for solutions provided by the ES and extended sustainability of the solution. Lower level strategies are more technical or functional in nature related to execution of a business process in ES system. Therefore governance structure can be bottom-up or top-down depending on the strategic relationship between the actors. There are instances where the ES adopter and the supporting actors have created governance through bottom-up processes to coordinate the functioning of local governance solutions. The opposite, top–down process creates many formal multi-level governance solutions. Many ES vendors provide for, or require the establishment of programs to gather requirements and best practices from the industry.

The bottom-up and top-down processes will generate nested organizational structures where the governance solutions with a smaller project are nested within larger program process. Multi-level governance solutions may emerge to realize economies of scale or scope in the implementation of these governance functions (Le Quesne, 2005). That is, governance functions may be implemented at different levels of governance and the different levels of governance may be functionally complementary, instead of just being nested. But this is not to say that multi-level governance solutions are tightly focused on strategic goals. There are always “degrees of freedom” between the levels of governance in multi-level solutions, because at each level the surrounding institutional framework partly determines what the effective governing rules are.

5.7.2 Sustainability of EAS implementation

Reviewing results of regression of ACT with SUP and BUS, have the following findings:

F4: Business and information technology groups, the two primary groups supporting EAS implementation should be aligned with strategic corporate objectives and support implementation of such, e.g. change management, resources (human and other assets) and training. (BUS-> ACT).

F5: Maintenance, support and upgradability should be aligned corporate strategic objectives and support implementation of such, e.g. change management, resources (human and other assets) and training. (BUS-> ACT).

F6: EAS adopter should have strategic alignment to support sustainability of the application (significance of ACT variable).

Following Ostrom (1990) and Agrawal (2002), the author suggests that a more detailed and analytically typology of governance functions can be distilled from the lists of common features of successful governance solutions presented (Table 16).

Table 16: Strategic alignment of internal ownership of EAS implementation

No	Type of alignment	Members from groups to execute governance (In order of ownership)	Analysis	To support finding
1	**Strategic Execution Alignment**	Business Strategy Organizational Infrastructure IT Infrastructure	Business decides which ES is suitable for the organization and takes ownership of the decision making process. IT works as a support organization. Business leads the governance process and works closely with ES vendor to ensure potentials gaps in requirements are meet in future release.	F4
2	**Competitive Potential Alignment**	IT Strategy Business Strategy Organization Infrastructure	ES implementation is part of strategic IT	F5, F6

			initiative and matched with business strategy. IT and Business takes joint ownership. This type of implementations requires ES vendor to adopt proper business consulting solution is adopted and solution implemented provides competitive advantages.	
3	**Technology Transformation Alignment**	IT Strategy IT Infrastructure Organizational Infrastructure	These are IT strategic initiatives to support IT growth in the organization. In technology transformation, the requirement is driven by the IT organization and Business is required to support such implementations. In these types of implementations, Business takes a less significant role and IT dominates the implementation. However IT requires working with several partners, to	F3, F4

			provide strategic advantages in several related areas e.g. network, hard work, database, performance, key performance indicators, to provide that transformation in the solution implemented.	

Different governance solutions organize these governance functions differently. The project governance should ensure that the scope of implementation be limited to a manageable level. All governance functions are performed without separation of powers and the resource users can participate directly in project decision-making affecting them. Resource users may perform some governance functions such as monitoring of compliance with the rules of exclusion and authorized resource use.

General purpose strategic relationship between actors involved in the environment may make some of the collective choices within the project while delegating others to be made in specialized relationships between actors, which may involve interested and affected parties directly and/or through representation. Interested actors also frequently monitor and enforce rules, while conflict resolution can be split between these actors. Most contemporary projects policies may also require that an ES adopter be aware of new releases of software. And how the software may impact continued use of the solution – both from business and technical perspective. It is important to appreciate that the complexity of formal governance solutions, and the associated division of labor and decision-making authority, are not obstacles for effective governance of project resources: they create a system of checks and balances which disperses power, creates transparency and accountability in project matters (Hukkinen,1999).

5.7.3 Corporate objectives of EAS implementation

Reviewing results of regression of EFF with ACT and ORG, have the following findings:

F7: EAS adopter corporate objectives should be aligned with solution vendors strategic directions. (ORG -> EFF).

F8: Corporate strategies e.g. change management, resources (human and other assets) and training should be derived from directions and alignment between solution adopter, solution provider and other stakeholders. (ACT-> EFF).

F9: Solution provider, solution vendor and other stakeholders should be aligned on statement of direction of the solution, adopter's corporate objectives and ability to support such an application. (Significance of EFF variable)

The project environment should also examine project governing rules of (table 17) the above discussed generic governance functions, because their formulation has implications on daily operations of the project and ensuring proper authority is empowered.

Table 17: Rules for governance of sustainable IT solution deployments

Type of Rules	Objective	Impact on governance and sustainability	To support finding
Rules of partnership	How effectively resourceful actors are to be partnered with.	This refers to partnership between stakeholders involved in the implementation, within the project and within the environment outside the project	F9
Rules of exclusion influence	Rules of exclusion influence (together with the attributes of the resource in question) how effectively unauthorized users can be excluded.	One of the primary governance responsibilities is to ensure user base target for the implementation	F8 and F3
Rules of entitlement	Rules to define charter, critical success factors and scope of the project.	Entitlement rules are key rules in governance solutions, because their formulation has significant implications for environmental outcomes and the distribution of benefits of resource use.	F9, F1
Rules of decision making rules	Rules related to management of project management involving knowledge related to PMBOK.	These rules largely determine the procedural justice implications of governance solutions. Decision rules influence distributive outcomes as well.	F3, F6, F9
Rules of risks mitigation and issues resolution	Rules related to risk strategy, communication risk mitigation; issues identification and action plan to resolve issues.	Governance should influence strategic directions of risk definition and mitigations and issues resolution	F1-F9

To conclude, the formulation of key institutional rules has implications in strategic and operational activities of project governance. Implementation of institutional rules requires simultaneous consideration of the changing environment – new business challenges, advancement of technology, and globalization have direct impacts on the environment.

In practice, institutional analysis has to analyze and compare the implications of alternative rule formulations and institutional designs that could be or could have been applied to the governance problem at hand.

5.8 Summary of EAS implementation models

Fitz-Gerald and Carroll (2003) suggested that there are three levels of governance required for ES success, they are required at the organization, project and information technology governance level. The approach adopted for this chapter was to formulate a structured and participatory multi-level approach of governance to address the missing connection in a multi-stakeholder environment, e.g. ES vendor may release a new version of the software which will introduce new functionalities, but it would be an investment to roll out the new version of the software by the adoptee due to business process, functionality, architecture, and/or cost impact. Secondly, the interests of all stakeholders are of an intrinsic value. That is, each group of stakeholders merits consideration for its own sake and not merely because of its ability to further the interests of some in the environment of the adoptee. Therefore in order to resolve the futuristic and normative concept of sustainability – the solution is an acknowledgement of pluralism, which broadens the distributive concerns to ensure that decisions are collectively made.

5.8.1 Theoretical implications of EAS implementation model

Governance of environment requires the ability to observe and interpret essential processes and variables in the environment dynamics. To ensure governance provides an appreciation of the changing environment, discussed a topology consisting of three dimensions; firstly, isolate the operational tier and strategic tiers of project governance. This isolation would ensure that a proper level of connection is established which will ensure structural balance. This isolation will further prove its value in discussing issues that involves operational challenges in contrast to strategic directions (which are based on environment variations). The second dimension is governance functions, which is focused on the content of the connections established in the first dimension. This will generate knowledge or contents to differentiate functional responsibilities that would focus on environment in contrast to operational functions. The third dimension defines the rules by which contents of the governance will be established.

Therefore, to operationalize the idea of ‘governance for sustainable development’, there is a need to deal with two important and mutually coherent characteristics. Firstly, project executives must accept that there are different perspectives on the concept of sustainable IT solution, which cannot be achieved by IT solution adopter alone ignoring other actors that impact the implementation. Therefore a multi-level governance model is proposed with different focus at each level. Secondly, have to be aware that multiple modes of governance are possible to steer the process of a sustainable IT solution. The governance itself is a part of the dynamics that are governed (Voss et al., 2005) and therefore the need for the proposed multi-level governance structure since all three levels may not be dynamic simultaneously. However, while the dynamic level is back in a state of equilibrium to govern properly and satisfy its responsibilities, other levels can continue to function.

The topology presented in this chapter submits the following assertions to ensure that these will solidify the criterion established above for sustainability. They are as follows:

A. A functional tier of governance ensures collective governance and reconciling differences in functionality provided to upgrade, scalability or integration and justifies both from the solution's vendors, adopter's or other stakeholders'(e.g. if the education partner is ready with course material to teach upgraded solution) perspective. This model will ensure the solution vendor has a value proposition from the new version of the system and adoptee can benefit from that.
B. The collective choice tier of the governance can influence multi-parties to grow results together.
C. Governance functions topology can act as an instrument to find common interests.

D. Governance functions identified should ensure business, technology, and infrastructural objectives are aligned and decision will be based on input from all stakeholders, rather than a by a specific business group.
E. Project rules related to topologies would ensure that the decision making is based on cost, performance, benefits, and objective principles, so that the solution meets sustainability goals.

5.8.2 Practical implications of EAS implementation model

This research carries considerable implications in the context of organizational resource alignment in projects. To ensure effectiveness use of organizational assets (Aral and Weill, 2008), the proposed model is based on two objectives: defined relationship between multiple stakeholder groups and ensure well define and instuitionalized structure to support that. Project governance has become an increasingly effective center of efficient project execution and substantial performance allocation in all areas of project management, direction setting, decision making, and alignment with corporate project objectives. By embracing pluralism, project management research may be better equipped to explore and explain difficulties in project execution (Söderlund, 2011).

This chapter extends the concept of pluralism (Sodurlund, 2010) to the project management. The relationship between multiple stakeholder groups into three key factors: organizational structure, governance functions and project rules. It provides all comprehensive structure that can be extended to an executable model.

This research explores the success communications and relationships inherent in IS/IT adoption and continued utilization. Expanding our understanding of this phenomenon is critical as firms and industries continue to evolve in ES implementation and align organizational resources with external stakeholder resources.

The chapter illustrates the need for an inclusive framework which is very useful for two distinct reasons. First, it can generate conciseness about the surroundings and institutionalize a structured way to capture knowledge from the stakeholders. The inclusive framework also provides an opportunity for stakeholders with relatively poor visibility (Renn 2005). Strategically, this should ensure capture of best practices. Second, an inclusive framework or “new institutionalism” generates awareness about the project and product or service produced in collective action and is likely to have better chances to ensure knowledge capture is complete. The approach also opens up an opportunity for the project owning organization to do many things, e.g. understanding pre-assessment of risks in the areas with least visibility, pre-emptive evaluation of a changing project situation, implementing regulatory changes early etc., and accordingly plan with impacted project resources for achieving other corporate goals and re-alignment.

From the theoretical construct as presented in this chapter, practitioners would benefit by obtaining valuable insights into their own governance practices. This would enable them to improve organizational acceptance and utilization, and in the long run, to gain a competitive advantage in a fast-changing business environment. The author also believes in the absence of a sustainable governance methodology, the provided topologies can be implemented by practitioners on a case by case basis. The author however argues that there is a need for conceptual revisions to the current project governance approaches moving away from the single project perspective. These have contributed to the underwhelming benchmarks in ES implementation failures in the long term.

A topology of governance is presented to ensure ES implementation is sustainable, looking beyond the current linear way and ‘single project’ way of viewing project management, but as a means to aggregate the execution of all governances into a holistic project governance approach. This chapter suggests that project governance for sustainable solutions is best understood within the context of environmental and futuristic complexities that is beyond the responsibilities of project management, but involves project governance. The acknowledgement of pluralism broadens the distributive concerns in project governance decisions to issues such as the distribution of complexities and project management impacts.

Chapter 6

Conclusions and Recommendations

6.1 Research Summary

This chapter will review the significant findings and summarize the formulation utilized to answer research questions. Practical guidelines to be utilized by project executives in their decision-making process for adoption and sustainability of EAS systems will be presented. The level of achievement of the research objectives will be scrutinized, and research limitations and recommendations for future work will be made.

In reality an organization can accept a cutting edge technology but under utilize it. Most IT related research in the area of EAS success generally proposes research models to identify individual critical success factors and risk factors, without understanding that EAS implementations are dynamic systems and each critical success factors and risk factors impact each other. Furthermore, since this type of research is still relatively new to EAS implementation related research; many surveys have been developed without sound theoretical background and without consultations with professionals from the field. Project management techniques related to EAS research has been developed without modification of standard methodology or understanding specifics related to the specific project leading to inadequate sequence of events for implementation.

The appropriateness of some of these basic assumptions is coming into question in many project contexts.

This research set out not only to formulate the reason(s) why EAS deployments fail to meet adopter's objectives, but also to propose a project governance execution methodology which could be utilized by the executives responsible for any EAS deployment.

This research was completed in four phases that consisted of problem formulation, analysis and confirmation that critical success factors and risk factors cannot be meet within current project governance methodology, proposal of two risk based success measures for EAS implementations, EAS Adoption Model (EAM) discussions, guidelines and conclusions.

After identification of the problem to be resolved by this research, a comprehensive literature review was conducted in the area of EAS applications in all industrial sectors. In particular, literature related to critical success factors and risk factors for EAS applications in order to obtain an in depth knowledge of this subject, also on-site interviews relating to their EAS experiences were conducted with various stakeholders of EAS implementation.

Current understandings of technology adoption processes, associated risks and benefits of ERP application were studied. A number of existing and prominent technology adoption models were reviewed, and based on their applicability to technology adoption in construction; three of them were further scrutinized. After a careful review of existing technology models, a new EAS success Model (EAM) was formulated and projected. The model was adopted based on the fact that it is integration and inter-dependency of the stakeholder groups which contributes to success of EAS implementation.

Valid measurement scales for predicting organization's acceptance of enterprise systems are in short supply. A questionnaire was designed and used as the primary instrument to survey the large EAS implementations and collect the necessary data to validate new scales proposed in this study. Based on the analysis of the results obtained from this questionnaire, integration and inter-dependency risks are identified as key contributing factors in EAS implementation.

As extension to acceptance of EAS implementation, sustainability of implementation was proposed. It was determined that in order to confirm and complete the required analysis to gauge the impact of the sustainability and their potential role in the continued acceptance or sustainability of deployments, a case study would need to be completed. These case study project were chosen because they had previous relevant experience with the implementation of EAS systems. A major national financial institute was used for case study. And the case study was followed by a questionnaire driven analysis.

The data obtained as a result of the second field questionnaire were analyzed to formulate to find relationship between different stakeholders that impacts the prohibitive criteria and establish a thorough understanding of their role in communications established between multiple stakeholders in the EAS. The relationships of the prohibitive criteria were analyzed. The results obtained for alternative ERP systems were compared so that the final recommendations could address the applicability and adoptability of a system. Various statistical methods were utilized to complete this analysis.

In order to validate the research model a case study that dealt with a medium size general contracting firm's adoption of an ERP system was conducted. As a result of data analysis and the case study conducted, the previously mentioned ERP Adoption Model (EAM) was completed. Prohibitive criteria and their ranking were adopted by getting incorporated into the self-regulation element of research model. Each individual element was further analyzed and its sub parts were identified. Issues of importance to the final version of EAM were presented and discussed in detail.

6.2 Research Results and Contributions

This research has delivered valid conclusions as the result of a case study and empirical analysis completed, utilizing the data obtained through two separate field questionnaires. Contributions of this research consisted of the following major items:

1. Obtaining data as a result of two field questionnaire
2. Identification and confirmation of two new risk based measures
3. Analysis of new measures
4. Risk based - EAS Success Model (REAS)

5. Identification and confirmation of five new measures for sustainability of sustainability
6. Analysis of new measures
7. Communications model between multiple stakeholders those impacts EAS deployments.
8. Three tier ERP Adoption Model (EAM)

Two separate field questionnaires were successfully designed and distributed, which resulted in the collection of valid responses. These data were then utilized to complete the required analysis.

Risk based success measures were identified and confirmed to consist of the following: integration and inter-dependency risks. In turn, each of these subcategories was further subdivided into subcategories that were individually and collectively analyzed utilizing statistical methods.

A case study to verify EAM in general and impact of prohibitive/self-regulation criteria was conducted. Ultimately EAM, incorporating the study's findings associated with prohibitive/self-regulation criteria was finalized and proposed to be utilized by SMSCO in order to increase the chances of successful implementation of ERP system.

This study is first attempt to look at IS/IT research beyond behavioral analysis based end users' acceptance. TAM was extended using adoption theory and defined organizational structure to facilitate sustainability of the implementation. The study presented has huge implications for management – it necessitates the need to rethink project organization in terms of the new dimensions, evaluate existing approaches, and understand projects as existing in a larger environment. A new framework is proposed based on adoption principles utilizing the new found relationships and dependencies.

6.3 Managerial relevance statements of this research

One of the objectives of this research was to develop practical guidelines for SMSCOs to be utilized in conjunction with EAM. The following can be summarized for practical guidelines:

1. Proposed and validated two new measures – integration and inter-dependency risks as contributor to success. It was established that both integration and inter-dependency risks contributes to success of the implementation. However both the type of risks and mitigation are different for business applications compared to technical applications. Also less experienced resources treat the above mentioned risks differently than more experienced resources. So project governance organization should be represented by the both type of resources. Also project executives should have different governance approach for business applications and technical applications.

2. With the advent of new participatory approach in the thesis, the two issues of inclusion of all stakeholders and decisions involving them have become more streamlined than conventional methods of project management. This should reduce complexities in decisions made in weak knowledge and

weak governance situation. Governing choices in modern societies is seen as interplay between appropriate level of resources and process. Project governance organization should have an inclusive approach to proactively mitigate integration and inter-dependency risks by adopting an inclusive approach – this requires both resources and methodology in place. The resources should be able to manage changes in configuration, business process and drivers, vendor releasing new software and changes in statutory requirements among others. This requires empowered resources, a necessary requirement for good project governance.

3. The research also carries considerable implications in the organization resource assignments. The proposed model also defined specific relationship and communication model between multiple stakeholder groups and a three tier structure to support that. While there are interactions between EAS vendor and EAS adoptee, often EAS vendor considers any adoptee just one of many customer. But the thesis confirms that even the adoptee one of many customers, adoptee's mission critical business application runs on vendor's software, and therefore the relationship should be more inclusive.

6.4 Research limitations

Although the research delivered valid conclusions and findings, there are several limitations associated with data collection and analysis. The main limitations are as follows:

• Linkedin was used to find target respondents based on profile presented in the website. Each of the Linkedin profiles is reviewed but there was no additional validation done or there was no direct discussion to validate the responses. Therefore the current study depended on the secondary data to validate respondent’s authenticity. There was no validation when emails were sent to the mailing groups. When emails were sent, even there were full details about affiliation and purpose of the case, some potential respondent may have considered to be a spam, or not interested to spent 15 minutes for a educational project, and may have lost some valuable data points.

• Another limitation related to data collection was missing data in the responses. Items related to the EAS implementation project have relatively low response rates since some respondents who were not involved in the implementation project may not be familiar with all the relevant facts, especially for items about the progress of the project. For this reason, the R square of the regression on the project progress was lower than any other regression models provided in this research.

• The sample size of the responses was large enough to verify the proposed EAS success model statistically, but more data points are required for better results. As a rule of thumb, at least 10 responses per variable are required to verify the research model properly but, realistically, more data were needed to have better results for this study. For instance, compared to the regression analysis with total responses, the regressions with different country samples have different results, which may be biased by the reduced sample size.

• Even though the research made every effort to identify the factors affecting EAS success based on the comprehensive literature and interviews with industry experts, there is a chance that additional important factors exists that merit serious consideration. Since there are many reasons that can lead to success or failure of EAS systems and the fact that these may differ case by case, it is not easy to consider all the possible factors associated with ERP success. This can negatively impact the parsimony of the proposed model.

There are some other specific limitations that are worth mentioning. From the second questionnaire one of such question was “Transparency mechanisms are strongly reinforced at different levels of stakeholder’s management process?” Analyzing the response profile shows that responses were evenly distributed among all the possible responses (i.e. 1 to 7 in the Likert scale). This was probably a very loaded question and should have been further broken down by different key stakeholder groups. Also transparency may be different by stakeholder groups.

Second, the responses to came from more than 20 countries and distributed all the continents. This leads to an interesting question, since business process and project management maturity are different, should this survey be focused to one specific country or business unions (e.g. European Union). Similar comments can be made regarding industries represented in the survey. There are 15 industries represented and therefore study was generalized, which was the purpose.

Third, proposed structure requires partnership between adopter and product vendor. In a global economy, but not all vendors of enterprise solutions have similar presence is all countries where they sell. This raises a concern that what kind of partnership can happen at that level and if any localized study is required.

6.5 Future Research

The research deals with one of the key issues in EAS related research and has provided both academic and practical implications to the construction business domain. Ideas for possible future studies raised by the main findings of this research are as follows:

From the perspective of analysis of integration and inter-dependency of risks: This research found that the most important factor for ERP success is mitigation of integration and inter-dependency risks. There are two primary areas that additional research is required to understand the full impact on EAS systems. First, as discussed already the impact of technology in EAS implementation. Second, there were only minimal set of questions related to validation of integration and inter-dependency risks. Clearly the need to identify the prohibitory factors that can cause these two types of risk. There is no probabilistic study conducted to find out which prohibitory factor contributes to what part of these risks.

From the perspective of sustainability of deployments: There are two possible future research areas that are required: first, as mentioned in the limitations section, the survey should be refined and focused to specific country and industry to make it more specific. It would be interesting to understand how the proposed structure would change by industry or country. Second, this is a theoretical validation, this hypothesis needs to be extended and converted to a methodology so that practitioners can implement the suggested topologies. The purpose of this chapter is to provide a framework to make decisions that ensure project investments help achieve organizational strategic objectives. And in the process, have defined characteristics that can help business leaders and project leaders achieve that. This is the first attempt to define sustainability of complex ES system implementations from an organization perspective. The chapter is a theoretical study connecting three independent research disciplines: sustainability, project governance, and organization strategy. Implementation project of the adopted solution is a one-time endeavor, however environment and business process to meet environmental changes are both dynamic and adoption of a new business process or a new system is not voluntary – therefore topology blends the three into a unitary concept.

Appendix 1

Survey details - EAS sustainability acceptance decision model survey

Q1: Describe the type of enterprise-wide application system you were involved with in the selection process.

Answer Options	Response Percent
Enterprise Resource Planning	52.6%
Human Resource Management	13.8%
Customer Relationship Management	7.3%
Networking Management	7.3%
Security System	2.8%
Reporting System	7.3%
Other (please specify)	8.9%

Q2: Name of the enterprise-wide application vendor you have been involved with in the selection process.

Answer Options	Response Percent	Response Count
Oracle	39.3%	97
SAP	24.3%	60
Microsoft	27.5%	68
BAE	2.0%	5
Cisco	9.7%	24
Symantics	2.8%	7
Optio	0.8%	2
Sybase, Inc.	4.0%	10
Lawson Software, Inc.	2.8%	7
Deltek, Inc.	9.3%	23
Cognos Inc	5.7%	14
BMC Software	2.4%	6
Other (please specify)	19.0%	47

Q3: Compatibility of the new application with which you were involved with as part of your company's business process:

Answer Options	Strongly Disagree	Moderately disagree	Somewhat disagree	Neutral	Somewhat agree	Moderately agree	Strongly agree	Don't know
Users do not have to change their current business functions	9	18	17	7	14	23	13	2
The use of the new application does not require significant changes in user's existing work routine	11	19	19	8	10	19	13	3

Q4: Compatibility of the new application you were involved with in the selection process with your company's values/strategy

Answer Options	Strongly disagree	Moderately disagree	Somewhat disagree	Neutral	Somewhat agree	Moderately agree	Strongly agree	Don't know
Using the new system runs counter to most of the users' values	20	16	15	14	14	11	9	3
Using the new system runs counter to most of the employee's values about how to conduct job	19	16	9	15	16	13	11	3

Q5: Compatibility of the new application you were involved in the selection process with your company's employee's prior experience

Answer Options	Strongly disagree	Moderately disagree	Somewhat disagree	Neutral	Somewhat agree	Moderately agree	Strongly agree	Don't know
Using the new application is compatible with most users past computer experience	10	11	12	11	17	26	13	2

Q6: Will you need consultant's help to support your new application implementation? How important is consultant's industry knowledge?

Answer Options	Strongly disagree	Moderately disagree	Somewhat disagree	Neutral	Somewhat agree	Moderately agree	Strongly agree	Don't know
Our business process is unique/different from our competitors in the industry	10	10	17	10	13	17	19	2
Our consultants	1	2	10	5	13	19	45	4

must know our business process well enough before supporting our implementation

Q7: Will you need consultant's help to support your new application implementation? How important is consultant's product knowledge?

Answer Options	Strongly disagree	Moderately disagree	Somewhat disagree	Neutral	Somewhat agree	Moderately agree	Strongly agree	Don't know
Consultants must have supported multiple full life cycles incl. latest version of the software	2	3	7	7	11	29	37	3
We will not accept any new college graduate as a consultant	3	5	7	14	12	11	40	6

Q8: How will the new application be supported?

Answer Options	Response Percent
Internal Support Organization	73.7%
New application vendor's support organization	35.4%
Application Service Provider	36.4%

Q9: Will you use third party Application Support Provider (ASP) or product support of the new application to support your implementation? - Security Related Questions?

Answer Options	Strongly disagree	Moderately disagree	Somewhat disagree	Neutral	Somewhat agree	Moderately agree	Strongly agree	Don't know
ASP and support organization should comply with our corporate security requirements	4	3	4	11	5	9	55	7
ASP and support organization will be able to work from a remote location	5	5	5	14	11	25	23	10

Q10: How critical is Service Level Agreement (SLA) with ASP or Support provider on your new application implementation?

Answer Options	Strongly disagree	Moderately disagree	Somewhat disagree	Neutral	Somewhat agree	Moderately agree	Strongly agree	Don't know
We will have pre-defined SLAs with our ASP or support organization	1	2	8	13	8	14	43	9
If there is a SLA breach there will be financial risk-reward system in place	1	3	9	20	6	15	34	11

Q11: Please specify two SLAs you have with your support or ASP organization?

Answer Options	Response Count
	92

Q12: Reliability, Scalability and Availability of Support or ASP?

Answer Options	Strongly disagree	Moderately disagree	Somewhat disagree	Neutral	Somewhat agree	Moderately agree	Strongly agree	N/A
We expect the support group for the new application to be reliable	1	3	4	4	9	14	56	8
We expect the support group for the new application to be available on call and return our calls with time specified by SLA	0	1	3	7	11	12	56	8
We expect the support group for the new application	0	1	2	7	11	25	43	9

to be scalable and integrate with future releases or other products used by our industry

Q13: Please respond on the following training related questions for the new application.

Answer Options	Strongly disagree	Moderately disagree	Somewhat disagree	Neutral	Somewhat agree	Moderately agree	Strongly agree	Don't know
Users worked on a similar application (similar to the new application) before and therefore training requirements will be minimal	15	11	17	8	23	10	11	4
The new system	5	15	8	10	22	20	15	3

should perform consistently. Therefore one time training will be sufficient								
Currently our organization works on a mentoring philosophy, therefore train-the-trainer approach will be used to minimize training costs	2	2	4	10	17	28	30	4
Currently our organization has a very low turnover, therefore continued training requirements will be minimal	7	10	17	15	17	19	8	5

Q15: Describe your hardware requirements for the new application

Answer Options	Minor PCs and printers	Additional hard disk or memory for existing servers	Using existing severs and adds new servers	Complete new set of servers	Complete new set of servers and PCs	Complete new set of servers, PCs and printers	N/A
Upgrade Requirements	2	8	27	16	8	9	9

Q16: What is the perceived usefulness of the new application?

Answer Options	Strongly disagree	Moderately disagree	Somewhat disagree	Neutral	Somewhat agree	Moderately agree	Strongly agree	Don't know
Using the new system will increase end users productivity.	0	3	4	5	8	21	34	4
Using the new system will enhance end users' effectiveness on the job.	0	1	3	5	10	24	32	3
Using the new system will make easier for users to do the job	1	2	3	9	14	20	26	3

Q17: What is the perceived ease of use of the new application?

Answer Options	Strongly disagree	Moderately disagree	Somewhat disagree	Neutral	Somewhat agree	Moderately agree	Strongly agree	Don't know
Learning to operate the new system will be easy and flexible to use.	4	6	10	9	16	21	10	3
End users' interaction with the new system will be clear and understandable.	2	5	7	6	14	28	13	3

Q18: What is interdependency risks involved in the new application implementation?

Answer Options	Strongly disagree	Moderately disagree	Somewhat disagree	Neutral	Somewhat agree	Moderately agree	Strongly agree	Don't know
New application system is compatible with existing systems which will not be replaced	7	7	13	6	15	14	11	6
All the	5	1	8	3	17	14	26	4

stake-holders of the existing applications to be integrated are committed to integrate with the new system								

Q19: What is integration risks involved in the new application implementation?

Answer Options	Strongly disagree	Moderately disagree	Somewhat disagree	Neutral	Somewhat agree	Moderately agree	Strongly agree	Don't know
Different components of existing system architecture are evaluated to understand efforts required to integrate with the new application	3	2	3	4	16	30	16	5
All the intermediaries required to	4	5	11	9	20	13	12	5

integrate(for e.g. strategy to interface data, network connectivity, data mapping strategy) existing applications with the new application are in place and therefore integration risks are minimal

Q20: What was the primary reason for looking for new application?

Answer Options	Strongly disagree	Moderately disagree	Somewhat disagree	Neutral	Somewhat agree	Moderately agree	Strongly agree	Don't know
Market/Industry competition	4	4	4	9	14	23	16	5
Legacy system	1	0	5	11	10	22	25	5
Lacking analytical abilities	2	2	3	5	11	18	31	7
Not compatible with other applications used by the	6	5	11	12	8	11	14	12

company

Q21: The application selected in this process will be able to help our company/organizations':

Answer Options	Strongly disagree	Moderately disagree	Somewhat disagree	Neutral	Somewhat agree	Moderately agree	Strongly agree	Don't know
Increase market share	3	2	3	18	16	17	10	8
Help customers better	0	1	3	5	14	23	28	4
Become a industry leader	0	0	6	12	14	22	18	6
Improve internal information and knowledge flow	1	0	0	3	7	18	45	4

Q22: The application selected in this process will be able to help our company/organizations' to:

Answer Options	Legacy system stays, adds additional functionalities	1-20%	21-40%	41-60%	61-80%	81-100%	Don't know
Replace the percentage of legacy system:	2	1	8	8	12	9	8

Q22: Please respond to the following items regarding sunset strategy of the existing application to be replaced by the new application:

Answer Options	Strongly disagree	Moderately disagree	Somewhat disagree	Neutral	Somewhat agree	Moderately agree	Strongly agree	Don't know
Identified time frame for sunset of the existing application	2	3	4	9	14	16	21	9
Identified archiving plan of data from the existing application	2	2	4	11	10	15	26	9
Due to legal restrictions, cannot sunset the existing application	19	3	10	12	7	8	5	14

Q24: Name of the company/organization where the new application will be implemented? (If you work for an international company/organization, please specify your country also.)

Answer Options	Response Count
	76

Q25: Your position in your company?

Answer Options	Response Count
	74

Q26: How many years of experience do you have in enterprise wide application related business?

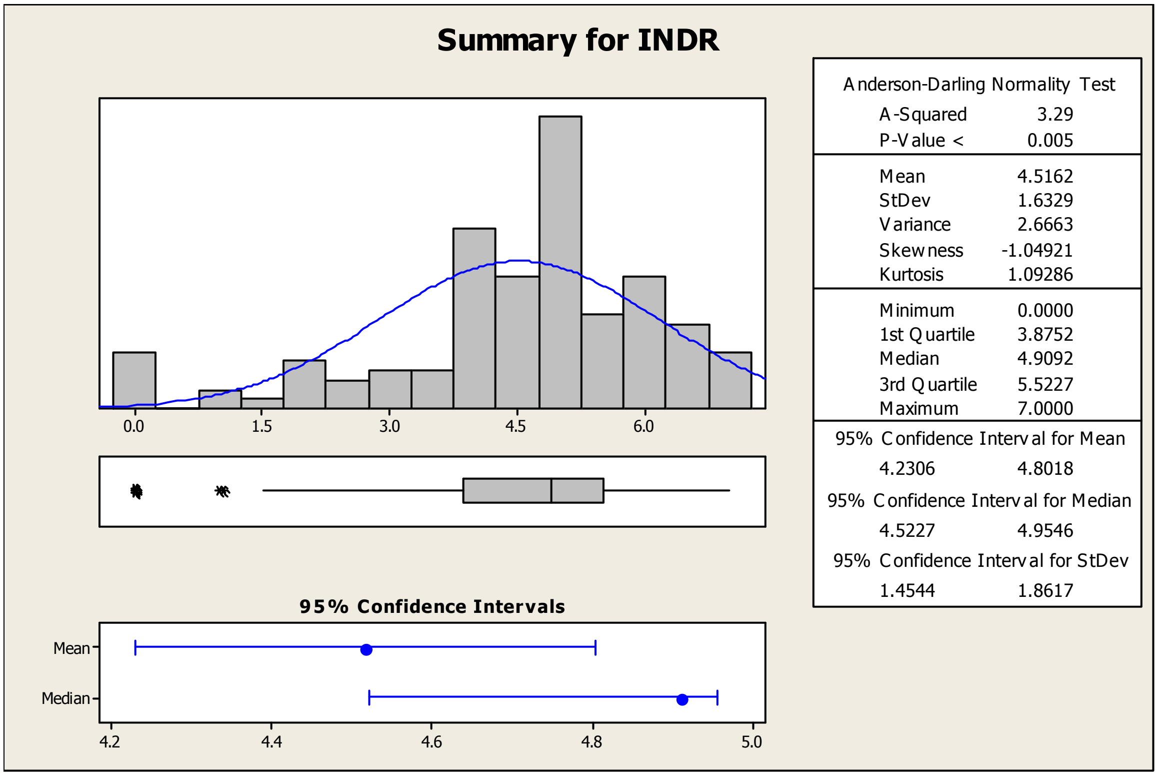
Answer Options	Response Percent	Response Count
Less than 1 year	6.3%	5
More than 1 but less than 5 years	17.7%	14
More than 5 but less than 10 years	29.1%	23
More than 10 but less than 20 years	36.7%	29
20+ years	10.1%	8

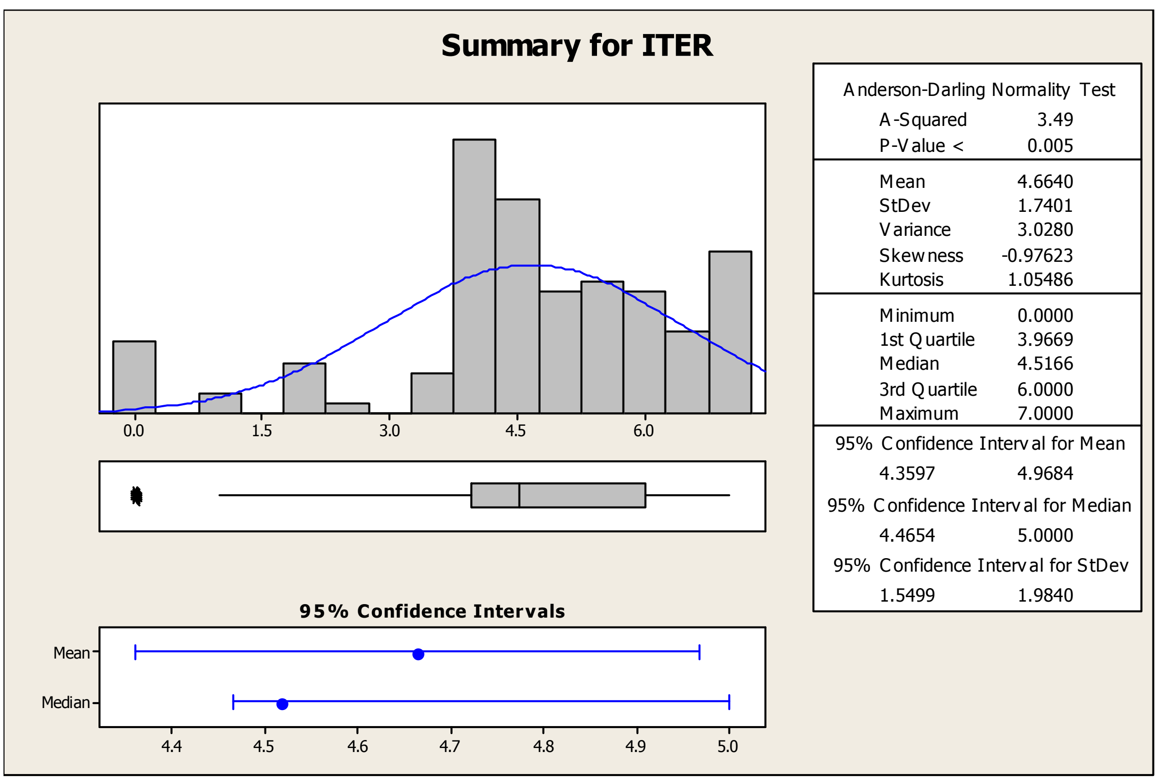
Q27: Employees count of the company/organization where the new application will be implemented?

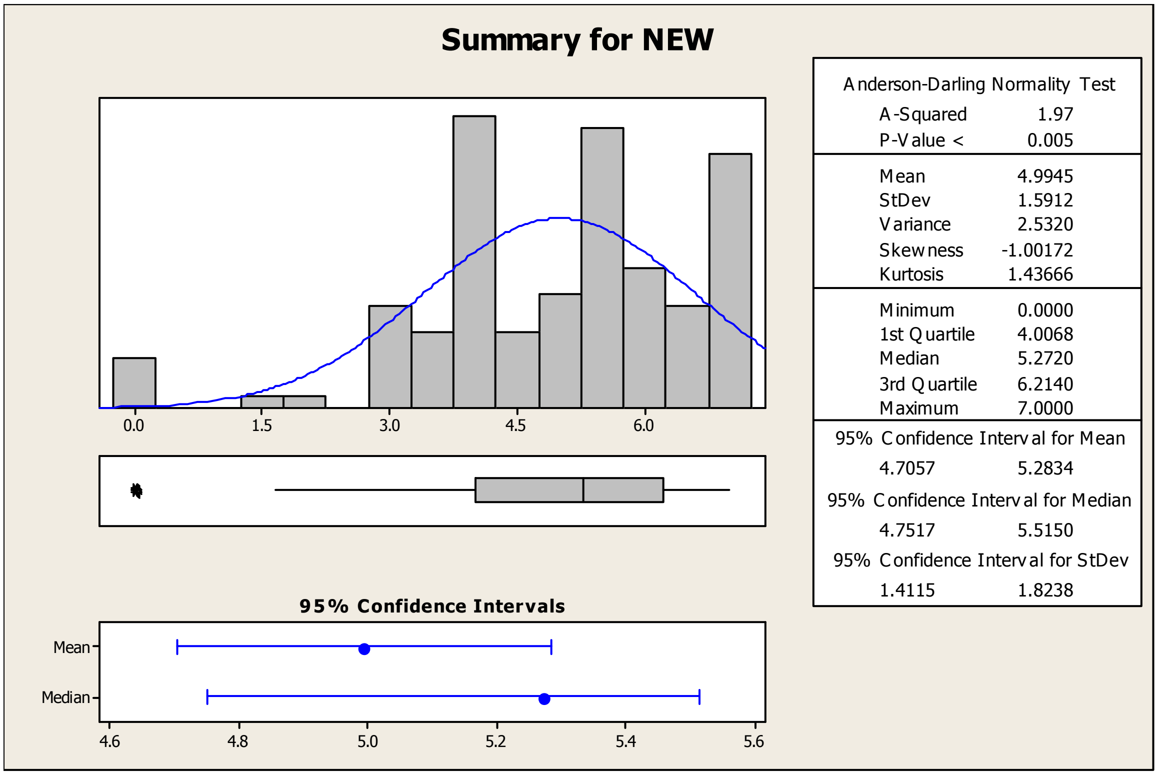
Answer Options	Less than 100	101-500	501-1000	1001-5000	5001+
No of employees on the company where new application will be implemented	11	22	12	17	16
No of potential users of the new application	25	21	12	5	11

Q28: Industry where the new application will be implemented:

Answer Options	Response Percent	Response Count
Agriculture, Forestry, Fishing and Hunting	2.5%	2
Mining, Quarrying, and Oil and Gas Extraction	2.5%	2
Utilities	5.1%	4
Construction	8.9%	7
Wholesale Trade	6.3%	5
Information	12.7%	10
Finance and Insurance	6.3%	5
Real Estate and Rental and Leasing	0.0%	0
Professional, Scientific, and Technical Services	13.9%	11
Management of Companies and Enterprises	1.3%	1
Administrative and Support and Waste Management and Remediation Services	0.0%	0
Educational Services	5.1%	4
Health Care and Social Assistance	7.6%	6
Arts, Entertainment, and Recreation	1.3%	1
Accommodation and Food Services	2.5%	2
Other Services (except Public Administration)	17.7%	14
Public Administration (incl. Fed and State Govt agencies)	6.3%	5


Summary for INDR
Anderson-Darling Normality Test
A-Squared 3.29
P-Value < 0.005
Mean 4.5162
StDev 1.6329
Variance 2.6663
Skewness -1.04921
Kurtosis 1.09286
Minimum 0.0000
1st Quartile 3.8752
Median 4.9092
3rd Quartile 5.5227
Maximum 7.0000
95% Confidence Interval for Mean
4.2306 4.8018
95% Confidence Interval for Median
4.5227 4.9546
95% Confidence Interval for StDev
1.4544 1.8617
0.0
1.5
3.0
4.5
6.0
95% Confidence Intervals
Mean
Median
4.2
4.4
4.6
4.8
5.0


Summary for ITER
Anderson-Darling Normality Test
A-Squared 3.49
P-Value < 0.005
Mean 4.6640
StDev 1.7401
Variance 3.0280
Skewness -0.97623
Kurtosis 1.05486
Minimum 0.0000
1st Quartile 3.9669
Median 4.5166
3rd Quartile 6.0000
Maximum 7.0000
95% Confidence Interval for Mean
4.3597 4.9684
95% Confidence Interval for Median
4.4654 5.0000
95% Confidence Interval for StDev
1.5499 1.9840
0.0
1.5
3.0
4.5
6.0
95% Confidence Intervals
Mean
Median
4.4
4.5
4.6
4.7
4.8
4.9
5.0



Mann-Whitney Test and CI: ITER, INDR

	N	Median
ITER	128	4.5166
INDR	128	4.9092

Point estimate for ETA1-ETA2 is 0.0454
95.0 Percent CI for ETA1-ETA2 is (-0.1119,0.4956)
W = 16816.5
Test of ETA1 = ETA2 vs ETA1 not = ETA2 is significant at 0.5344
The test is significant at 0.5340 (adjusted for ties)

Mann-Whitney Test and CI: ITER, NEW

Point estimate for ETA1-ETA2 is -0.2491
95.0 Percent CI for ETA1-ETA2 is (-0.5725,-0.0002), W = 14944.5
Test of ETA1 = ETA2 vs ETA1 not = ETA2 is significant at 0.0985
The test is significant at 0.0979 (adjusted for ties)

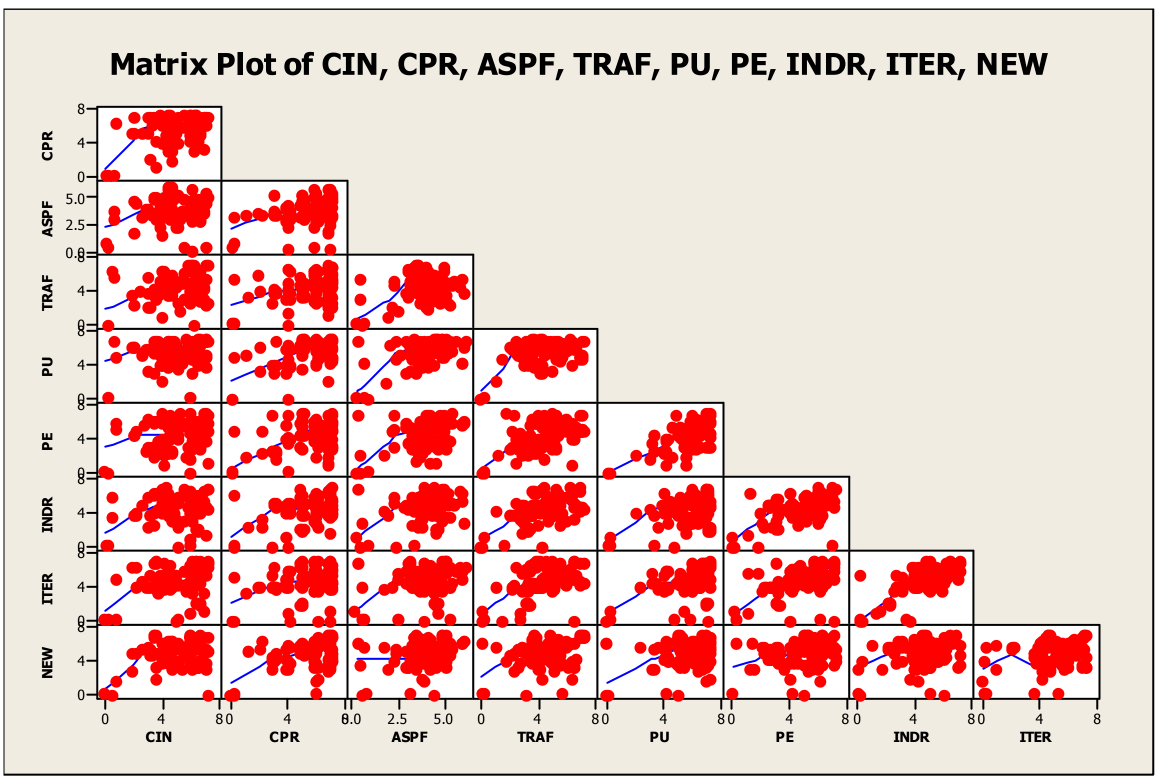
Mann-Whitney Test and CI: INDR, NEW

Point estimate for ETA1-ETA2 is -0.4905
95.0 Percent CI for ETA1-ETA2 is (-0.8242,-0.0403)
W = 14534.5
Test of ETA1 = ETA2 vs ETA1 not = ETA2 is significant at 0.0172
The test is significant at 0.0171 (adjusted for ties)

Mann-Whitney Test and CI: CIN, CPR

Point estimate for ETA1-ETA2 is -0.5173
95.0 Percent CI for ETA1-ETA2 is (-1.0001,-0.4827)
W = 19453.5
Test of ETA1 = ETA2 vs ETA1 not = ETA2 is significant at 0.0000
The test is significant at 0.0000 (adjusted for ties)

Cronbach's Alpha for **CIN, CPR, ASPF, TRAF, PU, PE, INDR, ITER, NEW** = 0.8480



Appendix 2

Survey details – Sustainability of EAS implementation survey

Q1: Describe the type of enterprise-wide application system you were involved with: (If you have had experience with multiple applications, please repeat the survey for each application, which is preferred, or pick the latest application).

Answer Options	Response Percent
Customer Relationship Management	40.7%
Enterprise Resource Planning	50.8%
Human Resource Management	18.6%
Network Management	22.0%
Reporting System	22.0%
Security System	13.6%
Other (please specify)	30.5%

List of Others
Wireless Networks Planning and Optimization
Core banking system
Logistics / Retail Management
Planning and Permitting system; Electronic Medical Record system; Billing System; Project Management System, etc.
System Management Server (SMS)
Data Governance and metadata management
Enterprise Risk Management
Management system It Service
Project Portfolio Management System
IT Governance
Project Management Solution
System Management Platform
Enterprise-wide Unclassified Information Sharing with non DoD entities
Governance, Risk and Compliance
Enterprise IT Service Management System
Develop the project

Q2: Provide a brief background about the project you used to respond to the survey:

Answer Options	Response Percent
Industry:	100.0%
Country:	98.2%
Title/Designation (project):	94.5%
Total experience in years (in related projects):	94.5%

Details of Industry/Country/Title/Total experience (first 50 responses)

Industry:	Categories	Country:	Categories	Title/Designation (project):	Categories	Total experience in years (in related projects):
Insurance		USA		Project and Portfolio Management		15
Telecomm		Canada		Videotron		10
Information Technology		Brazil		ITSM area		22
Government		USA		Program Manager		10
Consumer Goods		United States		Trade Funds Management		5
Hospitality		usa		Program manager		17
Financial, Insurance		USA, Switerland, UK, India, Italy		Managing Director		20
Telecommunications		Venezuela		Project Manager		21
Private Banking		Switzerland		Core Banking System downsizing		4
Retail		Brazil		New Life / New Infrastructure		12

Retail	Sweden	Confidential		5
Federal Government; Local Government; Insurance; Healthcare; Telecommunications; Internet	USA	Project Manager; Sr. Business Analyst		12
Consultancy	Jordan, United Arab Emirates	Project Management Consultant		16
Industrial Paint	Brazil and Venezuela	SAP Implementation at Renner Dupont	7 years	
IT / IS Infrastructure Management	India	Regional IT Director, India Sri Lanka & Central and South Asia		22
Government	USA	Data Integration		20
Electronics	Europe			
Telecomms	Saudi Arabia	ERP		10
Publishing		ERP		15
Telecommunication	RSA	Reginal Programme Manager	8 years	
Public and Private Sector	UK	A number of enterprise wide applications		15
Government	Australia	Enterprice Portfolio Management		1
Policia Militar do Governo do Estado de São Paulo	Brazil	quality management and project management gerenciamento da qualidade e gerente de projeto substitute		5
Mining	Chile	Unified Portfolio Management System		3
Utilities	Belgium	Project manager		25
Connectech Networks	Brazil	Migration Americanas Express x Blockbuster/ Manager		12
Information technology	Portugal	Portugal Telecom Program		7
Software IT Industry	India	Project Manager		10
Telecommunicatons	LATAM & USA	Master User		4
Defense	USA	A Comprehensive approach to		30

		unclassified civil-military info sharing	
Federal GOvernment	SA	ERP Upgrade	20
Software, Internet, eCommerce	India	AGM, Technology	18
Manufacturing	US	Implementation	15
Specialty Manufacturing - Jewelry	USA	Jewelry Financials, Supply Chain, Manufacturing, HR	
Various	South Africa	Advisor, Project manager	15
Software	USA	Sales Director	14
Service, Manufacturing	USA	SAP Technical Project Manager	15
Federal Government	United States	Talent Acquisition Management/Candidate Gateway	10
Software	India	Project Manager	12
Automobile Manufacturing	India	Consultant to the CIO and Program Manager	20
EPC Power Transmission & Distribution	Saudi Arabia	Planning Manager	16
State Govt	USA	FOCAS	10
Water plant	Saudi Arabia	Plastic factory	3
Retail	USA	Principal Consultant	10
Telecommunications	Australia	Manager Program Office	16
Hi Tech	USA	Director	15
Energy	USA	Director	2
Consulting	Brasil	ERP	20
Information Technology Services	UK	Designing and Implementation of Vehicle Licencing	1.5
Architecture & engineering	USA	Desktop power management	10

Q3: Your response is based on your role on the project as:

Answer Options	Response Percent
Project Manager	45.8%
Program Manager	27.1%
Project Sponsor/Executive	10.2%
Stakeholder	5.1%
Vendor/Partner	8.5%
Other decision maker	3.4%

Q4: Is the concept of long term support, maintenance and upgrading of the deployed IT solution sufficiently clear and understood by the project management?

Answer Options	Strongly disagree	Moderately disagree	Somewhat disagree	Neutral	Somewhat agree	Moderately agree	Strongly agree
Long term support	5	6	7	2	8	10	13
Maintenance of software	4	5	7	4	7	9	14
Future upgrade of software	5	5	7	1	9	10	13

Q5: Is it well understood by the different actors of the ecosystem (e.g. change management, training, support etc.) if the deployed solution is sustainable?

Answer Options	Strongly disagree	Moderately disagree	Somewhat disagree	Neutral	Somewhat agree	Moderately agree	Strongly agree
Decision makers	7	6	3	5	10	10	10
Change management	4	4	5	8	7	11	11
Training	5	4	3	10	9	7	12
Support	3	5	6	5	9	7	14
HR	8	2	5	10	6	9	10

Q6: Is there clear commitment at the highest level (decision makers, at C-level) to the formulation and implementation of sustainable deployment objectives and strategies of the deployed IT solution?

Answer Options	Strongly disagree	Moderately disagree	Somewhat disagree	Neutral	Somewhat agree	Moderately agree	Strongly agree
Deployment objectives	6	3	4	2	4	9	21
Deployment strategies	6	4	7	2	5	8	16
Deployment tactics	6	2	9	3	5	7	15

Q5: Is this commitment (ques no 5) effectively communicated across sectors of leadership between different stakeholder groups?

Answer Options	Response Percent
Strongly disagree	10.0%
Moderately disagree	6.0%
Somewhat disagree	14.0%
Neutral	4.0%
Somewhat agree	24.0%
Moderately agree	14.0%
Strongly agree	24.0%
Don't know	4.0%

Q8: There a strong institutional catalyst in charge of enforcing sustainable deployment strategies?

Answer Options	Response Percent
Strongly disagree	10.0%
Moderately disagree	16.0%
Somewhat disagree	10.0%
Neutral	4.0%
Somewhat agree	16.0%
Moderately agree	20.0%
Strongly agree	20.0%
Don't know	4.0%

Q9: Specific reviews are always conducted with corporate IT governance policies to check whether this specific deployment conflicts with sustainable deployment?

Answer Options	Response Percent
Strongly disagree	24.0%
Moderately disagree	2.0%
Somewhat disagree	12.0%
Neutral	10.0%
Somewhat agree	10.0%
Moderately agree	26.0%
Strongly agree	14.0%
Don't know	2.0%

Q10: Sustainable deployment strategies are integrated with corporate budget, procurement, resources and evaluation activities?

Answer Options	Strongly disagree	Moderately disagree	Somewhat disagree	Neutral	Somewhat agree	Moderately agree	Strongly agree	N/A
Corporate budget,	6	5	3	3	10	10	14	0
Procurement,	6	3	4	5	5	12	13	0
Resources	5	3	8	4	6	9	13	0
Evaluation activities	3	7	6	4	6	10	11	1

Q11 Does mechanism (defined procedures, processes or SLA) exist between solution adopter, solution provider and support organizations ensure that implemented solution is sustainable?

Answer Options	Strongly disagree	Moderately disagree	Somewhat disagree	Neutral	Somewhat agree	Moderately agree	Strongly agree	N/A
Solution adopter and Solution provider	5	3	2	2	14	9	14	0
Solution provider and Support organizations	5	3	2	4	10	8	17	0
Solution adopter and Support organizations	5	4	2	3	12	7	16	0
Between all three	6	4	2	2	12	9	13	0

Q12: A communication process exist within solution adopter's IT organization to ensure that end users are informed about consequences of their solution adoption decision

Answer Options	Response Percent
Strongly disagree	12.2%
Moderately disagree	6.1%
Somewhat disagree	12.2%
Neutral	12.2%
Somewhat agree	18.4%
Moderately agree	6.1%
Strongly agree	32.7%
Don't know	0.0%

Q13: There are documented guidelines on when, with whom, and how consultants should be used while adopting a new IT solution?

Answer Options	Strongly disagree	Moderately disagree	Somewhat disagree	Neutral	Somewhat agree	Moderately agree	Strongly agree	N/A
When	3	5	9	2	7	9	13	1
Preferred consultants exist	2	3	7	4	10	10	11	1
Process of hiring consultants	3	4	6	4	5	14	12	1

Q14: Transparency mechanisms are strongly reinforced at different levels of stakeholder's management process?

Answer Options	Response Percent
Strongly disagree	8.3%
Moderately disagree	8.3%
Somewhat disagree	22.9%
Neutral	8.3%
Somewhat agree	14.6%
Moderately agree	18.8%
Strongly agree	14.6%
Don't know	4.2%

Q15: There are (documented) transparent mechanisms in place for managing conflictual knowledge?

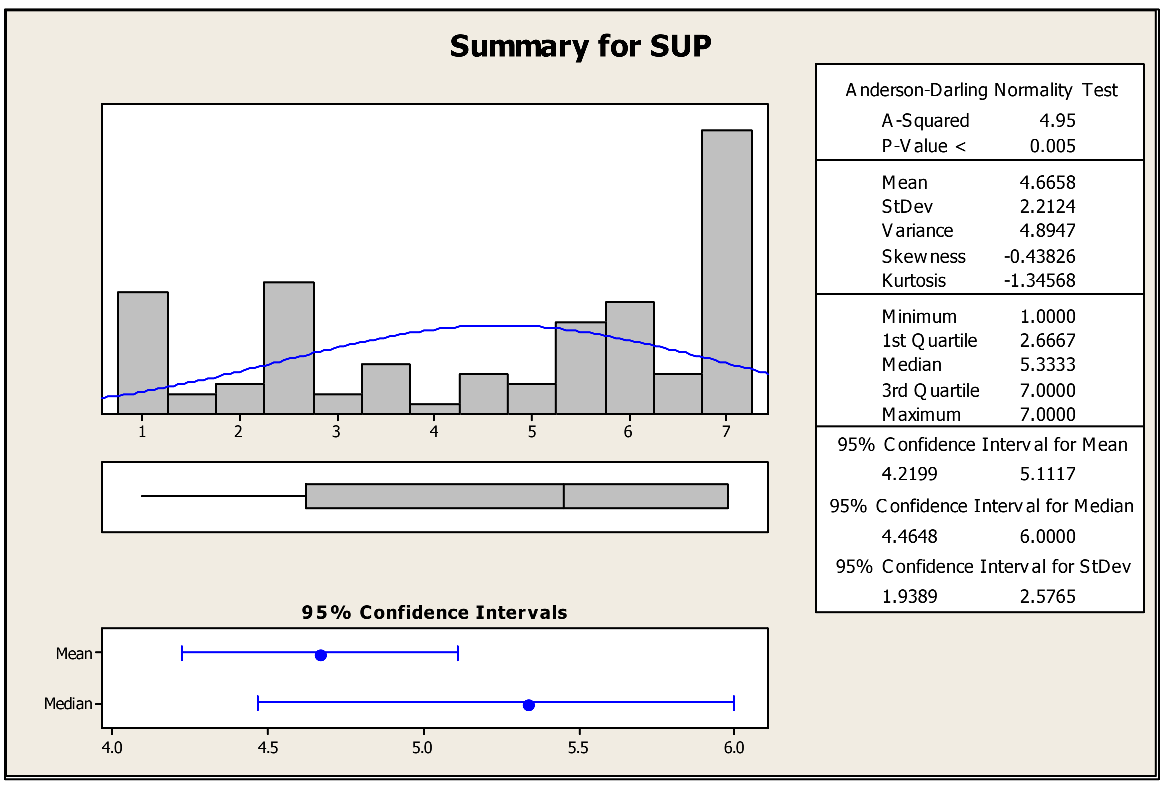
Answer Options	Response Percent
Strongly disagree	10.4%
Moderately disagree	8.3%
Somewhat disagree	18.8%
Neutral	6.3%
Somewhat agree	20.8%
Moderately agree	14.6%
Strongly agree	14.6%
Don't know	6.3%

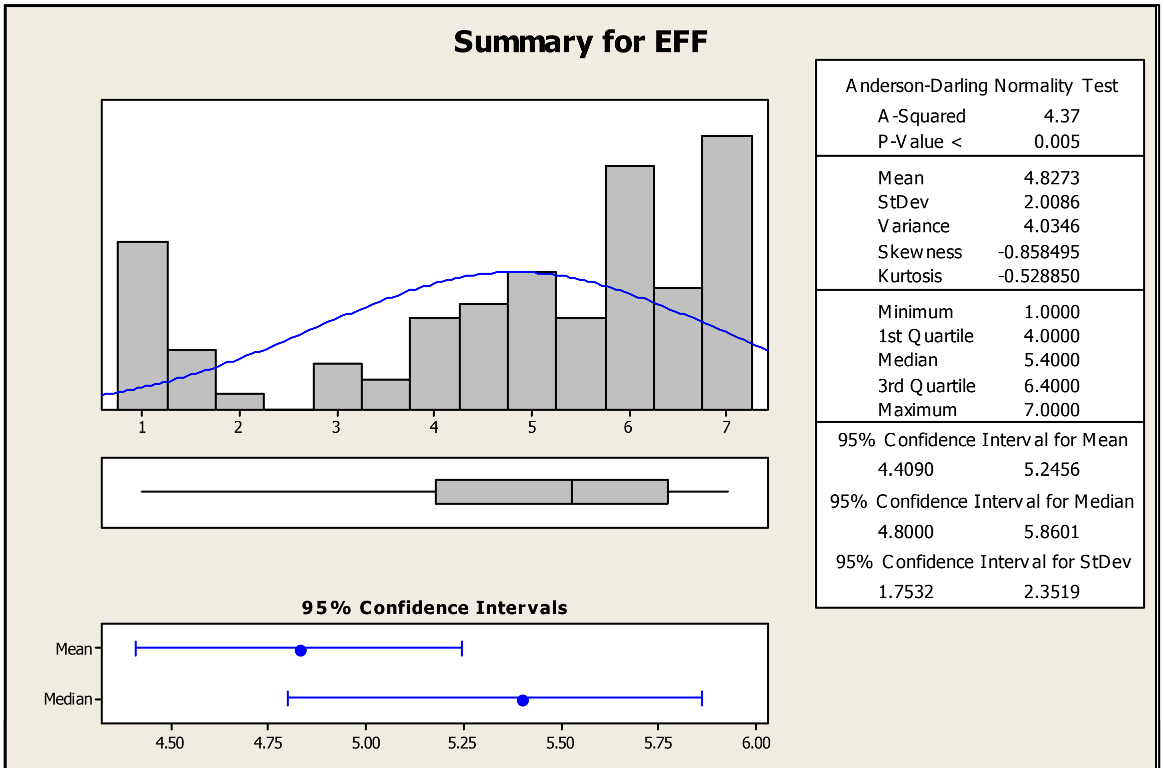
Q16: The flow of information between business stakeholders, information technology stakeholders and decision makers is efficient and effective?

Answer Options	Strongly disagree	Moderately disagree	Somewhat disagree	Neutral	Somewhat agree	Moderately agree	Strongly agree	N/A
Business stakeholders and IT stakeholders	4	6	6	3	10	9	11	0
Business stakeholders and decision makers	3	6	4	2	12	9	12	1
IT stakeholders and decision makers	4	7	3	4	12	6	11	1

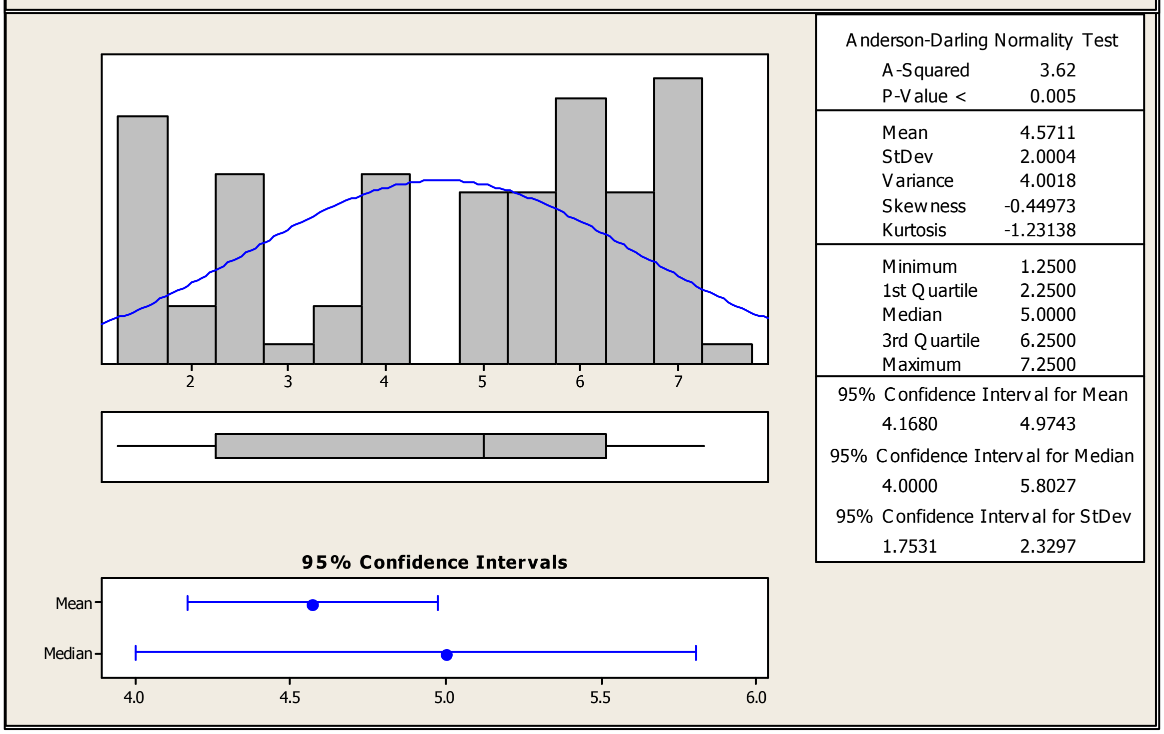
Descriptive statistics

Var	Mean	SE Mean	SD	Vari	CoVar	Min	Q1	Med	Q3	Max	IQR
SUP	4.67	0.23	2.21	4.90	47.42	1.00	2.67	5.33	7.00	7.00	4.33
ACT	4.77	0.21	2.07	4.27	43.32	1.00	2.88	5.50	6.63	7.25	3.75
ORG	4.57	0.20	2.00	4.00	43.76	1.25	2.25	5.00	6.25	7.25	4.00
EFF	4.83	0.21	2.01	4.04	41.61	1.00	4.00	5.40	6.40	7.00	2.40
BUS	4.78	0.22	2.08	4.31	43.37	1.00	3.00	5.00	7.00	7.00	4.00

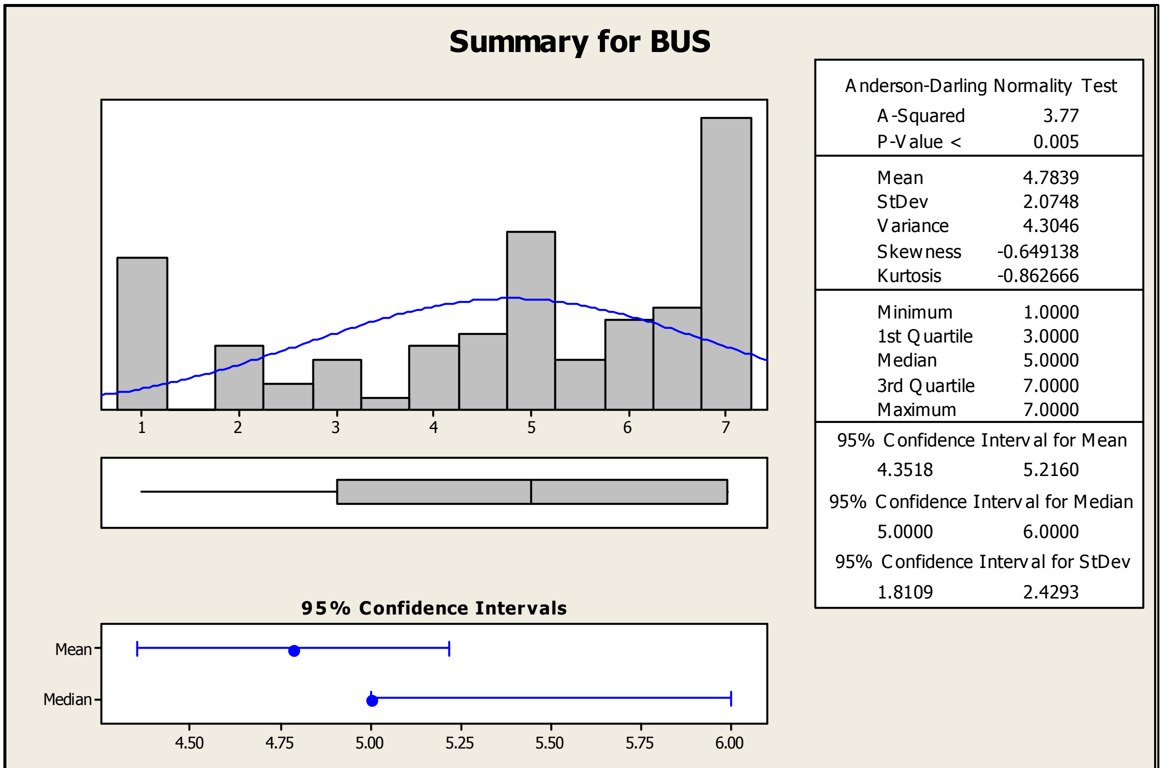


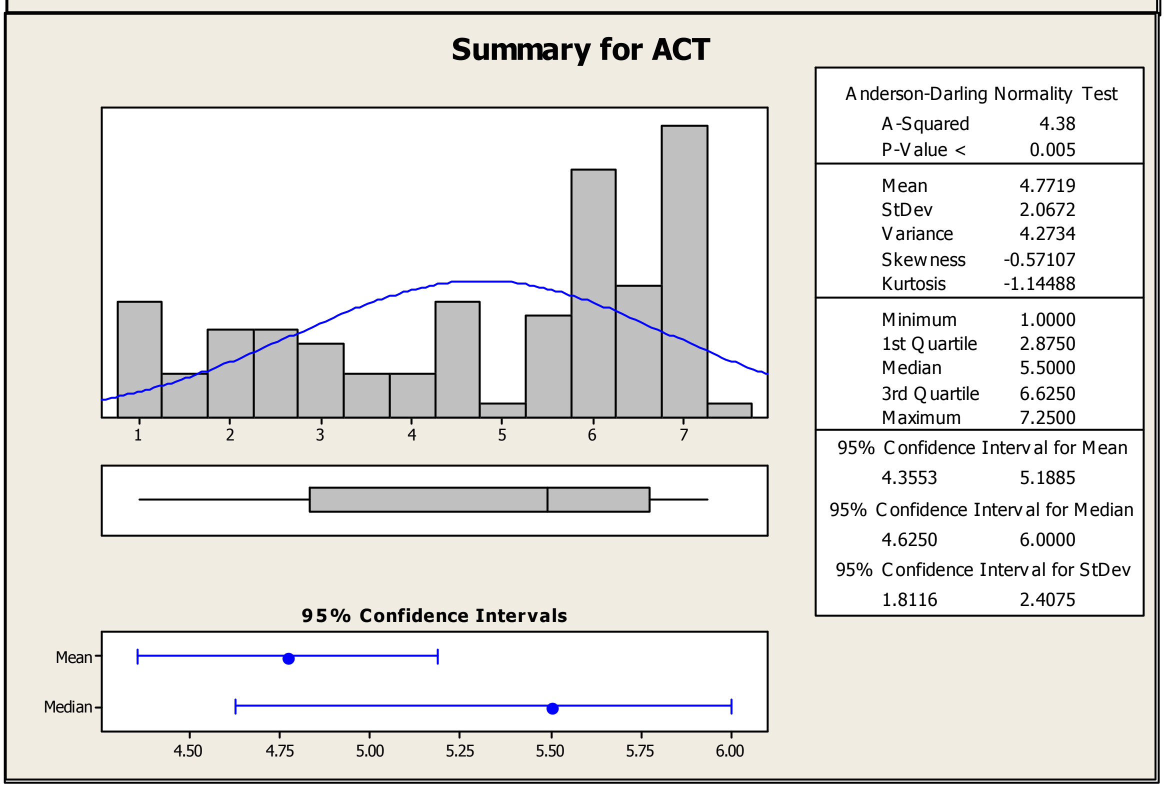


Summary for EFF
Anderson-Darling Normality Test
A-Squared 4.37
P-Value < 0.005
Mean 4.8273
StDev 2.0086
Variance 4.0346
Skewness -0.858495
Kurtosis -0.528850
Minimum 1.0000
1st Quartile 4.0000
Median 5.4000
3rd Quartile 6.4000
Maximum 7.0000
95% Confidence Interval for Mean
4.4090 5.2456
95% Confidence Interval for Median
4.8000 5.8601
95% Confidence Interval for StDev
1.7532 2.3519
1 2 3 4 5 6 7
95% Confidence Intervals
Mean
Median
4.50 4.75 5.00 5.25 5.50 5.75 6.00



Anderson-Darling Normality Test
A-Squared 3.62
P-Value < 0.005
Mean 4.5711
StDev 2.0004
Variance 4.0018
Skewness -0.44973
Kurtosis -1.23138
Minimum 1.2500
1st Quartile 2.2500
Median 5.0000
3rd Quartile 6.2500
Maximum 7.2500
95% Confidence Interval for Mean
4.1680 4.9743
95% Confidence Interval for Median
4.0000 5.8027
95% Confidence Interval for StDev
1.7531 2.3297
2 3 4 5 6 7
95% Confidence Intervals
Mean
Median
4.0 4.5 5.0 5.5 6.0


Summary for BUS
Anderson-Darling Normality Test
A-Squared 3.77
P-Value < 0.005
Mean 4.7839
StDev 2.0748
Variance 4.3046
Skewness -0.649138
Kurtosis -0.862666
Minimum 1.0000
1st Quartile 3.0000
Median 5.0000
3rd Quartile 7.0000
Maximum 7.0000
95% Confidence Interval for Mean
4.3518 5.2160
95% Confidence Interval for Median
5.0000 6.0000
95% Confidence Interval for StDev
1.8109 2.4293
1 2 3 4 5 6 7
95% Confidence Intervals
Mean
Median
4.50 4.75 5.00 5.25 5.50 5.75 6.00


Summary for ACT
Anderson-Darling Normality Test
A-Squared 4.38
P-Value < 0.005
Mean 4.7719
StDev 2.0672
Variance 4.2734
Skewness -0.57107
Kurtosis -1.14488
Minimum 1.0000
1st Quartile 2.8750
Median 5.5000
3rd Quartile 6.6250
Maximum 7.2500
95% Confidence Interval for Mean
4.3553 5.1885
95% Confidence Interval for Median
4.6250 6.0000
95% Confidence Interval for StDev
1.8116 2.4075
1 2 3 4 5 6 7
95% Confidence Intervals
Mean
Median
4.50 4.75 5.00 5.25 5.50 5.75 6.00

Covariance: SUP, ACT, ORG, EFF, BUS

	SUP	ACT	ORG	EFF	BUS
SUP	4.8948				
ACT	4.1031	4.2734			
ORG	3.1488	3.0505	4.0018		
EFF	3.8404	3.7360	3.6259	4.0346	
BUS	3.7442	3.6167	3.5519	3.6182	4.3046

Correlation Coefficient: SUP, ACT, ORG, EFF, BUS

	SUP	ACT	ORG	EFF
ACT	0.897			
ORG	0.711	0.738		
EFF	0.852	0.89	0.921	
BUS	0.804	0.834	0.874	0.868

Mann-Whitney Test and CI: SUP, BUS

Point estimate for ETA1-ETA2 is -0.000
95.0 Percent CI for ETA1-ETA2 is (-0.334,0.334), W = 9145.5
Test of ETA1 = ETA2 vs ETA1 not = ETA2 is significant at 0.9562
The test is significant at 0.9556 (adjusted for ties)

Mann-Whitney Test and CI: ORG, SUP

Point estimate for ETA1-ETA2 is -0.083
95.0 Percent CI for ETA1-ETA2 is (-0.750,0.250) W = 9172.0
Test of ETA1 = ETA2 vs ETA1 not = ETA2 is significant at 0.4661
The test is significant at 0.4634 (adjusted for ties)

Mann-Whitney Test and CI: ACT, BUS

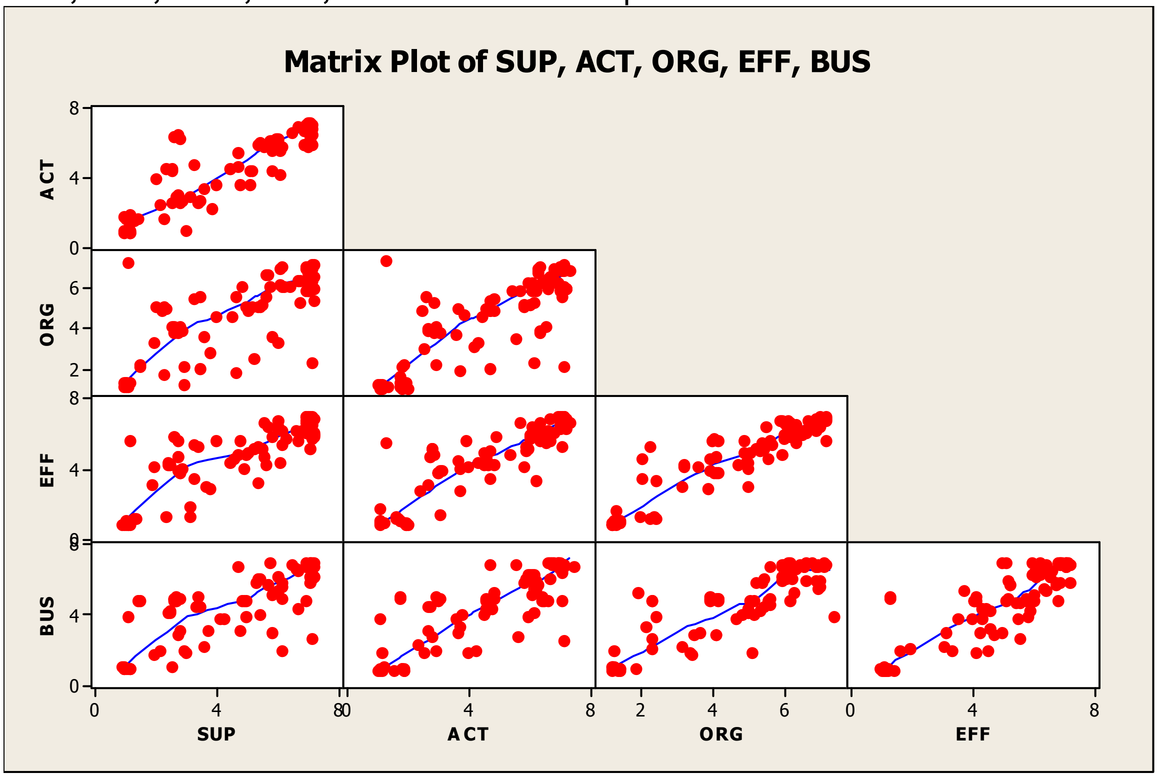
Point estimate for ETA1-ETA2 is -0.000
95.0 Percent CI for ETA1-ETA2 is (-0.375,0.542) W = 9121.0
Test of ETA1 = ETA2 vs ETA1 not = ETA2 is significant at 0.9039
The test is significant at 0.9034 (adjusted for ties)

Mann-Whitney Test and CI: EFF, ACT

Point estimate for ETA1-ETA2 is 0.000
90.0 Percent CI for ETA1-ETA2 is (-0.400,0.325) W = 8500.5
Test of ETA1 = ETA2 vs ETA1 not = ETA2 is significant at 0.7916

The test is significant at 0.7912 (adjusted for ties)

SUP, ACT, ORG, EFF, BUS Cronbach's Alpha = 0.9654



Appendix 3:

About LinkedIn.com (accessed Dec, 19, 2012)

"Company Background

- LinkedIn started out in the living room of co-founder Reid Hoffman in 2002.
- The site officially launched on May 5, 2003. At the end of the first month in operation, LinkedIn had a total of 4,500 members in the network.
- The company is publicly held and has a diversified business model with revenues coming from hiring solutions, marketing solutions and premium subscriptions.

LinkedIn Facts

- LinkedIn operates the world's largest professional network on the Internet in over 200 countries and territories.
- LinkedIn's mission is to connect the world's professionals to make them more productive and successful.
- Headquartered in Mountain View, Calif., LinkedIn also has U.S. offices in Chicago, Los Angeles, New York, Omaha and San Francisco. International LinkedIn offices are located in Amsterdam, Bangalore, Delhi, Dublin, Hong Kong, London, Madrid, Melbourne, Milan, Mumbai, Munich, Paris, Perth, São Paulo, Singapore, Stockholm, Sydney, Tokyo and Toronto.
- The company's management team is comprised of seasoned executives from companies like Yahoo!, Google, Microsoft, TiVo, PayPal and Electronic Arts. The CEO of LinkedIn is Jeff Weiner.

- LinkedIn is currently available in eighteen languages: English, Czech, Dutch, French, German, Indonesian, Italian, Japanese, Korean, Malay, Norwegian, Polish, Portuguese, Romanian, Russian, Spanish, Swedish and Turkish.

For more information, please visit our Press Center. Members of the media may direct inquiries to press@linkedin.com" (LinkedIn.com)

About SurveyMonkey.com (accessed Dec, 19, 2012)

"Who we are

We're a smart, passionate group of people who work really hard so you don't have to. We strive to make our tools powerful enough for professional researchers, yet easy enough for a survey novice. And we pack our solutions with over 10 years of experience in survey methodology and web technology so you can be confident in the quality of the data.

Our Mission

We want to help you make better decisions. That's it. That's all. That's what drives us. We want to make it as easy as possible for you to get at the knowledge you need to make smart, informed choices. And after 10 years, we're still challenging ourselves to deliver simple, powerful solutions. We're dedicated to making even the most advanced research design easy enough for anyone – and everyone – to use.

What we care about most

1. Our customers - We offer round the clock support and spend every waking hour striving to make their experience better. And they seem to appreciate it, as our satisfaction rating is 99.5%.*

2. Knowledge for everyone - We believe everyone deserves easy access to the information they need to make better decisions. Budgets, timelines and logistics should not get in the way. That's why we created the simple, cost-effective, self-serve solution you know as SurveyMonkey.

3. Privacy and security - We use SSL encryption and multi-machine backup to keep your data secure. To read more on our privacy and security policies click here.

Who uses SurveyMonkey?

Chances are you know someone who is hooked on the Monkey. Our customers include 100% of the Fortune 100, as well as other businesses, academic institutions, and organizations of all shapes and sizes. Literally millions of people use SurveyMonkey for everything from customer satisfaction and employee performance reviews, to course evaluations and research of all types.

* Source: SurveyMonkey Brand Perception Survey, October 2009. "

(surveymonkey.com)

Glossary of terms used in the dissertation

Acceptance (of EAS): is the process to predict user acceptance of innovation based on user perceptions of usefulness, ease of use, and attitude.

Adoption (of EAS): is the process through which organizations or individuals decide to make full use of an innovation in their daily businesses (Rogers, 1983). Rogers (1983:21) defines adoption as “a decision to make full use of an innovation as the best course of action, and conversely, rejection is a decision not to adopt an available innovation”.

Decision (related EAS deployment): is selection between possible actions to manage or complete any tasks related to an EAS project.

Deployment (of EAS): is defined as the transfer (conversion) between old systems to a target system in an organization.

Diffusion (of EAS): is the process during which an innovation is communicated among members over time (Rogers, 1995) and this process consists of four main elements: an innovation, communication channels, time, and a social system (Rogers, 1983). Time relates to the rate at which the innovation is diffused, whereas the social system refers to individuals and organizations as potential adopters of an innovation.

Distributed influence (in EAS project management): influence is the capacity or power of persons or things to be a compelling force on or produce effects on the actions, behavior, opinions, etc. Distributed influence is defined as stakeholders with diverse influences impacting in management of a specific EAS project.

Enterprise application systems (EAS): Enterprise application systems (EAS) are software packages that allow companies to automate and control their operations. EAS systems are basically successor of material planning software but now the definition is extended to any software that enterprises use.

Enterprise architecture (EA): is a discipline for proactively and holistically leading enterprise responses to disruptive forces by identifying and analyzing the execution of change toward desired business vision and outcomes. EA delivers value by presenting business and IT leaders with signature-ready recommendations for adjusting policies and projects to achieve target business outcomes that capitalize on relevant business disruptions. EA is used to steer decision making toward the evolution of the future state architecture (www.gartner.com)

Experienced resources – less: Project resources with 10 years or less years of experience in a specific EAS project as project managers, executive sponsor, project leaders, solution architect and consultants.

Experienced resources – more: Project resources with more than 10 years of experience in a specific EAS project as project managers, executive sponsor, project leaders, solution architect and consultants.

Good project governance: Based on criterion of good governance in organization theory (Aguilera and Cuervo-Cazurra, 2004) and adopted for project management practices, codes of good project governance are a set of 'best practice' recommendations regarding the behavior and structure of the project governance and stakeholders of a project.

Governance (of projects) - 1: Project governance is a process-oriented system by which projects are strategically directed, interactively managed and holistically controlled, in an entrepreneurial and ethically reflected way, appropriate to the singular time-wise limited, inter-disciplinary, and complex context projects.

Governance framework (for projects): A project governance framework is an abstraction in which project specific decisions can be selectively made thus providing project specific directions. A project governance framework is a universal, reusable decision platform used to make project specific decisions. Project governance frameworks include resources, process, and methodology that bring together all the different components to enable good project governance.

Governance school in project management: The Governance School aims to analyze why projects exist and define the appropriate governing mechanisms of projects as a particular kind of administrative problem and complex transaction. In the Governance School, contributions are found that use an economics approach on projects and project management. The majority of papers include applications of either agency theory or transaction cost theory.

Governance topology (for projects): topology is the study of continuity and connectivity. Project governance topology is defined as a framework that connects different independent stakeholder groups in a continuous manner.

Implementation (of EAS): is used synonymously with EAS deployments

Inclusive governance: this means that the major stakeholders in risk decision making should jointly engage in the process of framing the problem, generating options, evaluating options, and coming to a joint conclusion. This has also been the main recommendation of the EU White Paper on European Governance (EU 2001a). Inclusive governance consists of the followings (based on Renn and Schweizer, 2002):

- Involve representatives of all relevant actor groups (if appropriate);
- Empower all stakeholders to participate actively and constructively in the discourse;
- Co-design the framing of project challenges in a dialogue with these different groups
- Generate a common understanding about the framing of the problem, potential solutions and their likely consequences (based on the expertise of all participants);
- Conduct a forum for decision-making that provides equal and fair opportunities for all parties to voice their opinion and to express their preferences; and

- Establish a connection between the participatory bodies of decision-making and in the implementation level.

Inclusive risk governance: This concept is based on a normative belief that the integration of knowledge and values can best be accomplished by involving those actors in the decision making process that are able to contribute all the respective knowledge a well as the variability of values necessary to make effective, efficient, fair and morally acceptable decisions about risk (Kemp, 1985; Warren, 1993; Tuler and Webler, 1995; Webler, 1995, 1999; IRGC 2005).

Innovation: The innovation can be defined as "an idea, practice, or object that is perceived as new by an individual" (Rogers, 1995:7).

Knowledge intensive: Requiring access to and manipulation of large quantities of knowledge.

Knowledge governance: the knowledge governance (Foss 2007) is the systematic integration between governance and knowledge in an organization setting. Knowledge governance process is the governance structures, governance and coordination mechanism so as to favorable influence process of transferring, sharing, integrating, using and creating knowledge. Knowledge governance is taken up with how the deployment of governance mechanisms influences knowledge processes, such as sharing, retaining and creating knowledge.

Multi-level project governance: defined as an arrangement for making binding decisions that engages a multiplicity of independent stakeholders at different levels of territorial integration.

Pluralism: Pluralism is the energetic engagement with diversity based on dialogue. Pluralism in project governance means solving project management problems involving diverse group of stakeholders by means of communications and dialogue.

Pluralism - embracing: means how to stimulate cross-fertilization, unification and thus enhance a pluralistic understanding of projects and project management accurately resolve problems related to contemporary projects.

Project complexity: Baccarini proposes a definition of project complexity as ``consisting of many varied interrelated parts'', which he operationalize in terms of differentiation the number of varied elements and interdependency the degree of interrelatedness between these elements

Project knowledge management: Project knowledge management is defined as the control of the project problem solution (Rwelamila, Edries 2007) and adaptation capacity through a goal-directed development and utilization of the organizational knowledge base, and is considered to be an essential capability in the emerging knowledge economy.

Project knowledge: Project knowledge is defined as “lessons and experiences from given projects”. For the thesis, knowledge we are focused on are those lessons and experiences that may impact the outcome of the project. This includes best practices, methodology, industry standards, quality standards among other project specific knowledge.

Project management: Project management is the application of knowledge, skills, tools, and techniques to project activities in order to meet or exceed stakeholder needs and expectations from a project. For the thesis, project management will be restricted by the project management book of knowledge.

Reductionist techniques in project management: refers to the techniques used in project management involving reducing a bigger task into a set of smaller tasks (e.g. work break down structure) and management is run based on bottom-up completion of tasks to complete the whole project.

Risk communication: risk communication is to assist stakeholders in understanding the rationale behind a risk-based decision, so that they may arrive at a balanced judgment, which reflects the factual evidence about the matter at hand, in relation to their own interests and values.

Sustainable development: is a social science terminology; the most frequently quoted definition is 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (Voss and Kemp, 2005; Brundtland Commission, UNCED, 1992).

Sustainability (of EAS): EAS is the process during which as innovation is continues to be acceptance by an organization during changing business environment. Sustainability is process to implement a solution without sacrificing future.

Sustainability – normative characteristics: means inter- and intra-generational equity.

Sustainability – subjectivity characteristics: means same results can be derived many ways

Sustainability – ambiguity characteristics: means there are clear guidelines and priorities may change over time

Weak governance: Project governance principals that does not follow good governance principals.

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