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Technological, organizational, and environmental factors affecting the adoption of cloud enterprise resource planning (ERP) systems

John Njenga Kinuthia

Technological, Organizational, and Environmental Factors Affecting the Adoption of Cloud Enterprise Resource Planning (ERP) Systems

Dissertation

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John Njenga Kinuthia

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Dissertation Committee:

Dr. Al Bellamy, Chair

Dr. Sock Chung

Dr. Ali Eydgahi

Dr. Robert Teehan

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Dedication

I would like to dedicate this dissertation to my parents, Joseph and Mary Kinuthia, for working so hard to give me a good foundation in education, without which this dissertation would not be possible.

Acknowledgement

I would like to take this opportunity to express my deepest gratitude to Dr. Al Bellamy, the chair of my dissertation committee and professor of Technology Management at Eastern Michigan University. I gained so much from his many classes in Technology Management and from his knowledge in the subject matter and generous guidance throughout the dissertation process. I would also like to express my sincere appreciation to Dr. Sock Chung, Dr. Ali Eydgahi, and Dr. Robert Teehan for their constructive feedback as members of the dissertation committee. I would also like to thank Dr. Pamela Becker and Dr. Denise Pilato for their advice during the initial stages of my dissertation. This dissertation is a culmination of many years of school work. In that regard, I would like to thank all the teachers who undoubtedly shared their knowledge with me during this long journey.

I could not have finished this dissertation without the unwavering encouragement from my wife, Jennifer Njenga, who studiously filled in for me at home when I had to be away. She was always a willing sounding board when I needed to vent my frustrations with my research. My appreciation also goes to my kids, Gabriel, Maria, and Naomi, for being so patient with me while I worked on my "big paper."

Finally, I would like to thank all my other family members and friends who in one way or another offered their encouragement during this learning process.

Abstract

The purpose of this study was to determine the differences between organizations that adopted Cloud Enterprise Resource Planning (Cloud ERP) systems and organizations that did not adopt Cloud ERP systems based on the Technological, Organizational, and Environmental (TOE) factors. Relevant technological factors were identified as relative advantage of Cloud ERP systems, compatibility of Cloud ERP systems, and security concern of Cloud ERP system environment. Organizational factors included top management support, organizational readiness, size of the organization, centralization, and formalization. External environment factors were identified as competitive pressure and vendor support.

A survey was developed using constructs from existing studies of technology adoption and modified to fit this research. Using the survey, data were collected from individuals throughout the United States of America who identified themselves as working in an Information Technology (IT) job. Analysis from 159 respondents indicated that all the proposed TOE factors were significant predictors of Cloud ERP systems. In comparison to organizations that did not adopt Cloud ERP systems, organizations that adopted Cloud ERP systems had the following characteristics: higher level of relative advantage, higher level of compatibility, higher level of security concern, higher top management support, higher level of organization readiness, bigger sizes, more centralized, more formalized, higher competitive pressure, and perceived Cloud ERP system vendors as offering more support.

In the final chapter of this dissertation, practical and theoretical implications of these results are discussed, and suggestions offered for future research.

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Chapter 1: Introduction

The purpose of this research dissertation is to present a descriptive research study of cross-sectional design with the aim of determining the differences between organizations that adopted Cloud Enterprise Resource Planning (Cloud ERP) systems and organizations that did not adopt Cloud ERP systems based on the Technological, Organizational, and Environment (TOE) factors. Technological factors used in this study include (1) Relative Advantage of Cloud ERP system, (2) Compatibility of Cloud ERP system with existing systems, and (3) Security Concern of Cloud ERP system environment. The organizational factors include (1) Top Management Support, (2) Organizational Readiness, (3) Size of the organization, (4) Centralization of the organization, and (5) Formalization of the organization. The environmental factors include (1) Competitive Pressure, and (2) Vendor Support. The above factors were selected from existing studies of technology adoption which will be covered in the sections that follow.

Chapter 1 introduces the problem and covers such areas as statement of the problem, significance of the problem, objective of the research, hypothesis, delimitations, assumptions of the researcher, and definition of key terms. Chapter 2 provides a background and review of the literature on ERP, Cloud computing, and relevant theory on technology adoption. Chapter 3 is a review of the methodology and the research design. Chapter 4 presents data analysis and testing of the hypotheses. Finally, Chapter 5 contains a discussion of the research findings, practical and theoretical implications of the study results, and suggestions on future research.

Statement of the Problem

The differences between organizations that adopted Cloud ERP systems and organizations that did not adopt Cloud ERP systems in relation to their technological (Relative Advantage, Compatibility, and Security Concern), organizational (Top Management Support, Organization Readiness, Organization Size, Centralization, and Formalization), and environmental (Competitive Pressure, and Vendor Support) factors have not been adequately explored.

Objective of the Research

The objective of this study is to explore differences between organizations that adopted Cloud ERP systems and organizations that did not adopt Cloud ERP systems in relation to their technological (Relative Advantage, Compatibility, and Security Concern), organizational (Top Management Support, Organization Readiness, Organization Size, Centralization, and Formalization), and environmental (Competitive Pressure, and Vendor Support) factors.

Nature and Significance of the Problem

Information Technology (IT) has long been recognized as a powerful tool that offers organizations a competitive advantage (Porter & Millar, 1985). As organizations moved to adopt information systems, they developed systems that were intended to fulfill specific organizational functions (Raymond & Uwizeyemungu, 2007). As a result, there were many disparate applications spread across the organization. Such disparate applications can cause work redundancy where different organizational functions fail to share and communicate information efficiently. It can also create situations where decision-makers may have the

disadvantage of making decisions based on outdated and incorrect data that is also hard to access.

Enterprise Resource Planning (ERP) systems sought to address this existence of fragmented legacy systems (Beretta, 2002; Muscatello, Small, & Chen, 2003) by having a system that integrates all business functions into a single system. The various business units and processes are integrated into a single system hence, "creating value and reducing costs by making the right information available to the right people at the right time to help them make good decisions in managing resources productively and proactively" (Gunasekaran & McGaughey, 2007, p. 2).

Over the years, ERP systems have continued to evolve due to changing technology and business requirements (Gunasekaran & McGaughey, 2007). The systems evolved from Inventory Control Systems of the 1960s to Materials Requirements Planning (MRP), which became Manufacturing Resources Planning (MRPII) in the later years. In yet another evolution of ERP systems, recent advances in Cloud computing technology have resulted in the development of Cloud ERP systems (Saeed, Juell-Skielse, & Uppström, 2011). Since Cloud computing is an emerging technology, its definition is also still evolving. However, the National Institute of Standards and Technology (NIST) has defined Cloud computing as "a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction" (Mell & Grance, 2011, p. 6). In Cloud ERP systems, organizations may pay vendors a subscription fee in order to access the software over the internet. This is a marked departure from previous adoption paradigms where organizations

had to pay, host, and maintain the acquired ERP system (otherwise referred to as traditional ERP systems) within company premises. With the Cloud computing technology, ERP vendors get to host and maintain ERP systems within their Cloud servers and offer the software as a service to organizations.

Organizations that subscribe for Cloud ERP services have the benefit of not spending the hefty amount of money that may be associated with acquisitions of the software, servers, and other hardware equipment that may be required if they purchased and installed the traditional ERP software within company premises. In addition, organizations may be attracted to the characteristics of Cloud computing, which include (Mell & Grance, 2011) on-demand service where consumers can configure computing resources to suit their current needs; universal accessibility since organizations can access computing resources through the internet using different platforms such as laptops, tablets, and mobile phones; resource pooling where computing resources are brought together and shared among different consumers; rapid elasticity where computing resources can be increased and decreased based on the consumer needs; and measured service where use of resources can be metered in order to provide transparency on consumer usage and billings

Due to this emerging shift to Cloud ERP systems, a research question can be posed as to what are the factors that are significant predictors of Cloud ERP systems adoption and how do these factors differentiate organizations that adopt Cloud ERP systems and organizations that do not adopt? Based on results of recent literature analysis, however, there are not many Cloud ERP adoption studies (e.g. Saeed et al., 2011). Therefore, this study is important for several reasons. First, it contributes to existing literature by exploring the factors that may differentiate organizations that adopt Cloud ERP systems and organizations

that do not adopt Cloud ERP systems. Second, understanding these factors may help Cloud ERP systems vendors understand important factors that may enhance demand for their products. Organizations may also gain a better understanding of how such organizational characteristic as structure may enable or inhibit their ability to adopt new innovations.

Delimitations

This study is delimited to individuals who identified themselves as having an IT-related job function in the United States of America.

Assumptions

It was assumed that survey participants understood all the questions and responded accurately and truthfully. In addition, it was assumed that the survey respondents had prior knowledge of Cloud ERP systems before responding to the questions.

Definition of Terms

Enterprise resource planning (ERP) systems. Enterprise resources planning (ERP) systems are software packages that enable organizations to integrate the various organizational units and business processes into a single Information Technology (IT) system (Klaus, Rosemann, & Gable, 2000).

Cloud computing. Cloud computing is "a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction" (Mell & Grance, 2011, p. 6).

Cloud infrastructure. A Cloud infrastructure is the "…collection of hardware and software that enables the five essential characteristics of cloud computing. The cloud

infrastructure can be viewed as containing both a physical layer and an abstraction layer. The physical layer consists of the hardware resources that are necessary to support the cloud services being provided, and typically includes server, storage and network components. The abstraction layer consists of the software deployed across the physical layer, which manifests the essential cloud characteristics. Conceptually the abstraction layer sits above the physical layer" (Mell & Grance, 2011, p. 2).

Cloud ERP. Cloud ERP systems are ERP systems that are offered through the cloud architecture (Saeed et al., 2011).

Traditional ERP systems. Traditional ERP is used in this study to refer to enterprise resource planning systems that are not delivered through the cloud infrastructure. These systems are typically housed within company servers and accessed through the company intranet.

Technological context. Technological context refers to how organizations make the technology adoption decision based on the availability of the technology and how it fits with the firm's current technology (Tornatzky & Fleischer, 1990).

Organizational context. Organization context looks at the characteristics of the organization such as its structure, quality of human resources, or the extent to which its size impacts the technology adoption decision (Tornatzky & Fleischer, 1990).

Environmental context. External context refers to the arena of a firm's business operation which may include such factors as its industry, competitive pressure, and government regulations (Tornatzky & Fleischer, 1990).

Summary

This chapter presents a brief overview of the paradigm shift of traditional ERP systems into Cloud ERP systems, the nature and significance of the problem, and objective of the research. In addition, the assumptions, delimitations, and definition of terms used in the study were presented. In the following chapter, an in-depth literature review of traditional ERP systems, Cloud computing, and Cloud ERP systems is covered. Furthermore, the theoretical framework that the study will be based on is presented, looking at the technological, organizational, and environmental factors that may be significant predictors of Cloud ERP systems adoption.

Chapter 2: Background and Review of Literature

Introduction

This chapter presents a detailed literature review on traditional ERP systems, Cloud computing, and Cloud ERP systems. Literature on technology adoption, including the theoretical framework used in this research will also be presented.

Literature on Enterprise Resource Planning (ERP) Systems

The definition of ERP. Broadly defined, Enterprise Resources Planning (ERP) is a "…framework for organizing, defining, and standardizing the business processes necessary to effectively plan and control an organization so the organization can use its internal knowledge to seek external advantage" (Blackstone, 2010, p. 38). To accomplish this framework of organizing, defining and standardizing the business processes, organizations may adopt ERP systems. ERP systems are comprehensive, software packages that enable companies to "integrate the complete range of a business's processes and functions in order to present a holistic view of the business from a single information and IT architecture" (Klaus et al., 2000, p. 1). The software package usually contains several modules, each representing the specific organization function or business unit.

Figure 1 below presents the various modules that may be included in an ERP system. Although the naming standards may vary by vendor, these modules include sales and distribution, material management, financial and accounting, project management, human resources, and quality management (Shehab, Sharp, Supramaniam, & Spedding, 2004).

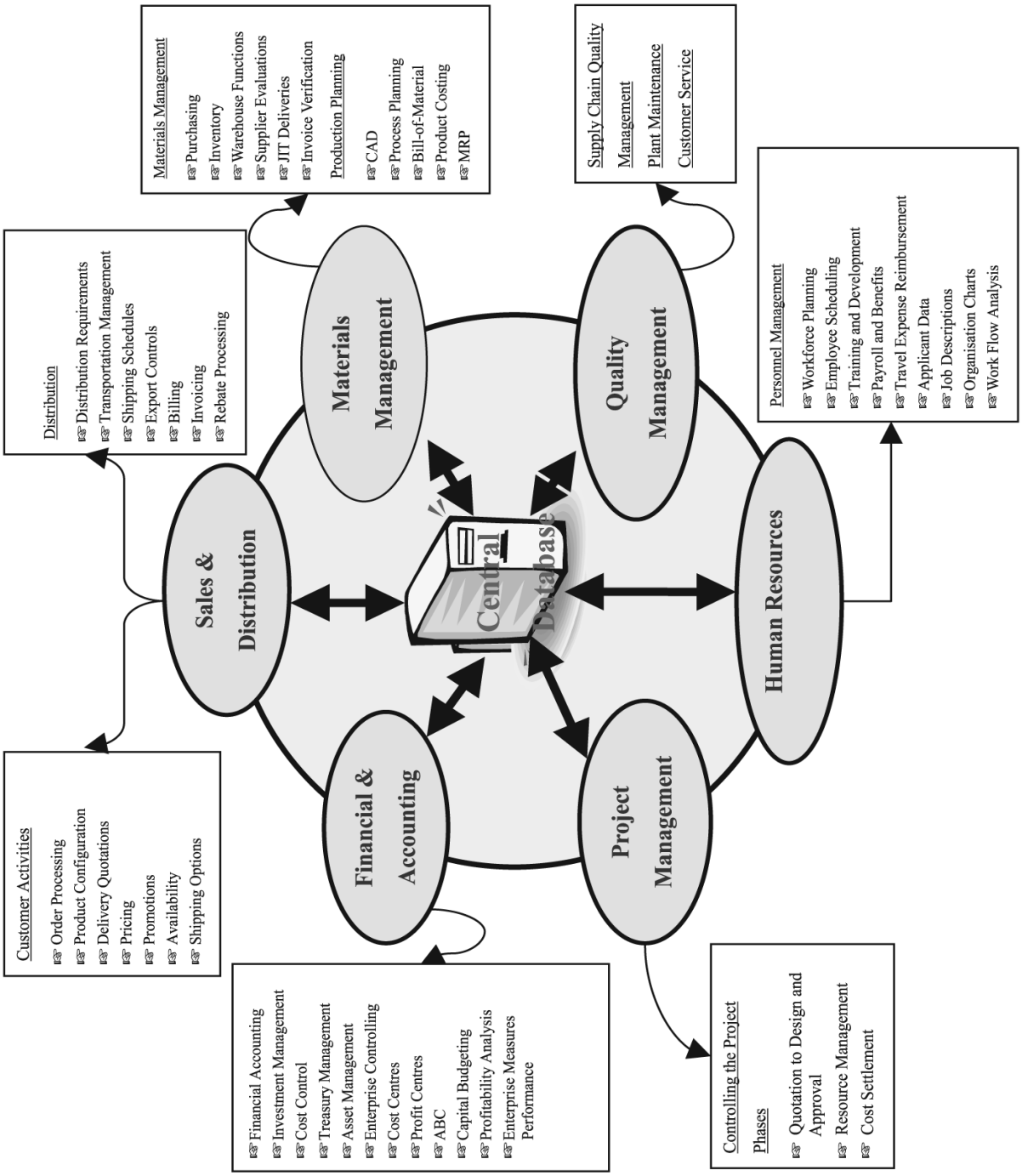


Figure 1. Typical Modules that are included in ERP Systems

Source: "Enterprise resource planning: An integrative review" by E. M. Shehab, M. W. Sharp, L. Supramaniam, & T. A. Spedding, 2004, *Business Process Management Journal*, *10*(4), p. 5.

The modules representing the various organizational units are then linked together into a single database. Instead of treating them as separate entities, ERP interlinks all the processes that form the entire business (Gupta, 2000). Due to this inter-linking, all the modules are able to access and exchange information freely through the single data repository (Chen, 2001). As all the organization functions are linked together, the best business practices are also applied through the underlying logic that is embedded in ERP systems (Shehab et al., 2004). An ERP system therefore, "is an integrated information technology (IT) that uses common databases and consistent cross-functional information flow to allow organizations to integrate information from different departments and locations" (Tsai, Lee, Shen, & Lin, 2012, p. 1).

Enterprise Resource Planning (ERP) systems come in different forms which can broadly be grouped into three categories. These categories may include the following (Klaus et al., 2000):

- ERP can be a comprehensive, generic software package that targets many industries. This package would need to be configured before use in order to fit a specific industry needs.
- The software can also be a comprehensive package that has been pre-configured in order to suit a specific industry.
- It may also be a generic or a pre-configured software package that is installed to fit specific requirements of an organization.

The Evolution of ERP systems. Enterprise Resource Planning (ERP) systems have a " pedigree in large, packaged application software that has been in widespread use since the 1970s" (Klaus et al., 2000, p. 1). However, their actual origin can be traced back to the

computerized reorder point (ROP) systems of the 1960's which were developed as control inventory systems. The competitive thrust for organizations during this time period was in cost reduction, "which resulted in product-focused manufacturing strategies based on high-volume production, cost minimization, and assuming stable economic conditions" (Jacobs & Weston, 2007, p. 2). As a result, organizations turned to a computerized system in order to fulfill their planning and control needs in manufacturing.

Since then, these earlier systems continued to evolve due to changing business requirements and advances in technology (McGaughey & Gunasekaran, 2007). From the earliest inventory control systems, Materials Requirements Planning (MRP) systems were developed with a general purpose of calculating required components in manufacturing. As MRP became popular in manufacturing, it was apparent that the systems could be updated to have more capabilities. New modules such as capacity requirements planning, human resources planning, and financial planning were added. Advances in technology also saw a departure from a mainframe based processing to client server architecture. Current data from different system modules could then be accessed in real time rather than having to wait for batch processing as was the case in the previous mainframe based systems. These newer systems came to be referred to as Manufacturing Resources Planning (MRPII). As organizations realized the potential for MRPII to help in decision making by providing real time data, they also wanted to create a system that would integrate all the various business functions under one system which led to systems that became known as ERP.

Jacobs and Weston (2007) chronicled the evolution of these computerized systems over the decades, culminating to ERP. See Table 1 below for more details.

Table 1

Major Evolution of ERP Systems over Several Decades

Decade	Major business needs and changes in technology
1960s	• Organizations primary business need was in overall cost reduction. Computerized reorder point (ROP) systems were developed. ROP computer systems used magnetic tapes as their data storage medium. • Random Access Memory (RAM) technology was developed to replace the bulky magnetic tapes. • Systems developed during this period were referred to as Materials Requirements Planning (MRP) systems, and later MRP systems used RAM data storage technology. • MRP became the basis of systems that evolved into ERP systems.
1970s	• Competition was driven by how well organizations could market their products which led to a need for better planning and production processes integration. • RAM disk technology grew in terms of access speeds and storage capacity. • MRP systems continued to utilize new RAM disk technology to offer more integrated features such as scheduling, procurement, and shop floor control. • IBM's released its Manufacturing Management Account Systems (MMAS) that offered more manufacturing process integration. • Major software development companies were founded which included SAP, J.D. Edwards, Oracle, Baan, and Lawson Software.

	• IBM released a mini computer that was less expensive than current mainframe computers that MRP software was run on. IBM also releases Manufacturing, Accounting and Production Information and Control System (MAPICS) integrating business processes with manufacturing and production control capabilities. • SAP releases SAP R/2, which allowed different module integration as well as interaction.
1980s	• Competition in manufacturing revolved around quality control and a focus on reducing overhead costs. • J. D. Edwards developed a system that ran on the cheaper IBM mini-computer hence making the system affordable for small and medium size businesses. • Digital Equipment Corporation (DEC) developed a UNIX based alternative to existing IBM systems which allowed real time data access rather than IBM's batch processing approach. • Structured Query Language (SQL) server database systems and C programming language became widely available allowing software to be written for other computer systems from vendors such DEC, Honeywell, and Hewlett-Packard (HP). • PeopleSoft organization was founded and later released a human resource management system. IBM also updated COPICS software to CIM (Computer Integrated Software), continuing the integration effort. • Systems developed during this period became known as Manufacturing

	Requirements Planning (MRP II), which intended to replace several stand-alone enterprise systems into one integrated system.
1990s	• Two major business events during this period included globalization and Year 2000 (Y2K) problem. • MRP II transitioned to ERP systems which could be characterized by real time interaction and integration within and across organizational functions. • Software integration was also aided by client server hardware architecture.
2000s	• Expansion of ERP vendors earlier seen in previous years suffered due to the internet bubble burst of early 2000s. • ERP vendors had to meet this challenge by increasing their product offerings and market share which led to the merger of Oracle, J.D.Edwards, and PeopleSoft.

After the 1990s, organizations had moved beyond mere integration of back – and front – office information systems and started to "…transform themselves from vertically integrated organizations focused on optimizing internal enterprise functions to more-agile, core-competency-based entities that strive to position the enterprise optimally within the supply chain and the value network" (Bond et al., 2000, p. 1). The organizations therefore, shifted to a strategy that sought to have better collaboration with their customers, suppliers, and trading partners.

This shift in strategy led to development of systems that were referred to as extended ERP or ERP II, which included additional modules such as, "CRM (customer relationship management) system functionality that links to customers and SCM (supply chain

management) system functionality that links to vendors" (Weston Jr., 2003, p. 1). ERP II systems can therefore be considered as, "…a business strategy and a set of industry domain-specific applications that build customer and shareholder value by enabling and optimizing enterprise and inter-enterprise, collaborative operational and financial processes" (Bond et al., 2000, p. 1).

In yet another evolution of ERP systems, recent advances in Cloud computing technology have resulted in the development of Cloud ERP systems (Saeed et al., 2011). Instead of organizations having to acquire traditional ERP systems and implement them within company premises, organizations may pay Cloud ERP systems vendors a subscription fee in order to access these systems over the internet. Figure 2 below presents a visual evolution of ERP evolution over the years, starting with inventory control packages of the 1960s.

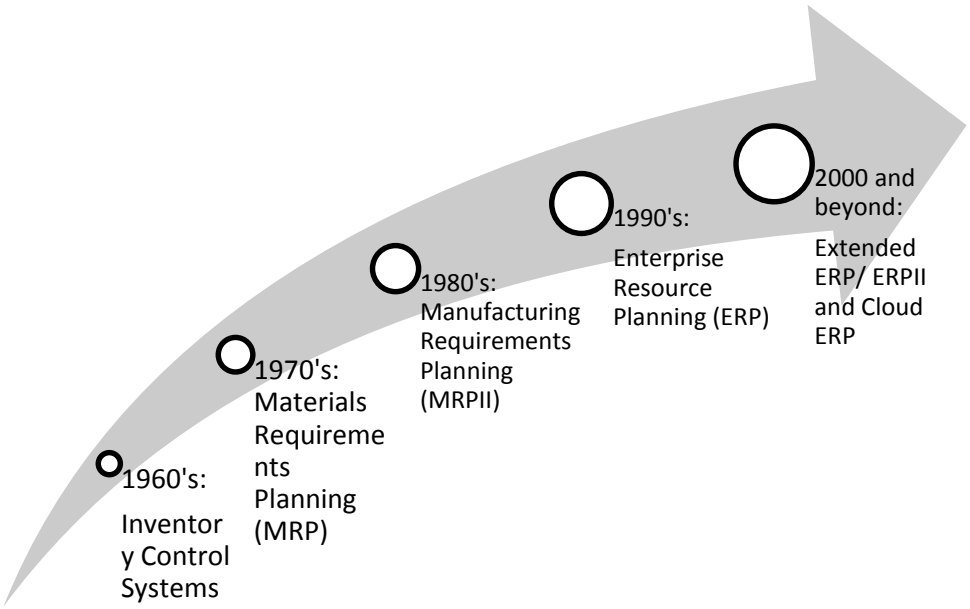


Figure 2. ERP Evolution from Inventory Control Systems to Cloud ERP

Literature on Cloud Computing

Cloud computing is a newer technology whose definition is still evolving, and can be referred to as "…applications delivered as services over the Internet and the hardware and systems software in the data centers that provide those services" (Armbrust et al., 2010, p. 1). Another closely related definition referred to Cloud computing as an IT as a Service (ITaaS), Internet based software development platform, or an enormous data center infrastructure that can be connected over the internet (G. Lin, Fu, Zhu, & Dasmalchi, 2009). Cloud computing is therefore seen as a model of delivering computing resources over the internet, where users are able to access such computing resources offered by cloud vendors for a fee. In the case of ERP software for example, organizations can pay Cloud ERP vendors a subscription fee in order for them to be able to access the software over the internet. Such organizations are relieved of the hefty cost that may be associated with acquisitions of the software, servers, and other hardware equipment that may be required if they purchased and installed the ERP software within company premises.

While acknowledging the need for a clear definition of the emerging technology, the National Institute of Standards and Technology (NIST) broadly defined Cloud computing as "a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction" (Mell & Grance, 2011, p. 6). However, not all computing resources accessed over the internet qualify as Cloud computing. According to the NIST, Cloud computing must have the following five characteristics (Mell & Grance, 2011):

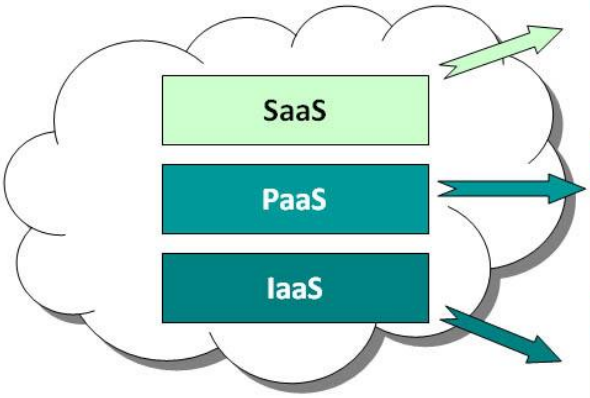
1. On-demand self-service. Consumers have the ability to configure computing resources including server time and storage, whenever such resources are needed without the need for human input from the vendor.
2. Broad network access. Services can be accessed through the internet using different platforms such as workstations, laptops, tablets and mobile phones.
3. Resource pooling. Computing resources such as storage, processing, memory, and network bandwidth can be brought together and shared among different consumers who would be assigned the resources according to their demand.
4. Rapid elasticity. Computing resources appear to be unlimited. This is because the resources that are available to the consumers can be increased or decreased based on the consumer needs.
5. Measured service. Use of resources can be metered according to the type of service, hence providing transparency on consumer usage. Consequently, service users pay only what they use.

In terms of how the services are delivered, Cloud computing is considered to have three distinct delivery models. These three service delivery models include (Armbrust et al., 2010; Mell & Grance, 2011; Wang, Rashid, & Chuang, 2011; Zhang, Yan, & Chen, 2012):

1. Software as a Service (SaaS).
2. Platform as a Service (Paas).
3. Infrastructure as a Service (Iaas).

In SaaS model, users are offered applications by the cloud vendor through the cloud infrastructure. The cloud users are therefore able to access the applications over the network for a fee, using such gadgets as workstations, laptops, tablets, or mobile phones. In PaaS

model, the cloud users are offered the ability, for a fee, to be able to deploy their own applications to the vendor's cloud infrastructure. The vendor controls components of the cloud infrastructure including servers, storage, and operating systems. The user however, may have the ability to configure the hosting environment. The last model, IaaS involves cloud vendors offering users such computing resources as storage, network, and server processing capabilities that may allow users to deploy and run their software, including operating systems and other applications. As with the PaaS and SaaS models, the user has no control of the underlying cloud infrastructure. However, cloud users are able to control deployed applications, operating systems, and storage. They may also be able to configure some network components such as firewalls. The figure below shows the three service models and their purposes.



Who Uses It	What Services are available	Why use it?
Business Users	EMail, Office Automation, CRM, Website Testing, Wiki, Blog, Virtual Desktop ...	To complete business tasks
Developers and Deployers	Service and application test, development, integration and deployment	Create or deploy applications and services for users
System Managers	Virtual machines, operating systems, message queues, networks, storage, CPU, memory, backup services	Create platforms for service and application test, development, integration and deployment

Figure 3. The Different Cloud Computing Service Models

Source: *United States*, n.d., Retrieved January 12, 2013, from http://info.apps.gov/content/what-are-services.

In addition to the cloud characteristics and service delivery models covered above, it is important to mention that clouds come in different types or deployment models. These deployment models include the following (Mell & Grance, 2011):

1. Private cloud. A cloud infrastructure created to be used by a single organization. This cloud infrastructure may be within or outside of the organization premises. The main advantage of private cloud is that the organization retains control of such crucial aspects of the cloud infrastructure affecting data and network security.
2. Public cloud. The cloud infrastructure is run by the cloud provider within the provider's premises where they offer their cloud services to the general public.
3. Community cloud. A cloud infrastructure created to be used by a group of consumers with shared interests. Such a cloud may be run by one of the organization in the group or by a third party and it may be within or outside the organization's premises.
4. Hybrid cloud. Hybrid clouds are cloud infrastructures that are made up of two or more separate infrastructures such as private cloud, public cloud, or community cloud. These clouds are held together by standardized or customized technology that allow them to share computing resources when needed. Figure 4 below shows an example of a hybrid cloud made up of private and public cloud.

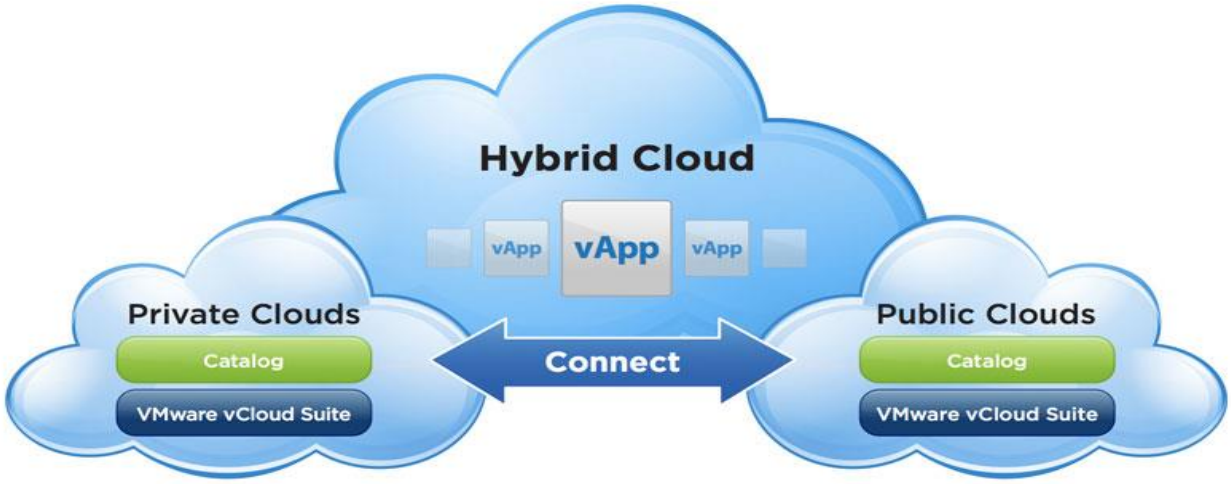


Figure 4. Creating Hybrid Cloud by Connecting Public and Private Cloud

Source: *vmware*, n.d., Retrieved January 12, 2013, from http://www.vmware.com/products/datacenter-virtualization/vcloudconnector/overview.html.

Cloud computing is one of the most important technological shift of the last decade (Wang et al., 2011) and ERP vendors have taken advantage of the technology to have yet another evolution of ERP into Cloud ERP systems. Cloud ERP systems are ERP systems that are offered through the cloud architecture (Saeed et al., 2011). In the context of Cloud computing literature covered in this section, cloud ERP would typically fall in the category of SaaS service delivery model. In this SaaS model, ERP vendors offer customers for a fee, the ability to access ERP software that is deployed though a public cloud. A search on the

internet returns a list of the current Cloud ERP vendors and their products ("ERP Software Comparison," n.d.), as outlined in Table 2 below.

Table 2

Major Cloud ERP Vendors and their Product Offering

Cloud ERP Vendor	Product offered
QAD	• Product: QAD Enterprise Applications. • Specializes in manufacturing industry.
Plex	• Product: Plex systems which include typical ERP modules such as Accounting, HR, and Costing. • Also include manufacturing specific modules, and extended ERP modules such as Business Intelligence (BI), Supply Chain Management (SCM), and Customer Relationship Management (CRM).
NetSuite	• Product: NetSuite • NetSuite is an integrated cloud solution comprising of such components as ERP/Financials, CRM, ecommerce and inventory management.
Epicor	• Product: Epicor ERP (Epicor Manufacturing Express Edition, Epicor Distribution Express Edition) • Epicor ERP offers a complete enterprise solution that includes traditional ERP modules as well as extended modules such as

	Business Intelligence (BI).
IQMS	• Product: EnterpriseIQ. • EnterpriseIQ is an ERP system specializing in the manufacturing industry.
Infor	• Product: Infor Business Cloud. • Infor has several systems that target specific markets: Infor LN, Infor M3, Infor SyteLine, Infor Visual, Infor Adage, and Infor System i.
TGI	• Product: Enterprise 21 ERP. • Enterprise 21 ERP is a fully integrated ERP system that target small and medium enterprises in manufacturing and distribution industry.
Oracle	• Product: Oracle E-Business Suite • Oracle E-Business Suite offers enterprise wide management software on the cloud.
Microsoft Dynamics	• Product: Microsoft Dynamics GP, Microsoft Dynamics AX. • Microsoft Dynamics AX targets midsize and larger size organizations and has capability for multi-language and multi-currency. • Microsoft GP offers out of the box solution for small and midsize organizations.
SAP	• Product: SAP Business by Design, SAP Business One onDemand,. • SAP Business by Design offers end to end enterprise management system targeted for small and medium enterprises as well as subsidiaries of large corporations.

- SAP Business onDemand also offers small business an array of ERP modules that can be deployed on the cloud.

As seen from the table above, there are many cloud ERP vendors offering their products to users. The next section will cover the literature on technology adoption theory that this study will be based on.

Literature on Adoption Theory

Innovation of diffusion. The area of adoption of innovations has received considerable attention from researchers in the past decades. One of these researchers is Rogers (2003) who is credited with the development of innovation of diffusion theory. Rogers (2003) defined innovation as "an idea, practice, or project that is perceived as new by an individual or other unit of adoption" (p. 12). Diffusion on the other hand, is "the process in which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 2003, p. 5). With this definition, even technologies that have long existed in the market can be considered innovative if adopting entities perceive them as new. Adopting these perceived new innovations however, is a long process. As shown in Figure 5 below, the innovation adoption process occurs in five stages (Rogers, 2003):

1. Knowledge. In this stage, individuals or adopting unit become aware of the existing innovation, how it can be used and in some cases, why it functions the way it does.
2. Persuasion. Attitude towards the innovation develop as individuals or adopting unit get to know the innovation.

3. Decision. The decision to adopt or reject the innovation is made.
4. Implementation. Innovation is utilized during this stage.
5. Confirmation. Adoption decision is revisited. Decision to continue utilizing the innovation or discontinue using the innovation is made.

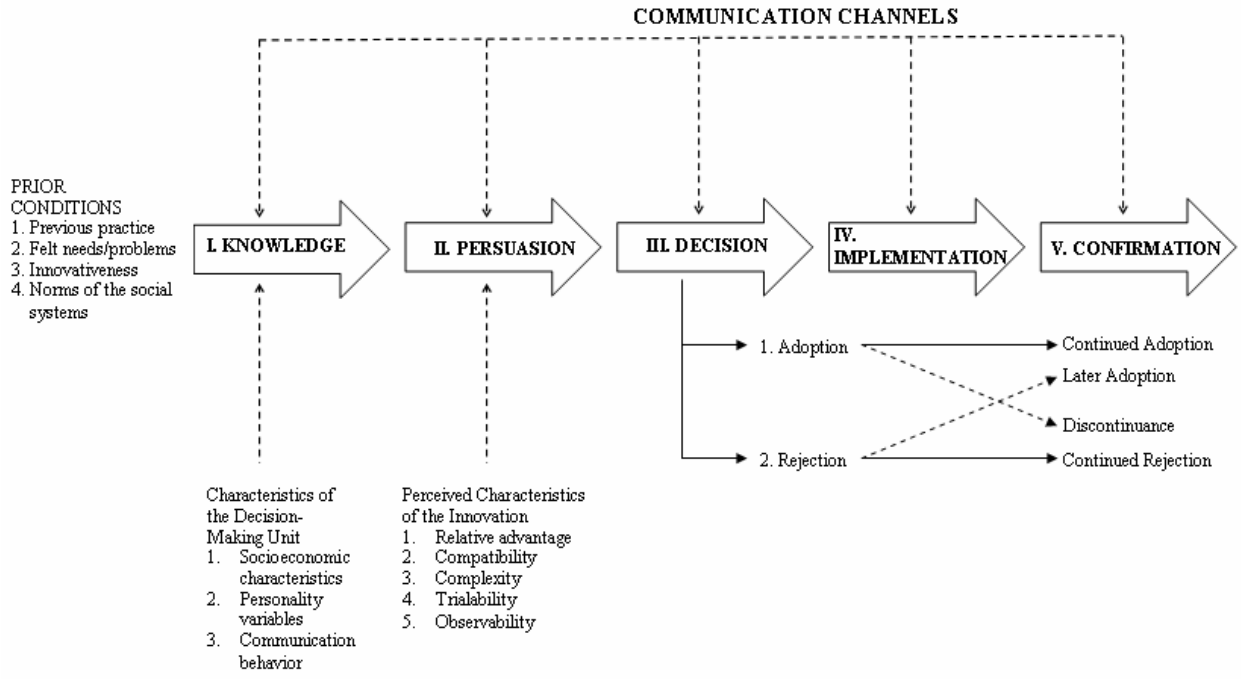


Figure 5. A Model of Five Stages in the Innovation-Decision Process

Source: *Diffusion of Innovations* (p. 170) by E. M. Rogers, 2003, New York, NY: The Free Press.

As it relates to this study, the focus falls within the first three stages where organizations will make the adoption or rejection decision. In addition to the above stages in innovation diffusion process, the innovation diffusion theory identified the following three organization characteristics as predictors of adoption (Rogers, 2003):

1. Leader characteristics. This refers to leader's attitude towards change. Leaders that are open to change may favor adoption of innovations than leaders that are not likely to favor change.
2. Internal characteristics of organization. Include such factors as centralization, complexity, formalization, interconnectedness, organizational slack, and size. Centralization refers to organizational structures whereby decision making authority and control rests with a few individuals, hence negatively affecting innovation adoption. Complexity refers to level of expertise, knowledge and professionalism. Higher level of complexity is suggested to encourage innovation. Formalization refers to the degree of which an organization enforces rules and regulation. Formalization may discourage new ideas and innovations. Interconnectedness refers to the degree of which internal communications are integrated among individuals and organizational units. Interconnectedness is suggested to increase innovation. Slack is defined as the available financial, human and physical resources in an organization and may have a positive relationship with innovation adoption. Lastly, size can be measured in different metrics such as organization's annual income or number of employees. It is suggested that larger organizations are more likely to adopt innovations.
3. External characteristics of organization. This refers to the system openness. Organizations with more interaction with the external environment opens up information flow where organizations may determine the need to adopt innovation in order to survive.

Another addition to the adoption literature from innovation of diffusion theory is the development of innovation attributes. These innovation attributes include, relative advantage, compatibility, complexity, trialability, and observability, characteristics that help alleviate potential adopters uncertainty regarding the innovation (Rogers, 2003).

1. Relative advantage. Relative advantage is defined as "the degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers, 2003, p. 229).
2. Compatibility. Compatibility is defined as "the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" (Rogers, 2003, p. 240).
3. Complexity. In the context of innovation characteristics, complexity is "the degree to which an innovation is perceived as relatively difficult to understand and use" (Rogers, 2003, p. 257).
4. Trialability. Trialability is the "degree to which an innovation may be experimented with on a limited basis" (Rogers, 2003, p. 258).
5. Observability. Observability was defined as "the degree to which the results of an innovation are visible to others" (Rogers, 2003, p. 258).

As it relates to this study, the research model will be grounded in the well-established Technology - Organization - Environment (TOE) framework developed by Tornatzky and Fleischer (1990). The TOE framework however, is consistent with the innovation of diffusion theory (Yoon & George, 2013; Zhu & Kraemer, 2005; Zhu, Kraemer, & Xu, 2003). Further review of the TOE framework is covered in the section that follows.

Technology – organization – environment (TOE) framework. According to Tornatzky and Fleischer (1990), adoption of technology is influenced by factors that can be identified through the technological context, organizational context, and the environmental context. According to the authors, the technological context refers to how organizations make the technology adoption decision based on the availability of the technology and how it fits with the firm's current technology; organizational context looks at the characteristics of the organization such as its structure, quality of human resources, or the extent to which its size impacts the technology adoption decision; and environmental context refers to the arena of a firm's business operation which may include such factors as its industry, competitive pressure, and government regulations. Figure 6 below shows the specific variables within each context as depicted in the TOE framework developed by Tornatzky and Fleischer (1990).

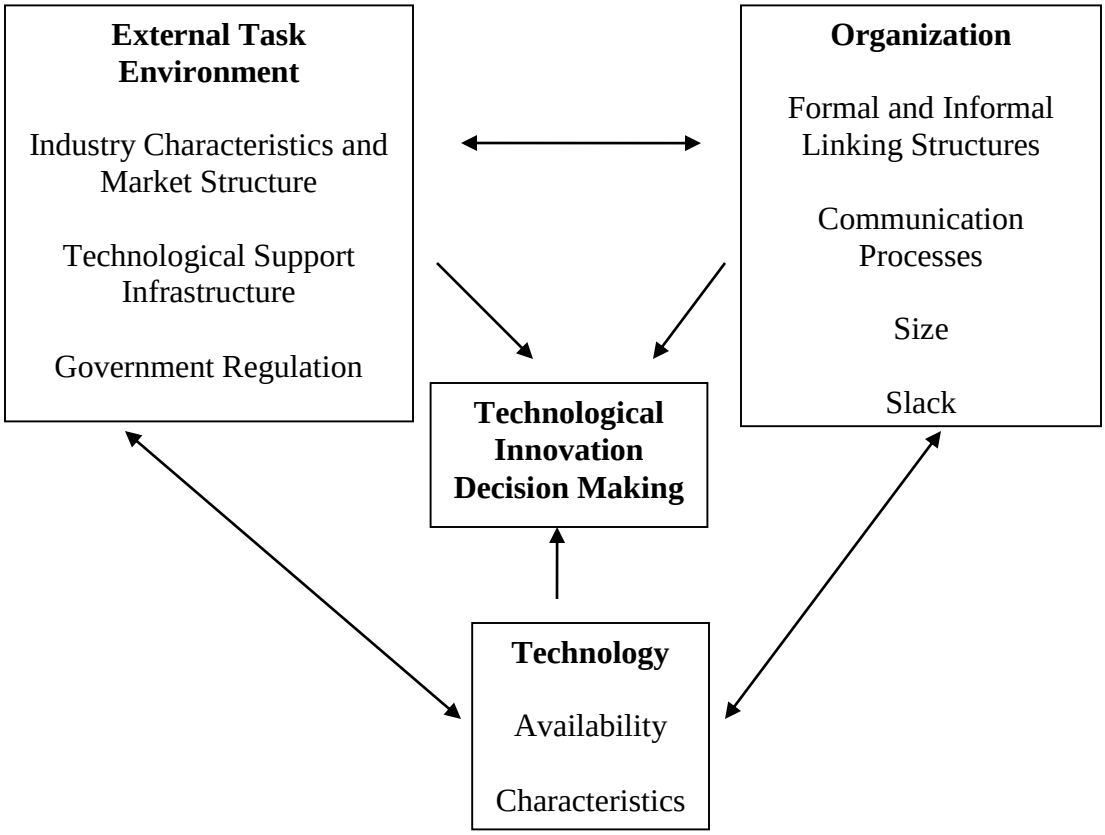


Figure 6. Technology, Organization, and Environment framework

Source: *The Process of Technological Innovation* (p. 153), by L.G. Tornatzky and M. Fleischer, 1990, Lexington, Massachusetts: Lexington Books.

Several researchers have suggested that the TOE framework is consistent with the diffusion of innovation theory (Yoon & George, 2013; Zhu & Kraemer, 2005; Zhu et al., 2003). In addition to the attributes of innovation that were emphasized, Rogers' (2003) diffusion of innovation theory in organizations identified leader characteristics, internal characteristics of organizations, and external characteristics of organizations as the three groups of innovation adoption predictors. Since leader characteristics can be classified as internal organization properties, the innovation diffusion theory contains elements of

technology, internal organization, and external organization factors hence making the theory consistent with the TOE framework (Zhu et al., 2003).

The use of TOE framework as a theoretical foundation in technology adoption studies is widely supported in existing literature (Chang, Hwang, Hung, Lin, & Yen, 2007; Chau & Tam, 1997; Chwelos, Benbasat, & Dexter, 2001; Grover & Goslar, 1993; T. Oliveira & Martins, 2010; Ramdani, Kawalek, & Lorenzo, 2009; Raymond & Uwizeyemungu, 2007; Yoon & George, 2013; Zhu et al., 2003). As shown in Table 3 below, numerous empirical studies have utilized the TOE framework to study specific information systems adoption by organizations. One of the major draw for the use of the TOE framework is its inclusion of the environmental context (Zhu, Kraemer, & Dedrick, 2004) which allows researchers to capture influencing factors emanating from intra-firm interaction.

Table 3

Studies Utilizing the TOE Framework

Studies using TOE Framework			
Sources	**Technological factors**	**Organizational factors**	**Environmental factors**
(Chang et al., 2007)	• Security protection • System complexity	• User involvement • Adequate resources • Firm size • Internal needs	• Vendor support • Government policy

(Chau & Tam, 1997)	• Perceived benefits • Perceived barriers • Perceived importance of compliance to standards, interoperability and interconnectivity	• Satisfaction level with current systems • Complexity of IT infrastructure • Formalization of systems development and management	• Market uncertainty

(Chwelos et al., 2001)	• Perceived benefits	• Organizational readiness
		  ○ Financial resources
		  ○ IT sophistication
		  ○ Trading partner readiness
			• External pressure
			  ○ Competitive pressure
			  ○ Dependency on trading partners
			  ○ Enacted trading partner power
			  ○ Industry pressure

(Dedrick & West, 2003)	• Relative advantage	• IT innovativeness • Strategic	• Available skills • Vendor support

	• Compatibility • Triability	importance of IT • Boundary spanners • Slack	
(Duan, Deng, & Corbitt, 2012)	• Perceived direct benefits • Perceived indirect benefits	• Size • Organization readiness • Top management support	• External pressure
(Grover & Goslar, 1993)	• IS maturity	• Size • Centralization • Formalization	• Environmental uncertainty
(Hu, Chau, & Sheng, 2000)	• Perceived ease of use • Perceived safety • Perceived benefits • Perceived risks	• Organizational readiness	• Service needs
(Iacovou, Benbasat, & Dexter, 1995)	• Perceived benefits	• Organizational readiness	• External pressure
(Jang & Pan, 2008)	• IT infrastructure	• Size	• Internal need

	• Technology readiness	• Perceived benefits	• Competitive pressure • Regulatory policy
(Kuan & Chau, 2001a)	• Perceived direct benefits • Perceived indirect benefits	• Perceived financial cost • Perceived technical competence	• Perceived industry pressure • Perceived government pressure
(Lertwongsatien & Wongpinunwatana, 2003)	• Perceived benefits • Perceived compatibility	• Size • Top management support • Existence of IT department	• Competitiveness
(H.-F. Lin & Lin, 2008)	• IT infrastructure • IS expertise	• Organizational compatibility • Expected benefits	• Competitive pressure • Trading partner readiness
(Low, Chen, & Wu, 2011a)	• Relative advantage • Complexity • Compatibility	• Top management support • Firm size • Technology readiness	• Competitive pressure • Trading partner pressure

(Nelson & Shaw, 2003)	• Relative advantage • Compatibility • Shared business process	• Top management support • Feasibility • Technology conversion	• Competitive pressure • Participation level
(T. S. H. Teo, Ranganathan, & Dhaliwal, 2006)	• Lack of IT infrastructure and expertise • Lack of interoperability • Unresolved technology issues	• Lack of top management support • Problems in project management • Difficulty in organization change • Lack of IT strategy	• Unresolved legal issues • Fear and uncertainty
(T. Oliveira & Martins, 2010)	• Technology readiness • Technology integration	• Firm size • Perceived benefits • Perceived obstacles • Improved products and	• Technology penetration • Competitive pressure

		services	
(Tiago Oliveira & Martins, 2010)	• Perceived benefits • Perceived obstacles	• Technology readiness • Technology integration • Firm size	• Competitive pressure • Trading partner collaboration
(Ramdani et al., 2009)	• Relative advantage • Compatibility • Complexity • Triability • Observability	• Top management support • Organizational readiness • IS expertise • Size	• Industry • Market scope • Competitive pressure • External IS support
(Raymond & Uwizeyemungu, 2007)	• Assimilation of technology	• Size and structure • Type of production • Operations capacity • Innovation capacity • Financial capacity	• Commercial dependence • Networking intensity
(J. Thong, 1999)	• Relative	• Size	• Competition

	advantage • Compatibility • Complexity	• Employee's IS knowledge • Information intensity	
(Yoon & George, 2013)	• Relative advantage • Compatibility • Security concern	• Top management support • Size • Organization readiness • Firm scope	• Mimetic pressure – competitors • Coercive pressure – customers • Normative pressure • Intensity of competition
(Zhu et al., 2003)	• Technology competence	• Firm scope • Firm size	• Consumer readiness • Competitive pressure • Lack of trading partner readiness
(Zhu, Kraemer, & Xu, 2006)	• Technology readiness • Technology integration	• Firm size • Global scope • Managerial obstacles	• Competitive intensity • Regulatory environment
(Zhu & Kraemer, 2005)	• Technology competence	• Size • International	• Competitive pressure

		scope • Financial commitment	• Regulatory support

On reviewing the above studies, it was noted that specific variables within the technological, organizational, and environmental contexts varied from one study to the other. However, such an approach of tailoring and refining theoretical frameworks in order to fit a specific study was considered appropriate since, "innovation adoption decisions must be studied within appropriate contexts and with variables tailored to the specificity of the innovation" (Chau & Tam, 1997, p. 3). Consistent with this approach, factors specific to this study will be explored within the technological, organizational, and environmental factors. These are: (1) Relative Advantage; (2) Compatibility; (3) Security Concern. The organizational factors include: (1) Top Management Support; (2) Organizational Readiness; (3) Size; (4) Centralization; (5) Formalization. The environmental factors include: (1) Competitive Pressure; and (2) Vendor Support.

Technological context.

Relative advantage or Perceived benefits. Relative advantage is defined as "the degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers, 2003, p. 229). Relative advantage and perceived benefits of an innovation are used interchangeably in reviewed literature. Innovations that are perceived to be better than their predecessors will be more likely to be adopted.

This view was empirically supported by the majority of studies reviewed (Chwelos et al., 2001; Dedrick & West, 2003; Duan et al., 2012; Iacovou et al., 1995; Kuan & Chau,

2001a; Tiago Oliveira & Martins, 2010; Ramdani et al., 2009; J. Thong, 1999). In one study however, relative advantage was found to have a negative relationship with cloud adoption technology adoption (Low et al., 2011a). In other studies, no significant relationship was found between relative advantage and studied technology (Chau & Tam, 1997; Nelson & Shaw, 2003; Yoon & George, 2013). The present study posits that organizations that adopted Cloud ERP systems will have a higher level of Relative advantage than organizations that have not adopted Cloud ERP systems.

Compatibility. Compatibility is defined as "the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" (Rogers, 2003, p. 240). Innovations that are perceived as compatible with organization's values and needs are more likely to be adopted.

Indeed, in various technology adoption studies, compatibility of an innovation was found to positively influence its adoption (Dedrick & West, 2003; J. Thong, 1999). Other studies didn't find any significant influence of innovation compatibility (Low et al., 2011a; Nelson & Shaw, 2003; Ramdani et al., 2009; Yoon & George, 2013). In the context of this study, organizations that adopted Cloud ERP systems will have a higher level of Compatibility than organizations that have not adopted Cloud ERP systems.

Security concerns. In a study of Cloud ERP adoption (Saeed et al., 2011), perceived security vulnerabilities and lack of data privacy were considered as some of the factors influencing the system's adoption. Consistent with available literature (Kraemer, Dedrick, Melville, & Zhu, 2006; Yoon & George, 2013), security concern is defined in this study as the degree to which cloud ERP system is perceived as an insecure system for data storage, exchanging data, and performing other business transactions.

For example, potential adopters may perceive the idea of running their ERP system on the cloud platform as a major system vulnerability that can be exploited by hackers. Potential adopters may also be unwilling to let vendors of ERP Cloud systems host data containing their customer's personal records or the organization's business secrets. Some studies however, have found no empirical support regarding the influence of security concern to technology adoption (Chang et al., 2007; Yoon & George, 2013). It is the study's hypothesis that organizations that have adopted Cloud ERP systems will have a lower level of Security concern than organizations that have not adopted Cloud ERP systems.

Organizational context. Factors that will be explored in the organizational context include Top management support, Organization size, Organization readiness, Centralization, and Formalization.

Top management support. According to several technology adoption studies (Duan et al., 2012; Low et al., 2011a; Nelson & Shaw, 2003; Ramdani et al., 2009), top management support has a positive influence on adoption of technology in an organization. There are several reasons why top management support is critical in adoption of technology. First, adopting a new technology may lead to many changes in the organization. Such changes may be met with resistance within the organization. Such resistance however, can be reduced if there is a top management that has a positive attitude towards the technology adoption (Duan et al., 2012). Second, top management would have the authority to decide on whether or not an organization should adopt a new technology. Top management support therefore is important since they can allocate the resources needed for technology adoption (Ramdani et al., 2009, 2009). This study postulates that organizations that have adopted

Cloud ERP systems will have a higher level of Top Management Support than organizations that have not adopted Cloud ERP systems.

Organizational readiness. Organizational readiness refers to the financial and technological resources that are available to an organization (Iacovou et al., 1995). In the context of the present study, organizational readiness is the measure of financial and technological resources available to the organization that can be used towards the adoption of cloud ERP systems. In addition, the present study will posit that organizations that have adopted Cloud ERP systems will have a higher level of Organizational readiness than organizations that have not adopted Cloud ERP systems. This is consistent with reviewed empirical studies (Chwelos et al., 2001; Iacovou et al., 1995; Ramdani et al., 2009; Yoon & George, 2013), which have found Organization readiness to be significant predictors of technology adoption.

The reviewed empirical studies have measured organizational readiness along two sub-constructs: financial readiness and technological readiness. Financial readiness may be an indication of whether the organization has the finances to pay for cloud ERP technology implementation and subsequent costs that may arise after implementation. Technical readiness on the other hand, is a measure of the level of IT sophistication in terms of usage and management (Iacovou et al., 1995). Organizations with more sophisticated IT systems are likely to have the competency and confidence to adopt cloud ERP systems.

Organization size. Size is usually included in studies of technology adoption in organizations, and is "probably a surrogate measure of several dimensions that lead to innovation: total resources, slack resources…employee's technical expertise, organizational

structure" (Rogers, 2003, p. 411). It is therefore possible to interpret the impact of organization size on technology adoption through multiple dimensions.

For example, unlike small organizations, large organizations may have more available resources that can be used to implement new technologies (Tornatzky & Fleischer, 1990), especially financial and technical resources. However, compared to small organizations, large organizations may suffer from inertia (Zhu & Kraemer, 2005), a situation whereby they become less agile and inflexible to adapt quickly (Hitt, Hoskisson, & Ireland, 1990). In that regard, small and medium enterprises (SMEs) may be more likely to adopt new technology than large organizations. However, even in those SMEs, they need to have the resources (such as financial resources and human skills) to be able to adopt new technologies (J. Thong, 1999).

Although several studies have found a positive relationship between technology adoption and size of the organization (Chang et al., 2007; Jang & Pan, 2008; Low et al., 2011a; Ramdani et al., 2009; J. Thong, 1999; Zhu & Kraemer, 2005), another study found organization size and technology adoption to have a negative relationship (Zhu et al., 2006). In accordance to the latter finding, this study will postulate that organizations that have adopted Cloud ERP systems will have smaller size than organizations that have not adopted Cloud ERP systems. This hypothesis is due to the view that although Cloud ERP systems may be more affordable to implement than traditional ERP systems, larger organizations may find it difficult to let a Cloud ERP vendor be responsible for such a critical business system. Since larger organizations may have more resources, they may opt to implement traditional ERP systems within their premises rather than adopt Cloud ERP systems. In addition, larger

organizations that may have already implemented expensive technology may find it difficult to discard investment for something else (Hitt et al., 1990).

Centralization. From the reviewed literature, there were not many recent studies that considered centralization as a factor for technology adoption. From an analysis of existing literature, Tornatzky and Fleischer (1990) had suggested that centralization was related to adoption of innovation but its measurement was somewhat ambiguous in terms of whether it was a measure of process or structure. The authors' analysis had mentioned prior studies that viewed centralization in terms of how decisions were made which is a process interpretation, but the variable was measured in terms of hierarchy and delegation of responsibility which is a structural measurement. In this study, *centralization* is defined as "the degree of decision making concentration" (Grover & Goslar, 1993, p. 4).

Centralization was identified as a dimension of organization structure in a study of organization bureaucracy by Hinnings, Pugh, Hickson, and Turner (1967). Other dimensions of structure identified in the study included specialization, standardization, configuration, flexibility, and formalization (which is covered in the next section below). These dimensions can be explained as follows (Hinings et al., 1967):

1. Specialization, which refers to how labor is divided within the organization.
2. Standardization, which refers to the extent of how roles and activities in the organization are subjected to rules and procedures.
3. Formalization, which indicates the extent of how communications and procedures are written and filed in the organization.
4. Centralization, which refers to how the authority of decision making is concentrated in the organization.

5. Configuration, which refers to the organization's shape, such as seen in the organization's chart.
6. Flexibility, which refers to the ability of effecting change in the organization structure.

In terms of the structural dimensions, this research will only study the influence of centralization and formalization on the adoption of Cloud ERP systems. The present study hypothesized that organizations that have adopted Cloud ERP systems will have a lower level of centralization than organizations that have not adopted Cloud ERP systems. This view is due to the characteristics of highly centralized organizations where decision making tend to be referred towards the top level management (Pugh, Hickson, Hinings, & Turner, 1968). Such a centralized structure may lead to a situation where the decision makers are not aware of the daily operational needs of the various organizational units. In addition, it may become harder to disseminate innovative ideas to the top level management in highly centralized organizations. The view that centralization have a negative influence on technology adoption is supported by prior study (Grover & Goslar, 1993), that also suggested that decentralized organizations are less autocratic and may encourage innovative behavior as compared to highly centralized organizations.

Formalization. As shown in the above sections, formalization as one of the structural dimensions of an organizations, indicates the extent of how communications and procedures are written and filed in an organization (Hinings et al., 1967). It was also defined as the "degree of reliance an organization places on formal rules and procedures" (Grover & Goslar, 1993, p. 5). Some empirical studies have found no impact of formalization on technology adoption (Chau & Tam, 1997; Grover & Goslar, 1993). Such finding is

inconsistent with previous empirical study that found formalization to have a positive relationship with technology adoption (Zmud, 1982).

The present study posited that organizations that have adopted Cloud ERP systems will have a lower level of formalization than organizations that have not adopted Cloud ERP system. Organizations with high level of formalization, as indicated by their high level of reliance on formal rules and procedures, may constrain rather than expand individual behaviors (Zmud, 1982). Instead of encouraging individuals to be more innovative, a high level of formalization may discourage employees from disseminating important information that may positively influence the decision to adopt Cloud ERP systems.

Environmental context. Environmental factors explored in this study include competitive pressure and vendor support.

Competitive pressure. Competitive pressure can be defined as the level of pressure that an organization experiences from competitors in the same industry (Zhu & Kraemer, 2005). This study argues that adopting Cloud ERP systems can offer organizations a vital strategic tool that can allow them to be competitive. Organizations that use information technology can change the rules of competition by altering the rules of the industry as well as be able to outperform their competitors, thus creating a competitive advantage (Porter & Millar, 1985). This study hypothesized that organizations that have adopted Cloud ERP systems will have a higher level of Competitive Pressure than organizations that have adopted Cloud ERP systems.

Vendor support. Vendor support refers to the availability of such things as vendor training regarding their systems and technical support on implementation and usage of cloud ERP system. Vendor support has been found to have a positive influence on technology

adoption (Chang et al., 2007; Dedrick & West, 2003). The present study postulated that Organizations that have adopted Cloud ERP systems will have a higher level of Vendor support.

Hypotheses

Based on the literature review, the following hypotheses were proposed:

H1: Organizations that adopted Cloud ERP systems will have a higher level of Relative Advantage than organizations that have not adopted Cloud ERP systems.

H2: Organizations that adopted Cloud ERP systems will have a higher level of Compatibility than organizations that have not adopted Cloud ERP systems.

H3: Organizations that have adopted Cloud ERP systems will have a lower level of Security Concern than organizations that have not adopted Cloud ERP systems.

H4: Organizations that have adopted Cloud ERP systems will have a higher level of Top Management Support than organizations that have not adopted Cloud ERP systems.

H5: Organizations that have adopted Cloud ERP systems will have smaller size than organizations that have not adopted Cloud ERP systems.

H6: Organizations that have adopted Cloud ERP systems will have a higher level of Organizational Readiness than organizations that have not adopted Cloud ERP systems.

H7: Organizations that have adopted Cloud ERP systems will have a lower level of Centralization than organizations that have not adopted Cloud ERP systems.

H8: Organizations that have adopted Cloud ERP systems will have a lower level of Formalization than organizations that have not adopted Cloud ERP system.

H9: Organizations that have adopted Cloud ERP systems will have a higher level of Competitive Pressure than organizations that have not adopted Cloud ERP systems.

H10: Organizations that have adopted Cloud ERP systems will have a higher level of Vendor Support than organizations that have not adopted Cloud ERP systems.

Figure 7 below shows the proposed research model, representing the variables in technological, organizational, and environmental context that may influence the adoption of Cloud ERP systems.

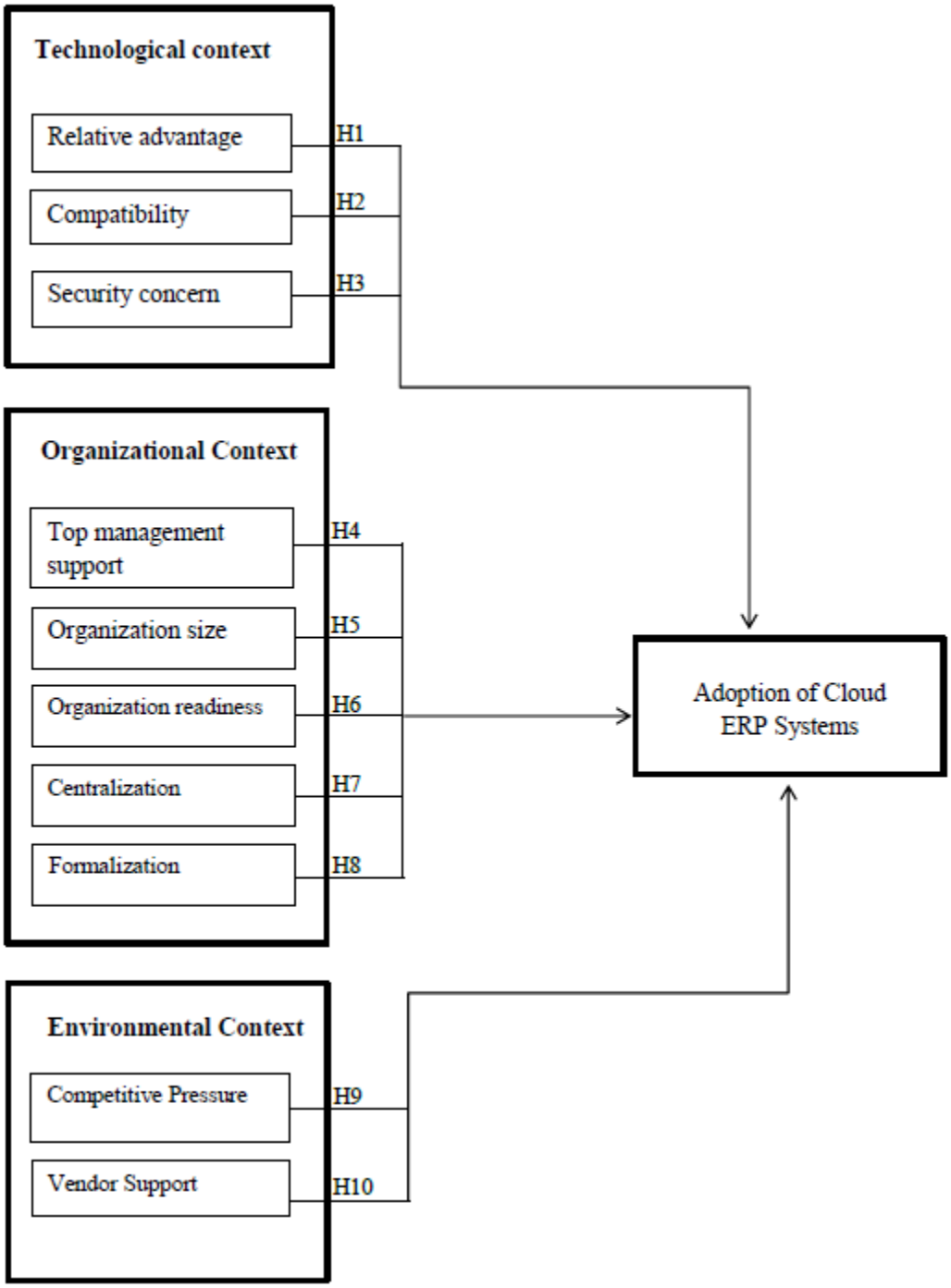


Figure 7. A Research Model for Cloud ERP Systems Adoption

Chapter 3: Methodology

Study Design and Study Type

In order to understand the Technological, Organizational, and Environmental factors that differentiate organizations that adopt Cloud ERP system from the organization that do not adopt Cloud ERP systems, a descriptive research study of cross-sectional design will be performed utilizing a survey to collect data. Descriptive research allows the identification of a phenomenon's characteristics, but "…does not involve changing or modifying the situation *as it is.* It does not involve changing or modifying the situation under investigation, nor is it intended to determine cause-and-effect relationship" (Leedy & Ormrod, 2010, p. 182).

Study Population and Sampling

Convenience sampling was used in this study. The sample was drawn from Survey Monkey's database, a well-known organization that offers survey services. For a fee, Survey Monkey allows individuals or organizations to send surveys to a target audience that has been registered with the company's database. The target audience is offered incentives to participate in surveys, such as donations to their preferred charity organizations and opportunities for sweepstakes entries.

The sample targeted in this study included five hundred and eighty individuals in the United States, who were over the age of eighteen years old and had indicated their job function to be in information technology. As shown in the sample demographic section below, these individuals had varying job titles such as Chief Technology Officer (CTO), Chief Financial Officer (CFO), and Software Developer.

After sending out the survey, 213 responses were received back. Out of these 213 responses, 53 cases were deleted for having incomplete responses. A total of 159 cases were deemed usable for data analysis.

Demographic Characteristics of the Sample

Table 4 below shows the frequency of respondents based on their job titles, the number of employees in the organization and the geographic distribution of the respondents. Out of the 159 respondents, 20.8% were classified as IT Managers or Other Managers, 17.6% as IT Support or Technician, 13.2% as Director or Administrator, 10.7% as IT Analyst, Systems Analyst or Business Analyst, 10.1% as Software Developer or Web Developer, 10.1% as Other, 9.4% as Engineers, 3.1% as Consultant, 2.5% as Owner, CTO, CFO, or Principal, and the remaining 2.5% as undisclosed.

Organizations with more than 10,000 employees had the biggest share of respondents at 34.6%. Other organizations had the following respondents based on the number of employees: 20.8% for those with less than 50 employees, 16.4% for organizations with 101 to 500 employees, 9.4% to organizations with 1,001 to 5,000 employees, 6.3% for organizations with 501 to 1,000 employees, 5.7% for organizations with 51 to 100 employees, and 5.7% for organizations with 5,001 to 10,000 employees.

The respondents were also located throughout the different regions of the United States: 25% from the South Atlantic region, 17.3% from the East North Central region, 15.4% from the Pacific region, 10.3% from the West North Central region, 9% from the West South Central region, 8.3% from the Mountain region, 6.4% from the New England region, 5.1% from the Middle Atlantic region, and 3.2% from the East South Central region.

Table 4

Demographic Characteristics of Survey Respondents

	Frequency	Percent
Job Title Classification		
IT Manager/ Other Manager	33	20.8
IT Support/ Technician	28	17.6
Director/ Administrator	21	13.2
IT Analyst/ System Analyst/ Business Analyst	17	10.7
Other	16	10.1
Software Developer/ Web developer	16	10.1
Network Engineer/ Infrastructure Engineer/ Other Engineer	15	9.4
Consultant	5	3.1
Owner/ CTO/ CFO/ Principal	4	2.5
Undisclosed	4	2.5
Total	159	100.0
Number of Employees		
> 10,000	55	34.6
1 – 50	33	20.8
101 – 500	26	16.4
1001 - 5,000	15	9.4
501 - 1,000	10	6.3
51 – 100	9	5.7
5001 - 10,000	9	5.7
Undisclosed	2	1.3
Total	159	100.0
Location of Respondents		
South Atlantic	39	24.5
East North Central	27	17.0
Pacific	24	15.1
West North Central	16	10.1
West South Central	14	8.8
Mountain	13	8.2
New England	10	6.3
Middle Atlantic	8	5.0
East South Central	5	3.1
Undisclosed	3	1.9
Total	159	100.0

Instrumentation Design

The survey that was used in this study is attached (Appendix C). Measurements for the variable constructs were adapted from existing studies, as shown in Table 5 below. These measurements were modified to fit the study of cloud ERP system adoption.

Table 5

Sources of Construct Operationalization

Construct	Sub-Construct	Sources	Items
Adoption of Cloud ERP		(Son & Benbasat, 2007; Yoon & George, 2013)	3
Technology Context			
Relative Advantage		(Tweel, 2012; Yoon & George, 2013)	4
Compatibility		(T. S. Teo & Pian, 2003; Yoon & George, 2013)	4
Security Concern		(Yoon & George, 2013)	3
Organization Context			
Top Management Support		(Yoon & George, 2013)	3
Organization Size		(J. Y. L. Thong & Yap, 1995)	1
Organization Readiness	IT Sophistication	(Chwelos et al., 2001; Yoon & George, 2013)	8
	Financial	(Chwelos et al., 2001)	2

	Readiness		
Centralization		(Grover & Goslar, 1993)	5
Formalization		(Grover & Goslar, 1993)	2
External Context			
Competitive Pressure		(Premkumar & Roberts, 1999)	2
Vendor Support		(Premkumar & Roberts, 1999)	3

Dependent variable. The first item asked the respondents to state whether their organization had already adopted Cloud ERP system. If their answer was "Yes," no further data was collected on this variable. If they answered "No," the respondents were asked three further questions as adapted from previous studies (Son & Benbasat, 2007; Yoon & George, 2013). A seven-point Likert scale was used to gauge whether the respondent agreed or disagreed with the following two of the three items: (1) Whether their organization intended to adopt Cloud ERP system; and (2) The likelihood that their organization will take steps to adopt Cloud ERP systems in the future. The third item was measured by asking the respondent to state when they thought their organization will adopt cloud ERP state.

Variables in the technology context.

Relative advantage. Relative advantage is measured using four items on a seven-point Likert scale consistent with the study by Yoon and George (2013) and modified to fit the present study. The respondents were asked whether they agreed or disagreed with the following items: (1) Adopting Cloud ERP system will allow better communication with customers; (2) Cloud ERP will increase profitability in the organization; (3) Cloud ERP systems costs less than purchasing traditional ERP systems; (4) Cloud ERP systems will allow the organization to enter new businesses or markets.

Compatibility. A seven-point Likert scale is used to measure compatibility, with respondents asked to state their level of agreement or disagreement regarding the four measurement items posed to them. These measurement items were adapted from prior studies (T. S. Teo & Pian, 2003; Yoon & George, 2013).

The four items included: (1) Whether Cloud ERP system is compatible with their organization's information technology infrastructure; (2) Whether Cloud ERP system is consistent with their organizational beliefs and values; (3) Whether the attitude towards Cloud ERP system adoption in their organization has been favorable; and (4) Whether Cloud ERP system adoption is consistent with their organization's business strategy.

Security concern. Security concern was measured using three reverse-scaled items that were adapted from Yoon and George (2013). One of the items was modified so as to use a seven-point Likert scale, making it consistent with the rest of the measurement items. The respondent was asked whether they agreed or disagreed with the following statements: (1) They are satisfied with the level of security environment in cloud ERP systems; (2) Data is safeguarded from unauthorized changes or use in Cloud ERP systems; (3) Sensitive data is protected from those who should not access to it in Cloud ERP systems.

Organizational context.

Top management support. Top management support items were adapted from Yoon and George (2013). Using a seven-point Likert scale, the respondents were asked to state their level of agreement or disagreement in regards to the following: (1) Top management in their organization is interested in adopting Cloud ERP systems; (2) Cloud ERP system adoption is considered important by the organization's top management; and (3) Top management in their organization has shown support for Cloud ERP system adoption.

Organization readiness. Organization readiness was operationalized to have two sub-constructs. These sub-constructs include (1) IT Sophistication; and (2) Financial Readiness. These sub-constructs are measured as follows:

IT Sophistication. IT Sophistication measurement items were adapted from prior technology adoption studies (Chwelos et al., 2001; Yoon & George, 2013). Eight items were captured by a seven-point Likert scale. The first measurement item asked the respondent to rate the attitude of top management toward the deployment of information technology in their organization.

The other seven measurement items were captured by asking the respondent to rate the level of importance of information technology in fulfilling the following objectives in their organizations: (1) Reduction of operational costs; (2) Productivity improvement; (3) Improved access to information; (4) Improved quality of decision making; (5) Improved competitiveness; (6) Improved service to customers; (7) Personnel reduction.

Financial readiness. Measurement items for Financial readiness were adapted from the previous study by Cheolos et al. (2001). The measurement items were modified into two reverse-scaled items in order to fit this study. On a seven-point Likert scale, the respondents were asked to state the level of significance regarding the following: (1) The financial cost of implementing Cloud ERP system in relation to the overall information systems budget of the organization; (2) The overall information systems budget in relation to the organization's revenue in the prior year.

Organization size. Organization size was measured by asking respondents to state the number of employees in their organization. Respondents were offered seven selections: 1 - 50; 51 - 100; 101 - 500; 501 – 1,000; 1,001 – 5,000; 5,001 – 10,000; >10,000

Centralization. Centralization was measured with five items and consistent with prior study by Grover and Gosler (1993). The items were modified to have a seven-point Likert scale, where respondents were asked to state whether they agreed or disagreed with the following statements: (1) The responsibility of making decisions regarding capital budgeting is centralized at the top levels of management; (2) The responsibility of introducing new products is centralized at the top levels of management; (3) The responsibility of making decisions regarding entry into new major markets is centralized at the top levels of management; (4) The responsibility of making decisions on pricing of major product line is centralized at the top level of management; (5) The responsibility of making decisions regarding hiring and firing of senior staff is centralized at the top levels of management.

Formalization. Formalization was measured with two items adapted from the study by Grover and Goslar (1993). The two items were measured on a seven-point Likert scale, where respondents were asked whether they agreed or disagreed with the following statements: (1) There are procedures to follow in dealing with whatever situation that arises; (2) When rules and procedures exist in the organization, they are usually in written form.

Environmental context.

Competitive pressure. Measurement items for competitive pressure were adapted from prior study of technology diffusion (Premkumar & Roberts, 1999). In the present study, competitive pressure is measured by two items in a seven-point Likert scale. Survey respondents are asked to agree or disagree with whether: (1) They believe they will lose customers if they did not adopt cloud ERP systems; (2) They felt that it is a strategic necessity to use cloud ERP system to compete in the market.

Vendor support. Vendor support measurement items were adapted from Premkumar and Roberts (1999). The respondents were asked to agree or disagree, on a seven-point Likert scale, to the following three items: (1) Technical support for effective use of cloud ERP systems is provided by cloud ERP system vendors; (2) Cloud ERP vendors actively market their technology by providing incentives for adoption; (3) cloud ERP vendors promote their technology by offering free training sessions.

Data-gathering Procedure

Data was collected through an online survey. To facilitate this process, an account was created at Survey Monkey, the website that offers services for researchers to administer online surveys. The questionnaire was then created on the established account. Included in the online questionnaire are all the items that were considered to represent measurements for the identified factors under being studied. In addition to these items, the questionnaire contains request for participants to state their job titles and their organization's primary industry. Identifiable participant data such as names, contacts, and emails was not requested in order to ensure anonymity and confidentiality. The online questionnaire is attached in Appendix C of this document.

Before sending out the survey, academic experts serving in the research project committee were asked to review and offer any feedback regarding the questionnaire. Additionally, approval from the human subjects committee at Eastern Michigan University was requested. Once the data collection process was completed, the data was downloaded into a spreadsheet and loaded into the Statistical Package for Social Sciences (SPSS) software for analysis.

Safety, Confidentiality, and Anonymity for Human Subjects

Due to the nature of this study, the safety of the participants was not a concern. Study participants were only requested to fill out a survey. The survey did not collect personal identifiable data and was coded to ensure confidentiality and anonymity of the subjects. In addition, the data collected will only be used for academic purposes. To ensure that proper guidelines are followed to protect human subjects, a consent agreement was sought from the Human Subject committee, following guidelines set by the Office of Research and Development approval at Eastern Michigan University.

Data Analysis

Out of the 213 responses from the survey, 159 cases were deemed usable and the rest discarded due to missing data. The data was analyzed by using the Statistical Package for the Social Sciences (SPSS) statistical software, version 22. First, a test of scale reliability was performed by determining the Cronbach alpha's internal consistency coefficient. A Cronbach's alpha value of 0.7 is the generally accepted threshold for scale reliability test (source). This test was performed on the ten scales used in this study: Relative Advantage, Compatibility, Security Concern, Top Management Support, Organization Readiness (IT Sophistication and Financial Readiness), Organization Size, Centralization, Formalization, Competitive Pressure, and Vendor Support.

Second, to verify construct validity on the various scales, factor analysis was run. Finally, independent sample t-test was performed on the data in order to determine the differences between the organizations that adopted Cloud ERP systems and the organization that did not adopt Cloud ERP systems based on the TOE factors.

Instrument Validity

The researcher followed several steps to ensure content validity and reliability of the present research instrument. In terms of content validity, the researcher performed exhaustive analysis of technology adoption literature to determine the different variables that have previously been used to measure the subject. These variables were then incorporated into the present study. In addition, input from academic experts involved in the present study was sought to ensure that the various items are appropriately used

Regarding reliability which is a measure of stability and internal consistency of the measurement instrument, an analysis of Cronbach's Alpha was performed to ensure that the results fall within acceptable values. The Cronbach's alpha coefficient value of 0.7 and above is the generally accepted threshold. The study had the following measurement scales: Relative Advantage (4 items), Compatibility (4 items), Security Concern (3 items), Top Management Support (3 items), Organization Readiness (Two sub-scales: IT readiness (7 items) and Financial Readiness (2 items)), Centralization (5 items), Formalization (2 items), Organization Climate (Two sub-scales: Open-mindedness (4 items), Innovation (3 items)), Competitive Pressure (2 items), and Vendor Support (3 items).

As summarized in Table 6 below, all the scales used in this study exceeded the generally accepted Cronbach's alpha coefficient value of 0.7. The Cronbach's alpha for Relative Advantage was 0.904, 0.941 for Compatibility, 0.953 for Security Concern, 0.982 for Top Management Support, 0.896 for Organization Readiness, 0.891 for Centralization, 0.892 for Formalization, 0.959 for Organization Climate, 0.927 for Competitive Pressure, and 0.843 for Vendor Support.

Table 6

Summary of Reliability Statistics for all the Survey Scales

Scale/ Variable	Cases Included	Cases Excluded	Total (N)	Number of Items	Cronbach's Alpha
Relative Advantage	155	4	159	4	0.904
Compatibility	158	1	159	4	0.941
Security Concern	158	1	159	3	0.953
Top Management Support	150	9	159	3	0.982
Organization Readiness	149	10	159	9	0.896
Centralization	154	5	159	5	0.891
Formalization	157	2	159	2	0.82
Organization Climate	157	2	159	7	0.959
Competitive Pressure	157	2	159	2	0.927
Vendor Support	157	2	159	3	0.843

Factor Analysis

Using Principal Component method in SPSS, an exploratory factor analysis was performed on the scales of Relative Advantage, Compatibility, Security Concern, Top Management Support, Organization Readiness, Centralization, Formalization, Organization Climate, Competitive Pressure, and Vendor Support. Although the measurement items used

in this study were adopted from prior studies (Chwelos et al., 2001; Grover & Goslar, 1993; Premkumar & Roberts, 1999; Son & Benbasat, 2007; T. S. Teo & Pian, 2003; J. Y. L. Thong & Yap, 1995; Tweel, 2012; Yoon & George, 2013), none of the scales have been validated in the context of Cloud ERP systems adoption. It is therefore important that exploratory factor analysis be run in order to determine the underlying structure of the various scales in the context of Cloud ERP systems adoption.

Values that were analyzed in this procedure included: Communalities values, Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, Bartlett's test significance, Percent of variance, and the Factor loadings values. Except for one item (ITSORG) in Organization Readiness scale, all the items in all scales had Communalities value of greater than 0.6. Performing factor analysis can be justified if the item has communalities values of more than 0.6 or all the items have average communalities of 0.7 (MacCallum, Widaman, Zhang, & Hong, 1999). Since the average communalities in Organization Readiness scale had a value of .717, and the fact that all the other items in other scales had communalities values greater than 0.6, it is therefore justifiable to perform factor analysis in this study.

In addition to the communalities, the KMO values for the scales should exceed the acceptable values of 0.6 (Kaiser & Rice, 1974; Kaiser, 1974) and have Bartlett's test significance at 0.05 level. As shown in Table 7 below, except for the Formalization and Competitive Pressure scales, all items had high KMO values with a 0.00 level of significance. Also included in the table are the factor loadings for all the items and their percentage of variance. Factor loadings were expected to meet the acceptable threshold of 0.45, which is the suggested value for a sample size of about 150 (Hair, Black, Babin, & Anderson, 2010). As shown in the table, most of the items had high loadings signifying the

strong validity of the measurement scale. The item with the highest factor loading was TOPMG2, with a value of .988 and the item with the lowest factor loading was ITSORG, which had a value of .464. Table 7 below shows the final results of the factor analysis.

Table 7

Results of Factor Analysis for all Scale Items

Scale	Scale Item	Communalities	Factor Loadings	KMO Value	Percent of Variance
Relative Advantage	RA1	.783	.885	0.809	77.71
	RA2	.856	.925		
	RA3	.700	.837		
	RA4	.769	.877		
Compatibility	COMP1	.792	.890	0.845	85.08
	COMP2	.921	.960		
	COMP3	.841	.917		
	COMP4	.850	.922		
Security Concern	SCONC1	.880	.938	0.757	91.392
	SCONC2	.925	.962		
	SCONC3	.937	.968		
Top Management Support	TOPMG1	.955	0.977	0.771	96.562
	TOPMG2	.977	0.988		
	TOPMG3	.965	0.983		
Organization Readiness	ITSORG	.322	.464	0.705	76.117
	ITSORG1	.669	.805		
	ITSORG2	.865	.905		
	ITSORG3	.839	.904		
	ITSORG4	.804	.879		
	ITSORG5	.700	.820		
	ITSORG6	.833	.893		
	FINRDY1	.765	.874		
	FINRDY2	.654	.742		
Centralization	CENTR1	.691	.831	0.83	69.74
	CENTR2	.736	.858		
	CENTR3	.733	.856		
	CENTR4	.735	.857		
	CENTR5	.592	.770		
Formalization	FMLZ1	.847	.921	0.5	84.741
	FMLZ2	.847	.921		
Competitive Pressure	CPRESS1	.932	.965	0.5	93.164
	CPRESS2	.932	.965		
Vendor Support	VSUPP1	.752	.867	0.705	76.117
	VSUPP2	.821	.906		
	VSUPP3	.710	.843		

Group Statistics

To test the hypotheses proposed in this study, independent sample t-test was run in SPSS. The independent variables included in the analysis were: Relative Advantage (S_RADV), Compatibility (S_COMPAT), Security Concern (S_SCONC), Top Management Support (S_TOPMNG), Size (S-Size), Organization Readiness (S_ORGREAD), Centralization (S_CENTR), Formalization (S_FMLZ), Competitive Pressure (S_CPRESS) and Vendor Support (S_VSUPP). There were two groups that were being analyzed: those organizations that had adopted Cloud ERP (shown with a value of 'Yes' in the group statistics table below) and those that had not adopted Cloud ERP systems (value of 'No' in the group statistics table below). Overall, there were a total of 159 cases being analyzed. However, the number of actual cases used in each analysis varied due to some missing values in some of the scales.

The number of cases (N), Mean, Standard Deviation, and standard error of the mean for each independent variable scale is as follows:

Relative advantage. A total of 155 cases were used in the Relative Advantage analysis. This value included 63 cases for organizations that had adopted Cloud ERP systems and 92 cases for those organizations that had not adopted Cloud ERP systems. Other Relative Advantage's group statistics for organizations that adopted Cloud ERP systems included: Mean score of 19.9048, Standard Deviation value of 3.89257, and standard error of the mean value of 0.49042. For organizations that had not adopted Cloud ERP systems, the group statistics were as follows: Mean value of 14.8370, Standard Deviation value of 4.55558, and standard error of the mean value of 0.47495.

Compatibility. Organizations that had adopted Cloud ERP systems had the following group statistics: N value 64, Mean Value of 20.9844, Standard Deviation value of 5.07247, and standard error of the mean value of 0.63406. On the other hand, organizations that had not adopted Cloud ERP systems had the following group statistics: N value of 94, Mean value of 14.9898, Standard Deviation value of 5.05347, and standard error of the mean value of 0.52123.

Security concern. Security Concern had the following group statistics for organizations that had adopted Cloud ERP systems: N value of 64, Mean value of 15.0156, Standard Deviation of 3.60992, and standard error of the mean value of 0.45124. Organizations that had not adopted Cloud ERP systems had an N value of 94, Mean value of 11.2553, Standard Deviation of 3.71262, and standard error of the mean value of 0.38293.

Top management support. Top Management Support had the following group statistics for organizations that had adopted Cloud ERP systems: N value of 59, Mean value of 15.2373, Standard Deviation of 4.49267, and standard error of the mean value of 0.58490. Organizations that had not adopted Cloud ERP systems had an N value of 91, Mean value of 9.8462, Standard Deviation of 4.20297, and standard error of the mean value of 0.44059.

Organization size. Size had the following group statistics for organizations that had adopted Cloud ERP systems: N value of 62, Mean value of 4.9194, Standard Deviation of 2.24921, and standard error of the mean value of 0.28565. Organizations that had not adopted Cloud ERP systems had an N value of 95, Mean value of 3.9789, Standard Deviation of 2.40557, and standard error of the mean value of 0.24681.

Organization readiness. Organization Readiness had the following group statistics for organizations that had adopted Cloud ERP systems: N value of 58, Mean value of

47.8621, Standard Deviation of 5.69533, and standard error of the mean value of 0.74783. Organizations that had not adopted Cloud ERP systems had an N value of 91, Mean value of 43.6593, Standard Deviation of 7.74341, and standard error of the mean value of 0.81173.

Centralization. Centralization had the following group statistics for organizations that had adopted Cloud ERP systems: N value of 61, Mean value of 28.3115, Standard Deviation of 4.83233, and standard error of the mean value of 0.61872. Organizations that had not adopted Cloud ERP systems had an N value of 93, Mean value of 24.8495, Standard Deviation of 6.39284, and standard error of the mean value of 0.66291.

Formalization. Formalization had the following group statistics for organizations that had adopted Cloud ERP systems: N value of 63, Mean value of 10.4921, Standard Deviation of 3.03673, and standard error of the mean value of 0.38259. Organizations that had not adopted Cloud ERP systems had an N value of 94, Mean value of 9.0745, Standard Deviation of 2.59958, and standard error of the mean value of 0.26813.

Competitive pressure. Competitive Pressure had the following group statistics for organizations that had adopted Cloud ERP systems: N value of 63, Mean value of 8.9524, Standard Deviation of 2.88169, and standard error of the mean value of 0.36306. Organizations that had not adopted Cloud ERP systems had an N value of 94, Mean value of 6.1383, Standard Deviation of 2.67043, and standard error of the mean value of 0.27543.

Vendor support. Vendor Support had the following group statistics for organizations that had adopted Cloud ERP systems: N value of 62, Mean value of 15.1452, Standard Deviation of 2.84488, and standard error of the mean value of 0.36130. Organizations that had not adopted Cloud ERP systems had an N value of 95, Mean value of 12.4211, Standard Deviation of 3.14060, and standard error of the mean value of 0.32222.

For further details on the group statistics of the various scales used in the analysis, refer to Table 8 below.

Table 8

Group Statistics of the Various Scale Items as Reported by SPSS

	My organization has already implemented Cloud ERP system	N	Mean	Std. Deviation	Std. Error Mean
S_RADV	Yes	63	19.9048	3.89257	.49042
	No	92	14.8370	4.55558	.47495
S_COMPAT	Yes	64	20.9844	5.07247	.63406
	No	94	14.9894	5.05347	.52123
S_SCONC	Yes	64	15.0156	3.60992	.45124
	No	94	11.2553	3.71262	.38293
S_TOPMNG	Yes	59	15.2373	4.49267	.58490
	No	91	9.8462	4.20297	.44059
S_Size	Yes	62	4.9194	2.24921	.28565
	No	95	3.9789	2.40557	.24681
S_ORGREAD	Yes	58	47.8621	5.69533	.74783
	No	91	43.6593	7.74341	.81173
S_CENTR	Yes	61	28.3115	4.83233	.61872
	No	93	24.8495	6.39284	.66291
S_FMLZ	Yes	63	10.4921	3.03673	.38259
	No	94	9.0745	2.59958	.26813
S_CPRESS	Yes	63	8.9524	2.88169	.36306
	No	94	6.1383	2.67043	.27543
S_VSUPP	Yes	62	15.1452	2.84488	.36130
	No	95	12.4211	3.14060	.32222

Chapter 4: Results

Test of Hypotheses

Additional results of the Independent Samples t-test procedure were analyzed to determine whether the various hypotheses proposed in this study were supported. The sections that follow detail the results of this analysis.

Hypothesis 1.

Organizations that adopted Cloud ERP systems will have a higher level of Relative Advantage than organizations that have not adopted Cloud ERP systems.

The results of the Independent Samples t-test procedure on Relative Advantage (S_RADV) for the two groups (those that adopted Cloud ERP systems and those that didn't) were reviewed to assess the assumption of homogeneity of variance. Levene's Test for Equality of Variances was used to assess whether the two groups met the assumption of equal variances. As shown in Table 9 in the section below, the F test for Relative Advantage was 2.067 at .153 significance level (Sig.,p>.05). Since the F test was not statistically significant (Sig.,p<= .05), the assumption of equality of variance is not violated.

The t-test results for Relative Advantage are shown in Table 10 below. The 'Equal variances assumed' row had a significance (2-tailed) value of 0.000. Since this value is less than the statistically significant level of 0.05, the null hypothesis that there is no statistically significant difference between the two groups based on Relative Advantage is rejected. Furthermore, the results show that the Mean for organizations that adopted Cloud ERP systems (Mean = 19.9048) was higher than that of the organizations that didn't adopt Cloud ERP systems (Mean = 14.8370). Therefore, this finding supports the hypothesis that

Organizations that adopted Cloud ERP systems will have a higher level of Relative Advantage than organizations that have not adopted Cloud ERP systems.

Hypothesis 2.

Organizations that adopted Cloud ERP systems will have a higher level of Compatibility than organizations that have not adopted Cloud ERP systems.

Homogeneity of variance for compatibility between the group that adopted Cloud ERP system and the group that did not adopt Cloud ERP systems was assessed using the Levene's Test for Equality of Variances. As shown in Table 9 in the section below, the F test for Compatibility was .099 at .754 level of significant. Since the F test was not statistically significant (Sig.,p>.05), the assumption of equality of variance between the two groups is not violated.

Table 10 below shows the t-test results for Compatibility (S_COMPAT). The t-test values from the 'Equal variances assumed' row show a statistically significant (2-tailed) value of 0.000. Thus, the null hypothesis that there is no statistically significant difference between the groups based on Compatibility is rejected. The results indicate that differences between means of the organizations that adopted Cloud ERP systems (Mean = 20.9844) and those organizations that didn't adopt Cloud ERP systems (Mean = 14.9894) may be attributed to changes in Compatibility. The hypothesis that organizations that adopted Cloud ERP systems will have a higher level of compatibility than organizations that have not adopted Cloud ERP systems, is therefore supported by these findings.

Hypothesis 3.

Organizations that have adopted Cloud ERP systems will have a lower level of Security Concern than organizations that have not adopted Cloud ERP systems.

Levene's Test for Equality of Variances was used to test the homogeneity of variance for Security Concern (S_SCONC) between the organizations that adopted Cloud ERP systems and those organizations that did not adopt Cloud ERP systems. Table 9, containing these values is shown in the section below. The Levene's Test for Equality of Variances for Security Concern had an F test value of 0.038 at .846 level of significant. Since this value was not statistically significant at .05, it is apparent that the assumption of homogeneity of variance was not violated. Table 10 below shows the other t-test values, which show a statistically significant (2-tailed) value of 0.000 for Security Concern.

Based on these results, the null hypothesis that there is no statistically significant difference between the two groups based on Security Concern is rejected. Further analysis from group statistics showed that organizations that adopted Cloud ERP systems had a higher Mean (Mean = 15.0156) than organizations that didn't adopt Cloud ERP systems (Mean = 11.2553). Therefore, the hypothesis that organizations that have adopted Cloud ERP systems will have a lower level of Security Concern than organizations that have not adopted Cloud ERP systems is not supported.

Hypothesis 4.

Organizations that have adopted Cloud ERP systems will have a higher level of Top Management Support than organizations that have not adopted Cloud ERP systems.

The Levine's Test for Equality of Variances had an F test of 0.143 and significance value of 0.706 for Top Management Support (S_TOPMNG). Table 9, containing these values

is shown in the section below. Since this value was not statistically significant at .05, the homogeneity of variance assumption was not violated. Table 10 below shows the other t-test values, which shows a statistically significant (2-tailed) value of 0.000 for Top Management Support.

Due to these results, the null hypothesis that there is no statistically significant difference between the two groups based on Top management Support is rejected. Additionally, organizations that adopted Cloud ERP systems had a higher Mean (Mean = 15.2373) than organizations that didn't adopt Cloud ERP systems (Mean = 9.8462). Therefore, the hypothesis that organizations that have adopted Cloud ERP systems will have a higher level of Top Management Support than organizations that have not adopted Cloud ERP systems is supported.

Hypothesis 5.

Organizations that have adopted Cloud ERP systems will have smaller size than organizations that have not adopted Cloud ERP systems.

Size (S_Size) had an F test of 0.758 and significant value of 0.385 in the Levine's Test for Equality of Variances. The results of this test are on Table 9 in the section below. Due to the fact that the F test was not statistically significant at 0.05, the assumption of homogeneity of variance between the two groups was not violated.

As shown in Table 10 below, the significant (2-tailed) value was 0.015. Since this value is within the statistically significant value of 0.05, the null hypothesis that there is no difference due to size between the group that adopted Cloud ERP system and the group that didn't is rejected. Additionally, the group statistics for size showed that organizations that adopted Cloud ERP system had a higher Mean (4.9194) than organizations that did not adopt

Cloud ERP systems (Mean = 3.9789). Based on these results, the hypothesis that organizations that have adopted Cloud ERP systems will have smaller size than organizations that have adopted Cloud ERP systems is not supported.

Hypothesis 6.

Organizations that have adopted Cloud ERP systems will have a higher level of Organizational Readiness than organizations that have not adopted Cloud ERP systems.

The Levine's Test for Equality of Variances had an F test of 5.628 and significance value of 0.019 for Organization Readiness (S_ORGREAD), as shown in Table 9 in the section below. Since the F value was statistically significant (Sig.,<=0.5), equal variances is not assumed between the group that adopted Cloud ERP system and the group that did not adopt Cloud ERP based on Organization Readiness. While doing further analysis on the t-test, values from the 'Equal variances not assumed' row from SPSS will be used. These values are shown on Table 10 below.

Using the 'Equal variances not assumed' row, the t-test had a significance (2-tailed) value of .000, signifying that the null hypothesis that there is no statistical differences between the group that adopted Cloud ERP and the group that did not adopt Cloud ERP system based on changes to Organization Readiness, can be rejected. The significant (2-tailed) value was .000, indicating that there is statistical significance that the two groups are different based on Organization Readiness. Since the group that adopted Cloud ERP system had a higher mean (47.8621) than the group that did not adopt Cloud ERP system (43.6593), the proposed hypothesis is supported. Organizations that have adopted Cloud ERP systems will have a level of Organization Readiness than Organizations that did not adopt Cloud ERP systems.

Hypothesis 7.

Organizations that have adopted Cloud ERP systems will have a lower level of Centralization than organizations that have not adopted Cloud ERP systems.

The Levine's Test for Equality of Variances for Centralization (S_CENTR) had an F test of 3.743 and significance value of 0.06 (rounded to two decimal points). These results are shown in Table 9 in the section below. Since the F value was not statistically significant, equal variances is assumed between the group that adopted Cloud ERP system and the group that did not adopt Cloud ERP based on Centralization. See Table 10 below for these values.

Based on the 'Equal variances assumed' row, Centralization had a significant (2-tailed) value of 0.000. Since this value is statistically significant, the null hypothesis that there is no statistical difference between the group that adopted Cloud ERP system and the group that did not adopt Cloud ERP system based on changes in Centralization is rejected. Furthermore, the organizations that adopted Cloud ERP systems had a higher mean (28.3115) than those organizations that did not adopt Cloud ERP systems (24.8495). Therefore, the hypothesis that organizations that have adopted Cloud ERP systems will have a lower level of Centralization than organizations that adopted Cloud ERP systems is not supported.

Hypothesis 8.

Organizations that have adopted Cloud ERP systems will have a lower level of Formalization than organizations that have not adopted Cloud ERP system.

Formalization (S_FMLZ) had F test of 2.129 with significance value of .147 in the Levine's Test for Equality of Variances. These values are shown on Table 9 in the section below. Due to the lack of statistical significance of the Levine's Test for Equality F test, equal variance is assumed between the group that adopted Cloud ERP and the group that did

not adopt Cloud ERP based on Formalization. Table 10 below provides the other t test values from the analysis procedure.

As shown in the table above, the 'Equal variances assumed' row had a significant (2-tailed) value of .002, which indicate that the null hypothesis that there is no statistical difference between the group that adopted Cloud ERP and the group that did not adopt Cloud ERP based on Formalization, can be rejected. Additionally, organizations that adopted Cloud ERP systems had a higher mean (10.4921) than the group that did not adopt Cloud ERP systems (9.0745). Therefore, the hypothesis that organizations that have adopted Cloud ERP systems will have a lower level of Formalization than organizations that did not adopt Cloud ERP systems is not supported.

Hypothesis 9.

Organizations that have adopted Cloud ERP systems will have a higher level of Competitive Pressure than organizations that have not adopted Cloud ERP systems.

Competitive Pressure (S_CPRESS) had F test of 0.009 with significance value of 0.926 in the Levine's Test for Equality of Variances. These values are shown on Table 9 in the section below. Since the F test of Levine's Test for Equality is not statistically significant, equal variances is assumed between the group that adopted Cloud ERP systems and the group that did not adopt Cloud ERP system based on Competitive Pressure.

Table 10 below shows that Competitive Pressure had a significant (2-tailed) value of 0.000, which is a statistically significant value. Therefore, the null hypothesis that there is no statistical difference due to Competitive Pressure between the group that adopted Cloud ERP systems and the group that did not adopt Cloud ERP systems is rejected. Additionally, organizations that adopted Cloud ERP systems had a higher mean (8.9524) than

organizations that did not adopt Cloud ERP systems (6.1383). Therefore, the hypothesis that organizations that adopted Cloud ERP systems will have a higher level of competitive pressure than organizations that adopted Cloud ERP systems is supported.

Hypothesis 10.

Organizations that have adopted Cloud ERP systems will have a higher level of Vendor Support than organizations that have not adopted Cloud ERP systems.

The Levine's Test for Equality of Variances for Vendor Support (S_VSUPP) had an F test of 1.171 and significance value of 0.281. These results are shown in Table 9 in the section below. Since the F value was not statistically significant, equal variances is assumed between the group that adopted Cloud ERP system and the group that did not adopt Cloud ERP systems based on Vendor Support

The 'Equal variances assumed' value shown in Table 10 below had a significant (2-tailed) value of 0.000, which indicate that the null hypothesis that there is no statistical difference between the group that adopted Cloud ERP systems and the group that did not adopt Cloud ERP systems can be rejected. Furthermore, the group statistics for Vendor Support had shown that organizations that adopted Cloud ERP systems had a higher Mean (15.1452) than the group that did not adopt Cloud ERP systems (12.4211). Therefore, the hypothesis that organizations that have adopted Cloud ERP systems will have a higher level of Vendor Support than organizations that did not adopt Cloud ERP systems is supported.

Table 9

Levine's Test for Equal Variances output for All Survey Scales

	Levene's Test for Equality of Variances	
	F	Sig.
S_RADV	2.067	0.153
S_COMPAT	0.099	0.754
S_SCONC	0.038	0.846
S_TOPMNG	0.143	0.706
S_Size	0.758	0.385
S_ORGREAD	5.628	0.019
S_CENTR	3.743	0.055
S_FMLZ	2.129	0.147
S_CPRESS	0.009	0.926
S_VSUPP	1.171	0.281

Table 10

Results of the Independent Sample T Test Analysis for All Scale Items

	Mean					
Adopted Cloud ERP	Yes	No	T	df	std. Error Difference	Sig (2-tailed)
S_RADV	19.9048	14.837	7.208	153	0.70306	0.000
S_COMPAT	20.9844	14.9894	7.309	156	0.82021	0.000
S_SCONC	15.0156	11.2553	6.32	156	0.595	0.000
S_TOPMNG	15.2373	9.8462	7.468	148	0.72188	0.000
S_SIZE	4.9194	3.9789	2.456	155	0.3829	0.015
S_ORGREAD	47.8621	43.6593	3.563	144	1.1037	0.000
S_CENTR	28.3115	24.8495	3.606	152	0.96006	0.000
S_FMLZ	10.4921	9.0745	3.129	155	0.45309	0.002
S_CPRESS	8.9524	6.1383	6.269	155	0.44888	0.000
S_VSUPP	15.1452	12.4211	5.511	155	0.49431	0.000

Chapter 5: Discussion of the Results

The purpose of this study was to determine whether differences existed between organizations that adopted Cloud ERP systems and organizations that did not adopt Cloud ERP systems based on their technological (Relative Advantage, Compatibility, and Security Concern), organizational (Top Management Support, Organization Readiness, Organization Size, Centralization, and Formalization), and environmental (Competitive Pressure, and Vendor Support) factors. Table 11 below shows a list of the hypotheses that were proposed in this study. The results of the hypotheses testing are also displayed, showing whether the proposed hypothesis was supported or rejected.

Table 11

Results of the Hypotheses Testing

No.	Proposed Hypothesis	Supported/ Not Supported
1	Organizations that adopted Cloud ERP systems will have a higher level of Relative Advantage than organizations that have not adopted Cloud ERP systems.	Supported
2	Organizations that adopted Cloud ERP systems will have a higher level of Compatibility than organizations that have not adopted Cloud ERP systems.	Supported
3	Organizations that have adopted Cloud ERP systems will have a lower level of Security Concern than organizations that have not adopted Cloud ERP systems.	Not Supported
4	Organizations that have adopted Cloud ERP systems will have a higher	Supported

	level of Top Management Support than organizations that have not adopted Cloud ERP systems.	
5	Organizations that have adopted Cloud ERP systems will have smaller size than organizations that have not adopted Cloud ERP systems.	Not Supported
6	Organizations that have adopted Cloud ERP systems will have a higher level of Organizational Readiness than organizations that have not adopted Cloud ERP systems.	Supported
7	Organizations that have adopted Cloud ERP systems will have a lower level of Centralization than organizations that have not adopted Cloud ERP systems.	Not Supported
8	Organizations that have adopted Cloud ERP systems will have a lower level of Formalization than organizations that have not adopted Cloud ERP system.	Not Supported
9	Organizations that have adopted Cloud ERP systems will have a higher level of Competitive Pressure than organizations that have adopted Cloud ERP systems.	Supported
10	Organizations that have adopted Cloud ERP systems will have a higher level of Vendor Support than organizations that have not adopted Cloud ERP systems.	Supported

Technological Context

Factors in the technological context included: (1) Relative Advantage of cloud ERP system; (2) Compatibility of cloud ERP system with existing systems; and (3) Security Concern of cloud ERP system environment. Of the three hypotheses proposed in the

technological context, hypotheses for relative advantage and compatibility were supported by the data. Hypothesis for security concern was not supported.

Relative advantage has been defined as "…the degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers, 2003, p 229). As it relates to the current study, organizations that adopted Cloud ERP systems had a higher score of relative advantage than organizations that did not adopt Cloud ERP systems. These results are consistent with prior research (Chwelos et al., 2001; Dedrick & West, 2003; Duan et al., 2012; Iacovou et al., 1995; Kuan & Chau, 2001b; Tiago Oliveira & Martins, 2010; Ramdani et al., 2009; J. Thong, 1999), which had found relative advantage to be a significant predictor of technology adoption. In the studies, relative advantage was thought to have a positive influence on the adoption of the various technologies. The results of the current study indicate that organizations that adopted Cloud ERP systems had higher perception on the benefits of adopting the systems. The perceived benefits included enhanced communication with customers, increased profitability, reduced cost of implementation compared to other ERP systems, and ability to access new markets (See Appendix D for item results).

Similar to relative advantage, compatibility was found to be higher in organizations that adopted Cloud ERP systems than in the organizations that did not adopt the systems. Compatibility is the "degree to which an innovation is perceived as consistent with the existing value, past experiences, and needs of potential adopters" (Rogers, 2003, p 240). The results of compatibility in this study are also consistent with prior research findings (Dedrick & West, 2003; J. Thong, 1999), where the factor was found to have a positive relationship with technology adoption.

It was surprising that the security concern hypothesis was not supported. The study had hypothesized that organizations that adopted Cloud ERP systems will have a lower level of security concern than organizations that adopted Cloud ERP systems. The study results showed the opposite; where security concern was actually higher for the organizations that adopted Cloud ERP systems than for organizations that did not. Prior studies on the impact of security concern on technology adoption have had mixed results. In a study of electronic healthcare in Taiwan, the issue of security concern was not considered to have any significant relationship on the technology adoption (Chang et al., 2007). However, this study was specific to electronic healthcare adoption in Taiwan and the results may have been different if the study was in a different country. Another study did not find any significant influence of security concern while adopting virtual worlds (Yoon & George, 2013). As stated by the author, respondents may have viewed virtual worlds more as a social community than a business technology, which may have altered their perception. It is likely that respondents have a different perception of Cloud ERP systems as opposed to other web based systems**.** Such a different perception may emanate from the fact that a Cloud ERP system may be connected to many vital functions of an organization, such as sales, customer service, finance, or production. Failure of the Cloud ERP system may therefore be more destructive to the operations of an organization than would other web based systems.

In a prior study, security concern was suggested as a barrier to Cloud ERP system adoption (Saeed et al., 2011). Since the Cloud ERP systems are hosted and accessed over the internet, data and transactions may be perceived to be vulnerable to unauthorized access and use. However, such concerns are not supported in this study. The results may be explained by the fact that Cloud ERP systems vendors provide technical expertise, which include ensuring

the safety and availability of the systems. In addition, Cloud computing services allow organizations to better control their network access, using web based interfaces (Marston, Li, Bandyopadhyay, Zhang, & Ghalsasi, 2011). With this perspective, it makes sense that organizations that have a higher security concern would adopt Cloud ERP systems.

Organizational Context

The organizational context included the following factors: (1) Top Management Support; (2) Organizational Readiness; (3) Centralization of the organization; (4) Formalization of the organization. Hypotheses for top management support and organization readiness were supported by the data analysis results. However, the hypotheses for organization size, centralization, and formalization were not supported.

In prior studies, top management support has consistently been shown to have a positive influence in the adoption of technology (Duan et al., 2012; Low, Chen, & Wu, 2011b; Nelson & Shaw, 2003; Ramdani et al., 2009). The obvious reasons for this is because top management usually have the final say on what technology the organization will adopt, they can allocate the necessary resources that are needed for the adoption, and may ensure that there is less resistance to organization changes that the new technology may bring.

In addition to top management support, the organization readiness hypothesis was also supported in the study. Organization readiness can be referred to as the level of financial and technological resources that are available to an organization (Iacovou et al., 1995). In the current study, organizations that had adopted Cloud ERP systems were found to have a higher level of organization readiness. Previous research had shown organization readiness to have a positive relationship with technology adoption (Chwelos et al., 2001; Iacovou et al., 1995; Ramdani et al., 2009; Yoon & George, 2013). The results from this study confirms the

expectation that organizations that have more financial resources, IT sophistication, and knowledge to use Cloud ERP systems, ended up adoption the technology.

Contrary to the proposed hypothesis, organizations that adopted Cloud ERP systems had larger Mean sizes than organizations that did not adopt Cloud ERP systems. Literature on the impact of organization size on technology adoption has shown mixed results. In one study, organization size was found to negatively influence the adoption of new innovations (Zhu et al., 2006), while others found size to have a positive relationship with technology adoption (Chang et al., 2007; Jang & Pan, 2008; Low et al., 2011b; Ramdani et al., 2009; J. Thong, 1999; Zhu & Kraemer, 2005). Size may be an indication of other characteristics of an organization such as availability of resources, which allow the organization the ability to adopt Cloud ERP systems. However, size is also "likely to lead directly to economies of scale which enhance the feasibility of innovation adoption. Larger organizations process input in sufficient volume to justify adoption of new technology to accommodate variations in input even when variations occur infrequently (Moch & Morse, 1977, p. 3). This direct impact of size on technology adoption may explain why organizations that adopted Cloud ERP systems had a higher Mean size than organizations that did not adopt Cloud ERP systems.

Organization size can also impact structure (measured in this study as level of centralization and formalization of the organization), since it "…allows organizations to more finely differentiate tasks (functional differentiation) and personnel (specialization)" (Moch & Morse, 1977, p. 3). Larger organizations may be able to afford and encourage their employees to specialize on specific skills such as accounting, sales, finance, or inventory control. The organizations may also establish departments around these functions such as

accounting, finance, or inventory control. Interestingly, ERP systems were designed with this kind of structure in mind, where it integrates the different kinds of organization's functional department into a single information system (Muscatello et al., 2003), and hence ensuring availability of accurate and timely information that can be used by decision makers.

Centralization, as a measure of the degree of decision making concentration, have been found to have a negative relationship with technology adoption (Grover & Goslar, 1993). In the present study however, and contrary to the proposed hypothesis on organization size, organizations that adopted Cloud ERP systems had a higher level of centralization than organizations that did not adopt Cloud ERP systems. This result may be due to the design nature of ERP systems, which complements a more centralized organizational structure. Organizations that have a higher level of centralization, may have found Cloud ERP systems to be a better fit for their existing organization structure.

In regards to formalization, it was defined in this study as the degree of reliance that organizations places on formal rules and procedures (Grover & Goslar, 1993). Some studies have found no statistical significance of formalization and technology adoption (Chau & Tam, 1997; Grover & Goslar, 1993), while another found formalization to have a positive relationship with technology adoption (Zmud, 1982). The statistical significance of formalization in latter study is consistent with the findings in the present study. However, contrary to the proposed hypothesis that adopting organization will have less level of formalization, the results showed the opposite to be the case. Organizations that adopted Cloud ERP systems had higher level of formalization than the non-adopting organizations. Similar to centralization, the nature of ERP system design may offer an explanation as to why this is the case. One key element of ERP systems is its ability to integrate firm wide

processes and standardize common data and business practices across the organization (Nah, Lau, & Kuang, 2001). For organizations that emphasize on having rules and procedures, adopting a Cloud ERP system will therefore be a good fit since such capabilities are embedded into the system.

Environmental Context

The environmental factors included: (1) Competitive Pressure; and (2) Vendor Support. Proposed hypotheses for competitive pressure and vendor support were supported by the data analysis results.

Competitive pressure refers to the level of pressure that an organization experiences from competitors in the same industry (Zhu & Kraemer, 2005), and has previously been shown to influence the adoption of technology (Iacovou et al., 1995). Organization may adopt Cloud ERP systems with the view that the technology will be a vital strategic tool that can help them compete in the market. Indeed, when organizations use information technology, they can gain a competitive advantage by changing the rules of competition in the industry and may be able to outperform their competitors (Porter & Millar, 1985). To avoid being outperformed, organizations may also adopt the technologies that are being adopted by the competitors. With this view, it is therefore not surprising that organizations that adopted Cloud ERP systems had a perceived a higher level of competitive pressure.

Regarding vendor support, the result of this study is consistent with prior research that had a significant relationship between vendor support and technology adoption (Chang et al., 2007; Dedrick & West, 2003). In the current study, respondents were asked whether they thought Cloud ERP system vendors offered free training sessions, technical support, or incentives for Cloud ERP systems adoption. Since Cloud ERP systems is a relatively new

technology, vendor support can be a vital factor that encourages adoption. Through free training sessions, vendors can take the opportunity to showcase their system capabilities. They can also use the opportunity to show their deep technical knowledge, which can convince potential adopters of the available vendor support during implementation and ongoing basis in case they adopted the systems.

Practical Implications

The purpose of this study was to determine the differences between the organizations that adopted Cloud ERP systems and the organizations that did not adopt Cloud ERP systems, based on the technological, organizational and environmental factors. The results of the data showed that all the TOE factors were statistically significant predictors of Cloud ERP systems adoption. There are various practical implications from the study results.

As vendors of Cloud ERP systems, the study results offer an insight regarding the important factors that may influence adoption of their systems. Vendors may gain more customers if they addressed the factors that were found to be inhibiting adoption. For example, the study showed that organizations that adopted Cloud ERP systems had a higher score on vendor support than the non-adopting organizations. It may be the case that vendors can offer more free training regarding their systems, provide further incentives to encourage adoption of their systems, and provide more technical support during implementation and on an ongoing basis. Other such area of improvement included the concern with security. Organizations that adopted Cloud ERP systems perceived the systems to be more secure than the non-adopting organizations. This may be more an issue with perception than actual reality. Regardless, there is an opportunity for vendors to gain more customers if they are

able to convince potential adopters that Cloud ERP system environment is secure and that data is protected from unauthorized access and use.

Based on the results from this study, organizations should review their organization characteristics and competitive strategies. It is important that organizations adopt information technology that can be a good strategic tool to help them remain competitive in the market. By using the TOE factors used in this study, organization would be able to determine the factors that inhibit them from adopting Cloud ERP systems. One potential area of improvement may be in how the organization is structured. The study showed that the organizations that adopted Cloud ERP systems had higher levels of centralization and formalization than organizations that did not adopted Cloud ERP systems. It may be the case that more centralized and highly formalized organizations had organizational procedures and knowledge that allowed them to recognize emerging innovations and their potential in supporting the organizations' goals.

Implications to Theory

The research in this study was grounded in the Technology-Organization-Environment (TOE) framework developed by Tornasky and Fleischer (1990). The TOE framework has been considered to be consistent with the diffusion of innovation theory (Yoon & George, 2013; Zhu & Kraemer, 2005; Zhu et al., 2003). These theories were reviewed earlier in this study in the 'Literature on Adoption Theory' section. There are two major implications to theory based on the results of this study.

First, the study confirms the relevancy of the TOE theory in the study of Cloud ERP systems adoption. Although this theory has been in numerous other studies of adoption of various technologies (see Table 3 for studies utilizing the TOE framework), there is only

prior instance where it was used to study Cloud ERP system adoption (Saeed et al., 2011). The present study therefore, adds to this scant literature. Second, the study offered a discovery of statistically significant factors that are relevant to Cloud ERP systems adoption. These factors can be incorporated in future Cloud ERP systems adoption studies.

Limitations and Future Studies

The data used in this study was collected using an online survey of individuals that identified themselves as working in an IT job throughout the United States of America. It was assumed that they truthfully identified themselves to be knowledgeable in Cloud ERP systems. Since the study is based on perceptions, the data is only as accurate as the perception of the respondents. Future researchers may replicate this study in order to determine the consistency of the results.

In addition, the study did not aim to research any particular industry or a specific Cloud ERP system. Results may vary based on the needs of an industry, or the unique characteristics of a particular brand of Cloud ERP system. These are areas where future research can offer more insight. Furthermore, the study's intention was to find differences between organizations that adopted Cloud ERP systems and organizations that did not adopt Cloud ERP systems based on the TOE factors. Future research can study these factors further by also using different research methodologies such as regression analysis. Such a study would be able to provide further details on the influencing relationship between the identified factors and cloud ERP systems adoption. A different research design may also be able to account for interaction among variables and also determine the impact of moderating variables such as organization climate on the study outcome.

Conclusion

The study sought to determine the differences between organization that adopted Cloud ERP systems and organizations that did not adopt Cloud ERP systems based on the TOE factors. Relevant technological factors were identified as relative advantage, compatibility, and security concern. Organizational factors included top management support, organizational readiness, size of the organization, centralization, and formalization. External environment factors were identified as competitive pressure and vendor support.

The study concluded that all the identified factors were statistically significant in the adoption of Cloud ERP systems. Organizations that adopted Cloud ERP systems were found to have the following:

1. Higher score of relative advantage than non-adopting organizations.
2. Higher compatibility than non-adopting organizations.
3. Higher level of security concern than non-adopting organizations.
4. Higher top management support than non-adopting organizations.
5. Higher organization readiness than non-adopting organizations.
6. Bigger sizes than non-adopting organizations.
7. Higher level of centralization than non-adopting organizations.
8. Higher level of formalization than non-adopting organizations.
9. Higher competitive pressure than non-adopting organizations.
10. Higher vendor support than non-adopting organizations.

These results offer more insight on Cloud ERP system adoption. It contributes to existing scant literature on the subject, and provides areas for future research.

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Appendices

Appendix A: Informed Consent

Informed Consent

Project Title: The Relationship between Technological, Organizational and Environmental factors and Organization's Intent to Adopt Cloud Enterprise Resource Planning (ERP) Systems.

Investigator: John Kinuthia, Eastern Michigan University.

Purpose of the study: This study is part of a doctoral dissertation research project. The objective of the study is to explore your perception regarding the technological, organizational, and environmental (TOE) factors in your organization and how these factors relate to the organization's intent to adopt Cloud ERP system. Technological factors include relative advantage, compatibility, and security concerns of Cloud ERP systems. Organizational factors include top management support, organizational readiness, centralization, and formalization within your organization. Environmental factors include the level of competitive pressure faced by your organization within the industry, and the extent to which vendors of cloud ERP systems offer support.

Cloud ERP refers to enterprise resource planning software that is hosted and accessed over the internet. The ERP software may be used for such business processes as sales, supply chain management, financial account management, etc.

Procedure: If you agree to participate in this study, you will be asked to answer about forty five online questions. Most of the questions will be asking your level of agreement or disagreement to a posed question. There is also an option to choose 'Neutral' if you are not sure about an answer. Overall, the questionnaire should take approximately twenty minutes or less.

Confidentiality: Identifying information such as your name, address, or place of work will not be collected as part of this survey. To further ensure that your identity remains anonymous, your survey response will be assigned a code that cannot be tied to you. This code will make it possible for the researcher to analyze your survey responses without the need for your identity. For safekeeping, the collected data will be stored securely in a password protected computer hard drive accessed only by the researcher.

However, Confidentiality will be maintained to the degree permitted by the technology used. Your participation in this online survey involves risks similar to a person's everyday use of the Internet.

Dissemination of survey results: Results of this study will be presented at Eastern Michigan University's College of Technology, in fulfillment of the college's doctoral program. The results may also be presented in academic conferences and submitted for publication in academic journals. However, the results will only be presented in aggregate form. Individually identifying information will not be revealed in the results.

Risks: There are no foreseeable risks associated with your participation in this study since data collected in the survey and subsequent results will be kept anonymous.

Benefits: Your response to the survey questions will offer insight on the subject being studied and contribute to the knowledge in the academic field.

Voluntary Participation: Your participation in this study is voluntary and you may opt not to participate. Should you choose to participate, you may withdraw from the survey at any time without any negative consequences.

Contact: This research is being conducted by John Kinuthia, a doctoral candidate at Eastern Michigan University's College of Technology. If you have any questions regarding this survey or to follow up regarding the results of the study, you may contact:

John Kinuthia
College of Technology
Eastern Michigan University
109 Sill Hall
Ypsilanti, MI 48197
Email: jkinuthi@emich.edu

This research protocol and informed consent document has been reviewed and approved by the Eastern Michigan University Human Subjects Review Committee for use from November 2013 to January 2014.

If you have questions about the approval process, please contact UHSCR at
human.subjects@emich.edu
Or call 734.487.0042.

Consent to participate: I have read all of the information regarding this research study including its purpose, procedure, confidentiality, risks and benefits. I also ascertain that I understand the definition of cloud ERP systems and that by clicking on the 'Next' button below, I consent to voluntarily participate in this study.

Appendix B: Human Subjects Approval

EASTERN MICHIGAN UNIVERSITY *Education First*

November 20, 2013 **UHSRC INITIAL APPROVAL: EXEMPT**

To: **John Kinuthia**
Eastern Michigan University – School of Technology Studies

Re: **UHSRC # 131022**
Category: Exempt
Approval Date: November 20, 2013

Title: **Relationship between Technological, Organizational, and Environmental factors and Organizations' Intent to Adopt Cloud ERP System**

The Eastern Michigan University Human Subjects Review Committee (UHSRC) has completed their review of your project. I am pleased to advise you that **your research has been deemed as exempt** in accordance with federal regulations.

The UHSRC has found that your research project meets the criteria for exempt status and the criteria for the protection of human subjects in exempt research. **Under our exempt policy the Principal Investigator assumes the responsibility for the protection of human subjects** in this project as outlined in the assurance letter and exempt educational material.

Renewals: Exempt protocols do not need to be renewed. If the project is completed, please submit the **Human Subjects Study Completion Form** (found on the UHSRC website).

Revisions: Exempt protocols do not require revisions. However, if changes are made to a protocol that may no longer meet the exempt criteria, a **Human Subjects Minor Modification Form** or new **Human Subjects Approval Request Form** (if major changes) will be required (see UHSRC website for forms).

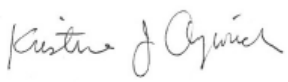
Problems: If issues should arise during the conduct of the research, such as unanticipated problems, adverse events, or any problem that may increase the risk to human subjects and change the category of review, notify the UHSRC office within 24 hours. Any complaints from participants regarding the risk and benefits of the project must be reported to the UHSRC.

Follow-up: If your exempt project is not completed and closed after three years, the UHSRC office will contact you regarding the status of the project and to verify that no changes have occurred that may affect exempt status.

Please use the UHSRC number listed above on any forms submitted that relate to this project, or on any correspondence with the UHSRC office.

Good luck in your research. If we can be of further assistance, please contact us at 734-487-0042 or via e-mail at gs_human_subjects@emich.edu. Thank you for your cooperation.

Sincerely,



Dr. Kristine Ajrouch
Faculty Co-chair
University Human Subjects Review Committee

University Human Subjects Review Committee · Eastern Michigan University · 200 Boone Hall
Ypsilanti, Michigan 48197
Phone: 734.487.0042 Fax: 734.487.0050
E-mail: human.subjects@emich.edu
www.ord.emich.edu (see Federal Compliance)

Appendix C: Data Gathering Instrument

Data Gathering Instrument

Section One: Demographic Questions

1. What is your job title?

2. What is your company's primary industry?

3. How many people does your firm currently employ?

◯ 1 - 50 ◯ 51 - 100 ◯ 101 - 500 ◯ 501 - 1,000 ◯ 1001 - 5,000 ◯ 5001 - 10,000 ◯ > 10,000

4. In what year was your organization established?

Questions about your Organization Cloud ERP Adoption

Enterprise Resource Planning (ERP) software refers to computer applications that are used to help manage various functions of a business such as inventory, sales, marketing, human resources, finance, etc. The ERP software may contain one or more of these business functions.

Examples of ERP software include SAP, Oracle, Salesforce, Sage, Netsuite, Microsoft Dynamics, Epicor,etc. Your organization may also have built its own ERP system.

Definition of Cloud ERP:
Cloud ERP refers to enterprise resource planning (ERP) software that is hosted and accessed over the internet. The software is delivered as a service by the hosting company for a fee.

Goal:
The purpose of this section is to determine whether your organization currently uses Cloud ERP software. If not, determine whether your organization intends to adopt Cloud ERP software systems in the future.

5. My organization has already implemented Cloud ERP system

◯ Yes

◯ No

Questions about your Organization's Intent to adopt Cloud ERP

6. My organization intends to adopt Cloud ERP system.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

7. It is likely that my organization will take steps to adopt Cloud ERP system in the future.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

8. Mark where appropriate: How soon do you think your organization will adopt Cloud ERP system?

◯ Less than 6 months
◯ 6 to 12 months
◯ 12 to 18 months
◯ 18 to 24 months
◯ More than 24 months
◯ No plan to adopt Cloud ERP

Questions about Technological Factors

9. Adopting Cloud ERP system allows better communication with our customers.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

10. Adopting Cloud ERP system increases the profitability in our organization.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

11. Adopting Cloud ERP system costs less than purchasing traditional ERP systems (ERP systems that are not on the 'Cloud'. Usually implemented in company's internal network).

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

12. Adopting Cloud ERP system allows our organization to enter new businesses or markets

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

Questions about Technological Factors

13. Cloud ERP system adoption is compatible with our information technology infrastructure.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

14. Cloud ERP system adoption is consistent with our organizational beliefs and values

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

15. Attitudes towards Cloud ERP system adoption in our organization have been favorable.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

Questions about Technological Factors

16. Cloud ERP system adoption is consistent with our business strategy.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

17. I am very satisfied with the security environment of Cloud ERP systems.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

18. In Cloud ERP systems, data is safeguarded from unauthorized changes or use.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

19. In Cloud ERP Systems, sensitive data is protected from those who should not have access to it.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

Questions about Organizational Factors

20. Top management in my organization is interested in adopting Cloud ERP system.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

21. Top management in my organization considers Cloud ERP system adoption important.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

22. Top management in my organization has shown support for Cloud ERP adoption.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

23. Please rate the attitude of your top management toward the deployment of information technology in your organization.

Very Negative	Negative	Somewhat Negative	Neutral	Somewhat Positive	Positive	Very Positive
◯	◯	◯	◯	◯	◯	◯

Questions about Organizational Factors

24. Information technology can be used for a number of objectives. To what extent is information technology important for the fulfillment of the following objectives in your organization?

	Not at all Important	Not Important	Somewhat Not important	Neutral	Somewhat Important	Important	Extremely Important
Reduction of Operational Costs	◯	◯	◯	◯	◯	◯	◯
Productivity Improvement	◯	◯	◯	◯	◯	◯	◯
Improved Access to Information.	◯	◯	◯	◯	◯	◯	◯
Improved Quality of Decision Making.	◯	◯	◯	◯	◯	◯	◯
Improved Competitiveness.	◯	◯	◯	◯	◯	◯	◯
Improved Service to Customers.	◯	◯	◯	◯	◯	◯	◯

25. In the context of your organization's overall Information Systems budget, how significant would the financial cost of implementing a Cloud ERP system be?

Not at all Significant	Not Significant	Somewhat Not Significant	Neutral	Somewhat Significant	Significant	Extremely Significant
◯	◯	◯	◯	◯	◯	◯

Questions about Organizational Factors

26. How significant is the overall information systems budget in relation to the organization's revenue last year?

Not at all Significant	Not Significant	Somewhat Not Significant	Neutral	Somewhat Significant	Significant	Extremely Significant
◯	◯	◯	◯	◯	◯	◯

27. The responsibility of making decisions regarding capital budgeting is centralized at the top levels of management

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

28. The responsibility of introducing new products is centralized at the top levels of management.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

29. The responsibility of making decisions regarding entry into new major markets is centralized at the top levels of management.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

Questions about Organizational Factors

30. The responsibility of making decisions on pricing of major product line is centralized at the top level of management

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

31. The responsibility of making decisions regarding hiring and firing of senior staff is centralized at the top levels of management.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

32. We have procedures to follow in dealing with whatever situation that arises.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

33. When rules and procedures exist here, they are usually in written form.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

Questions about Organizational Factors

34. In our organization, errors and failures are treated as opportunities to learn, therefore employees are encouraged to talk about them.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

35. In our organization, people can speak out openly.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

36. In our organization, people are free to express their view points, even those viewpoints that are unpopular.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

37. In our organization, open-mindedness is considered one of the most respected values that is highly encouraged.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

Questions about Organizational Factors

38. In our organization, thinking of an alternative way in which problems may be solved differently is highly encouraged.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

39. In our organization, trying out new ideas is always encouraged.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

40. In our organization, any changes that create a value or enable organizations to meet new conditions is highly encouraged.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

Questions about Environmental/ External Factors

41. We believe we could lose our customers to our competitors by not adopting Cloud ERP systems.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

42. We feel it is a strategic necessity to use Cloud ERP system to compete in the marketplace

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

Questions about Environmental/ External Factors

Cloud ERP vendors refers to organizations that make cloud ERP software e.g. Microsoft, Oracle, SAP, etc.
The following questions ask your perception regarding whether the Cloud ERP vendors offer technical support, offer incentives, or promote their products by offering free training.

43. Cloud ERP vendors provide technical support for effective use of Cloud ERP system.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

44. Cloud ERP vendors actively market their technology by providing incentives for adoption.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

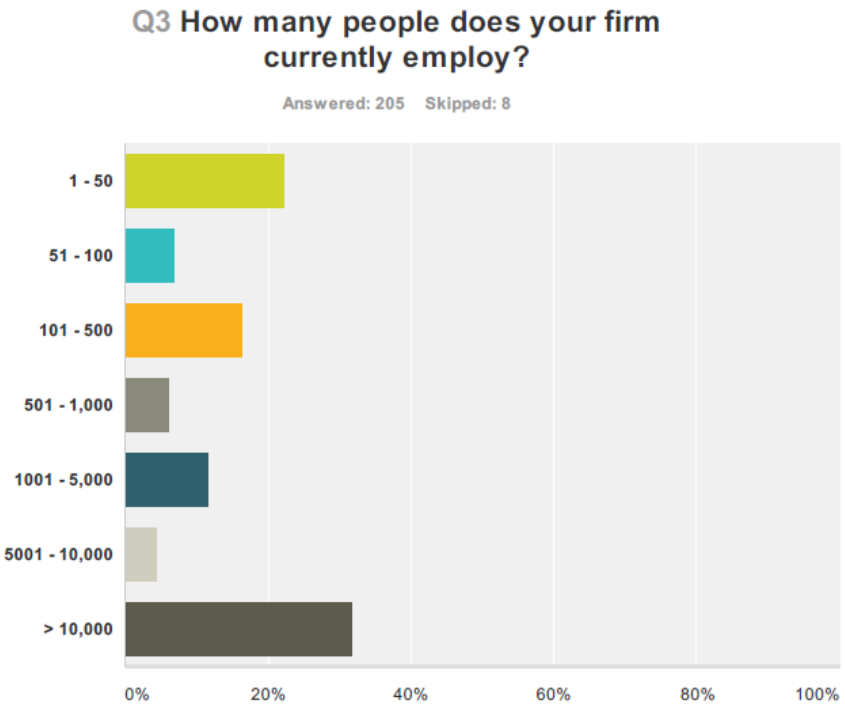
45. Cloud ERP vendors promote their technology by offering free training sessions.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
◯	◯	◯	◯	◯	◯	◯

The End

Survey complete. Thank you!

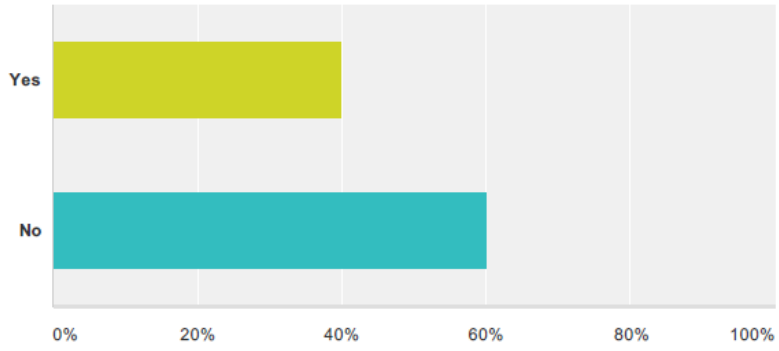
Appendix D: Analysis of Responses



Answer Choices	Responses	
1 - 50	**22.44%**	46
51 - 100	**6.83%**	14
101 - 500	**16.59%**	34
501 - 1,000	**6.34%**	13
1001 - 5,000	**11.71%**	24
5001 - 10,000	**4.39%**	9
> 10,000	**31.71%**	65
Total		**205**

Q5 My organization has already implemented Cloud ERP system

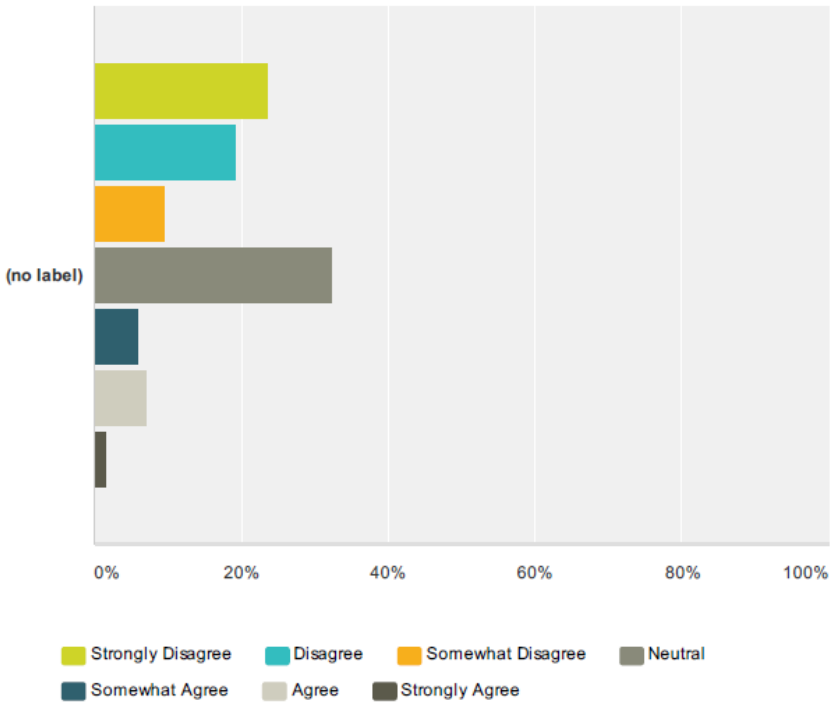
Answered: 206 Skipped: 7



Answer Choices	Responses	
Yes	**39.81%**	82
No	**60.19%**	124
Total		**206**

Q6 My organization intends to adopt Cloud ERP system.

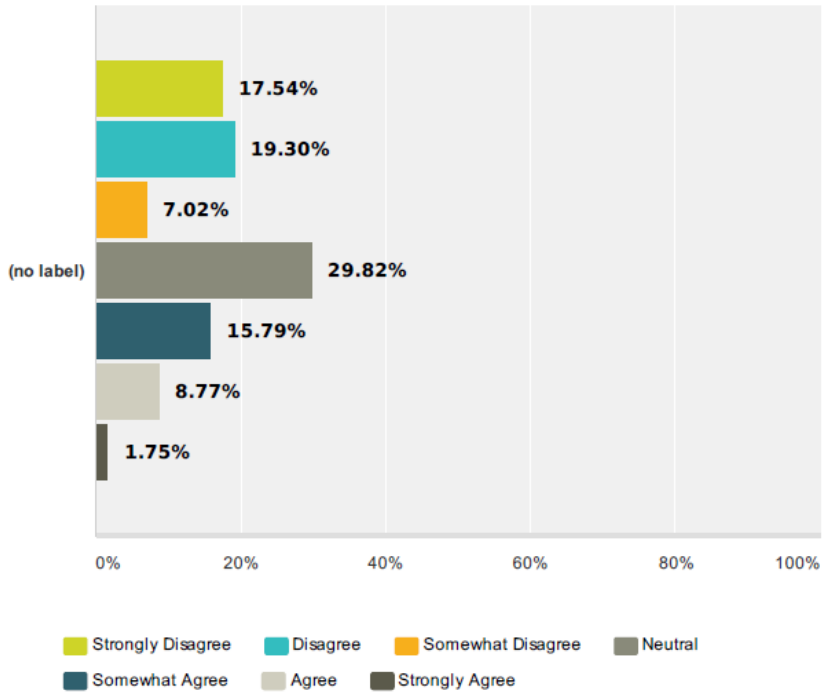
Answered: 114 Skipped: 99



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	**23.68%** 27	**19.30%** 22	**9.65%** 11	**32.46%** 37	**6.14%** 7	**7.02%** 8	**1.75%** 2	114	3.06

Q7 It is likely that my organization will take steps to adopt Cloud ERP system in the future.

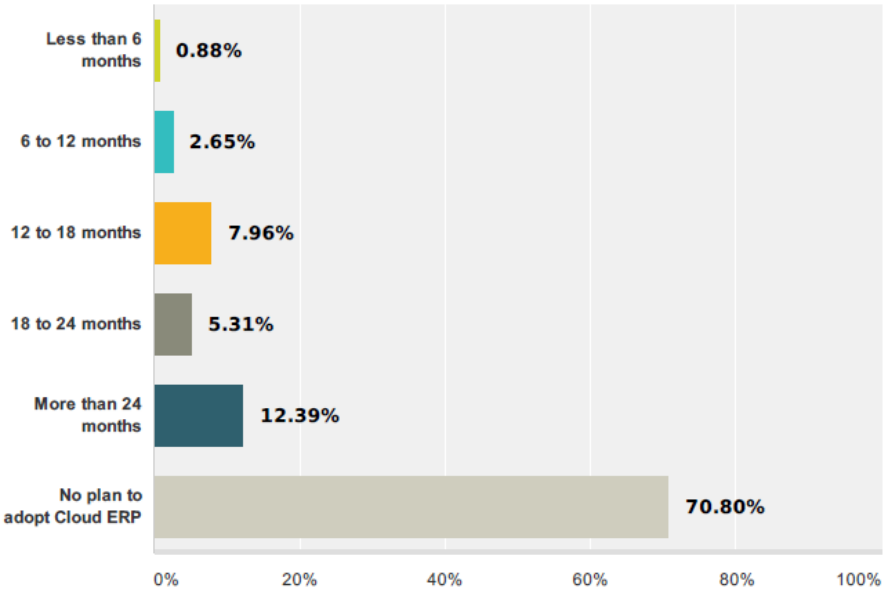
Answered: 114 Skipped: 99



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	17.54% 20	19.30% 22	7.02% 8	29.82% 34	15.79% 18	8.77% 10	1.75% 2	114	3.40

Q8 Mark where appropriate: How soon do you think your organization will adopt Cloud ERP system?

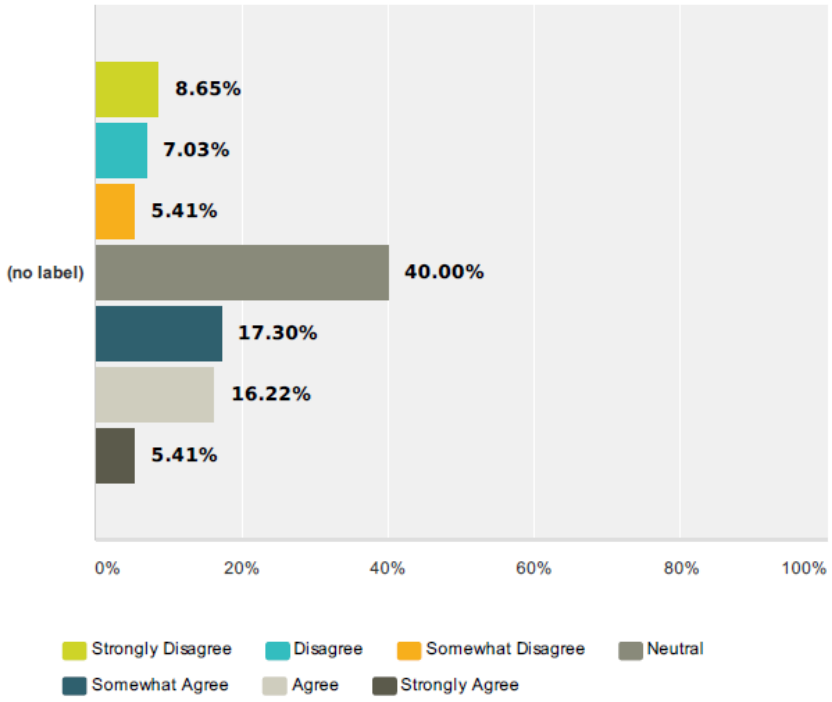
Answered: 113 Skipped: 100



Answer Choices	Responses	
Less than 6 months	**0.88%**	1
6 to 12 months	**2.65%**	3
12 to 18 months	**7.96%**	9
18 to 24 months	**5.31%**	6
More than 24 months	**12.39%**	14
No plan to adopt Cloud ERP	**70.80%**	80
Total		**113**

Q9 Adopting Cloud ERP system allows better communication with our customers.

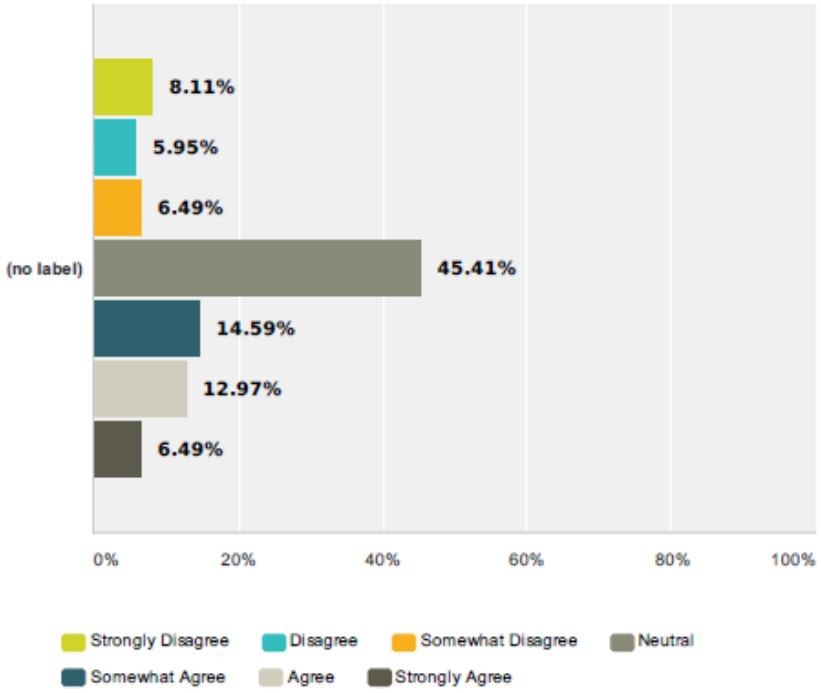
Answered: 185 Skipped: 28



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	**8.65%** 16	**7.03%** 13	**5.41%** 10	**40%** 74	**17.30%** 32	**16.22%** 30	**5.41%** 10	185	4.21

Q10 Adopting Cloud ERP system increases the profitability in our organization.

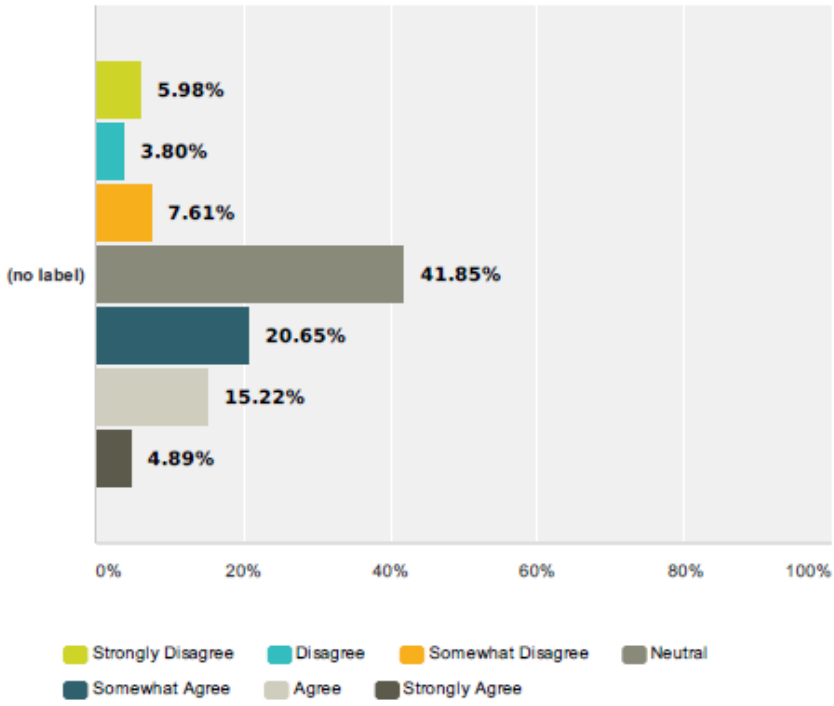
Answered: 185 Skipped: 28



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	**8.11%** 15	**5.95%** 11	**6.49%** 12	**45.41%** 84	**14.59%** 27	**12.97%** 24	**6.49%** 12	185	4.17

Q11 Adopting Cloud ERP system costs less than purchasing traditional ERP systems (ERP systems that are not on the 'Cloud'. Usually implemented in company's internal network).

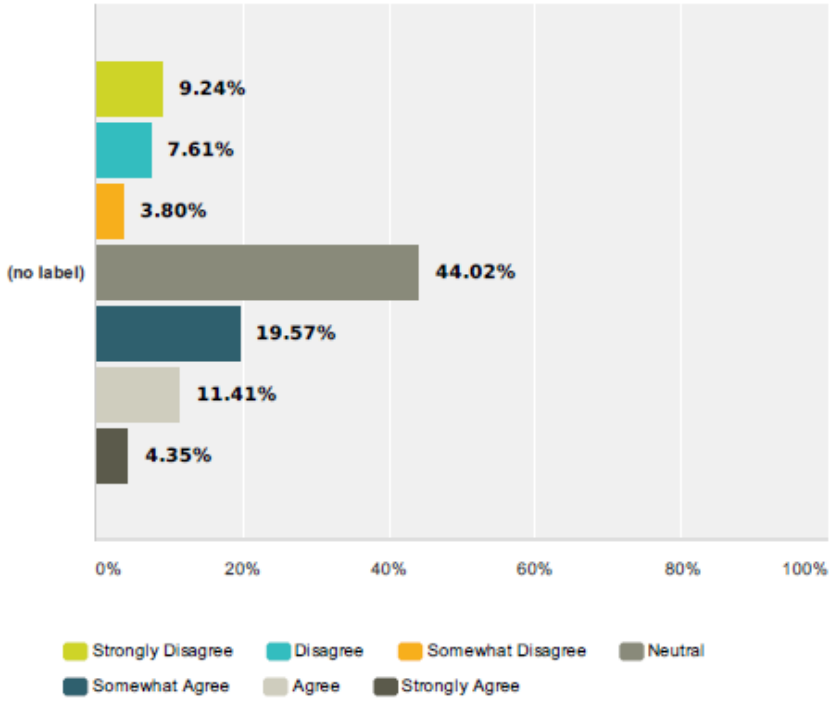
Answered: 184 Skipped: 29



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	5.98% 11	3.80% 7	7.61% 14	41.85% 77	20.65% 38	15.22% 28	4.89% 9	184	4.33

Q12 Adopting Cloud ERP system allows our organization to enter new businesses or markets

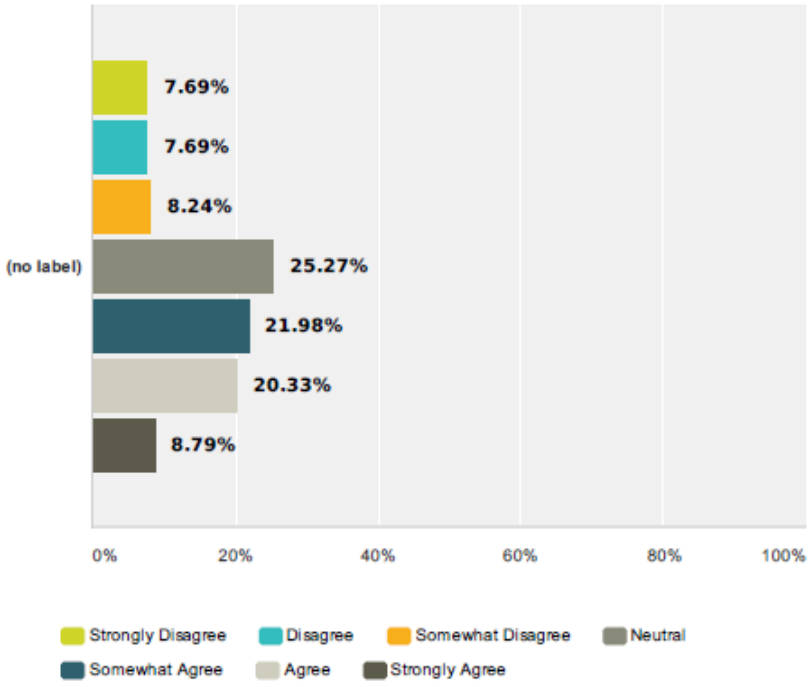
Answered: 184 Skipped: 29



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	9.24% 17	7.61% 14	3.80% 7	44.02% 81	19.57% 36	11.41% 21	4.35% 8	184	4.09

Q13 Cloud ERP system adoption is compatible with our information technology infrastructure.

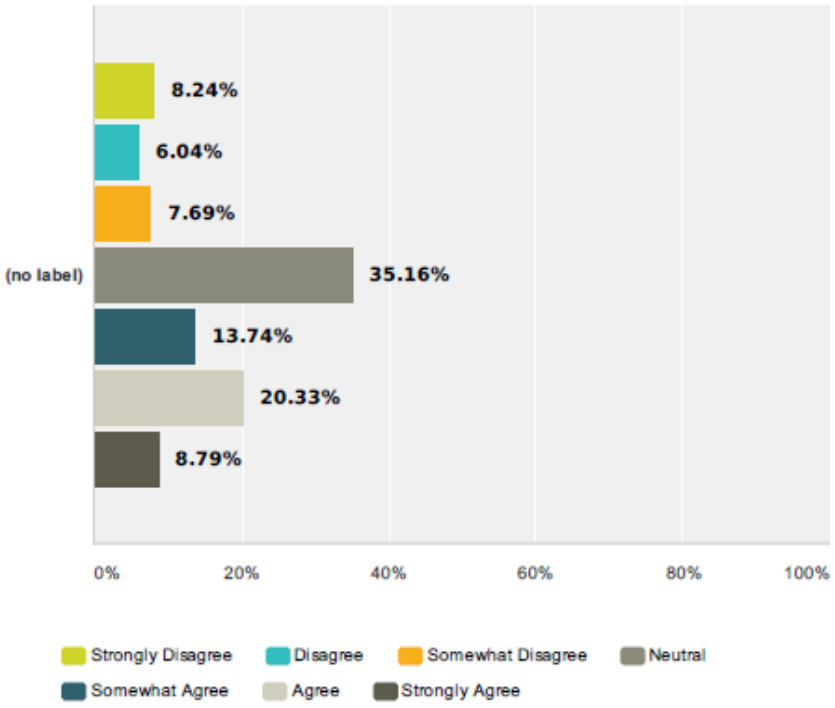
Answered: 182 Skipped: 31



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	7.69% 14	7.69% 14	8.24% 15	25.27% 46	21.98% 40	20.33% 37	8.79% 16	182	4.42

Q14 Cloud ERP system adoption is consistent with our organizational beliefs and values

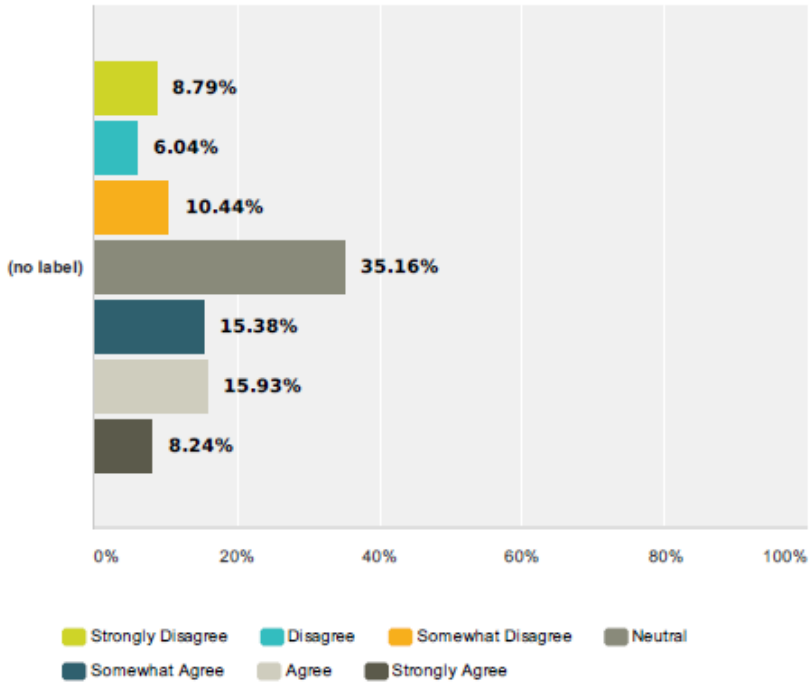
Answered: 182 Skipped: 31



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	8.24% 15	6.04% 11	7.69% 14	35.16% 64	13.74% 25	20.33% 37	8.79% 16	182	4.36

Q15 Attitudes towards Cloud ERP system adoption in our organization have been favorable.

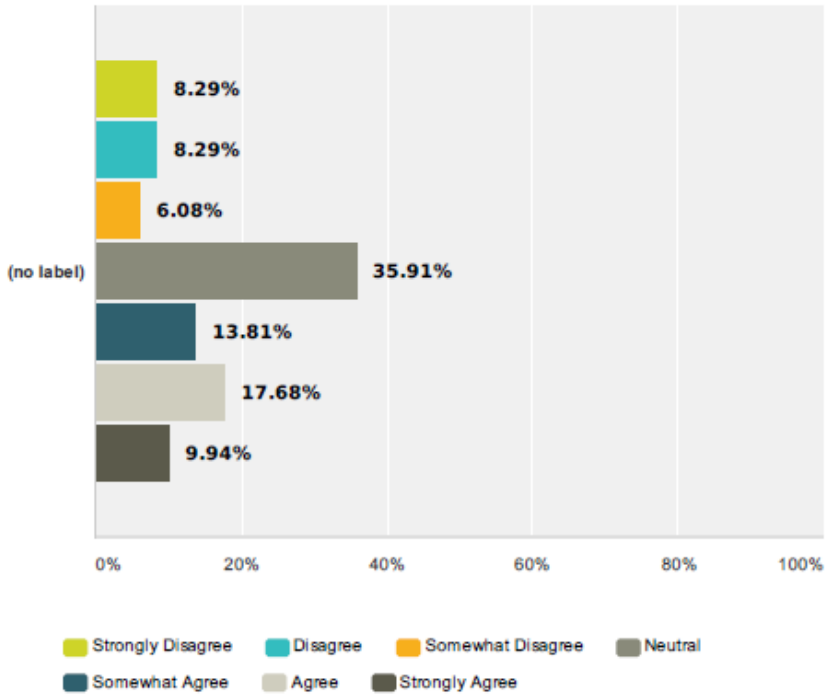
Answered: 182 Skipped: 31



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	8.79% 16	6.04% 11	10.44% 19	35.16% 64	15.38% 28	15.93% 29	8.24% 15	182	4.23

Q16 Cloud ERP system adoption is consistent with our business strategy.

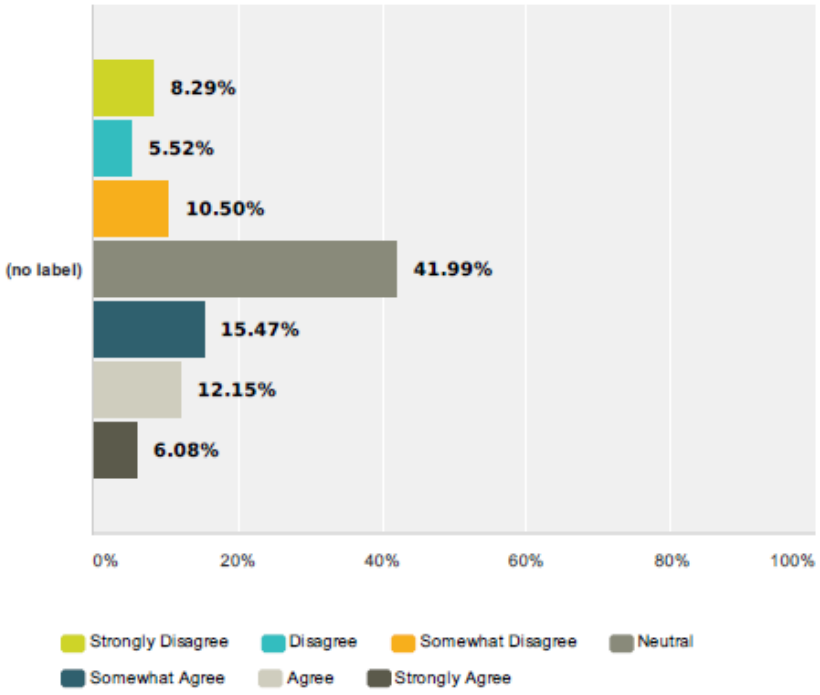
Answered: 181 Skipped: 32



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	**8.29%** 15	**8.29%** 15	**6.08%** 11	**35.91%** 65	**13.81%** 25	**17.68%** 32	**9.94%** 18	181	4.31

Q17 I am very satisfied with the security environment of Cloud ERP systems.

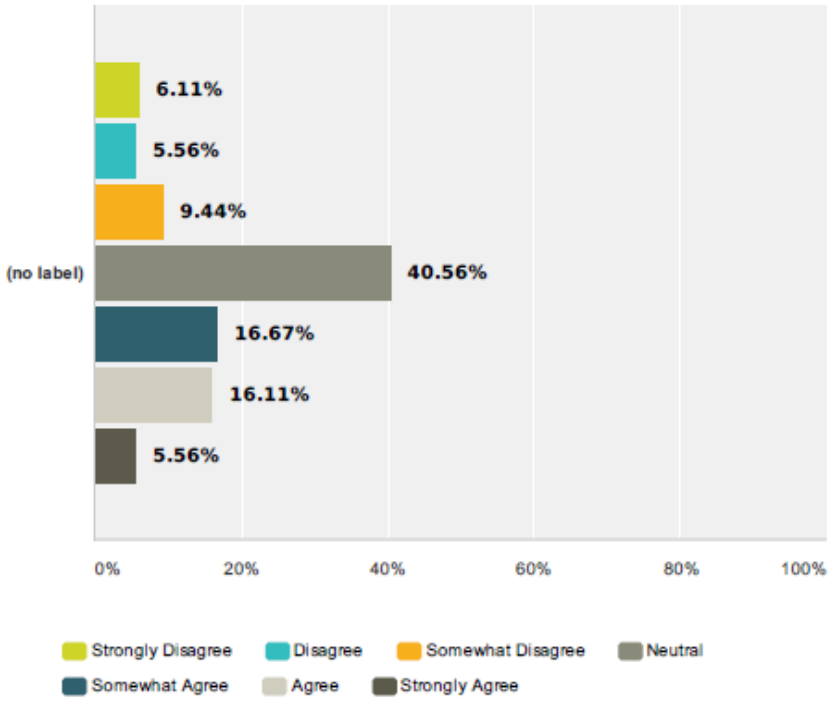
Answered: 181 Skipped: 32



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	**8.29%** 15	**5.52%** 10	**10.50%** 19	**41.99%** 76	**15.47%** 28	**12.15%** 22	**6.08%** 11	181	4.12

Q18 In Cloud ERP systems, data is safeguarded from unauthorized changes or use.

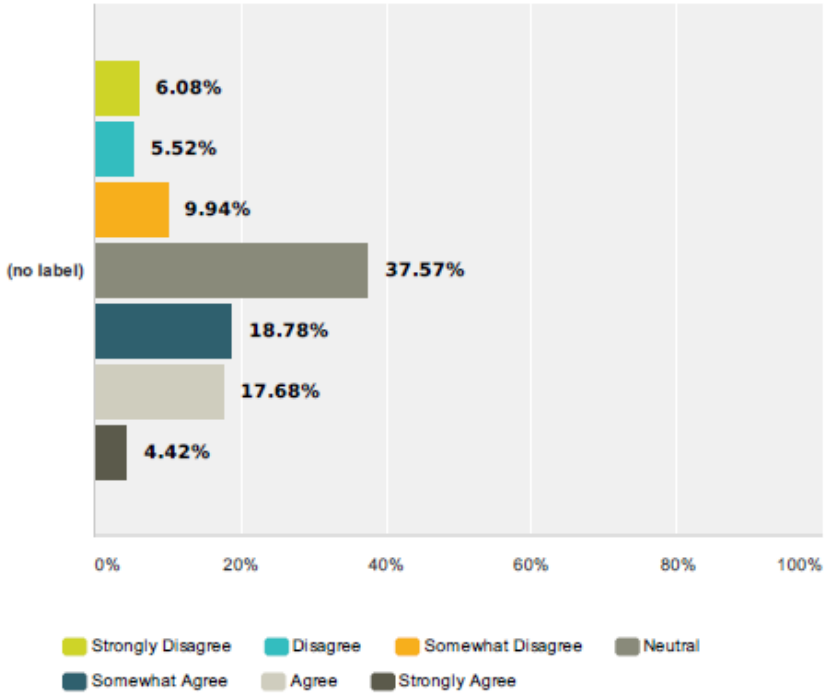
Answered: 180 Skipped: 33



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	**6.11%** 11	**5.56%** 10	**9.44%** 17	**40.56%** 73	**16.67%** 30	**16.11%** 29	**5.56%** 10	180	4.27

Q19 In Cloud ERP Systems, sensitive data is protected from those who should not have access to it.

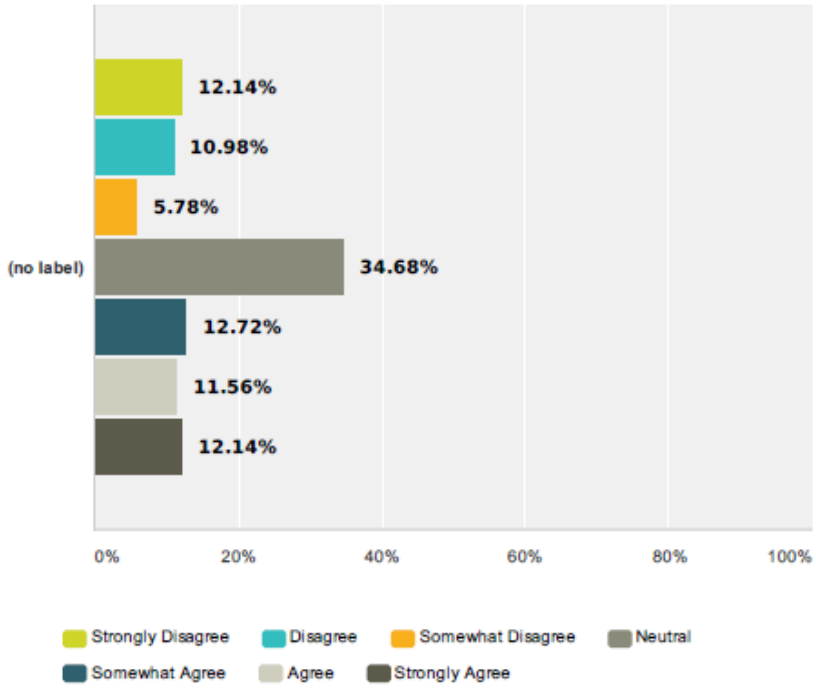
Answered: 181 Skipped: 32



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	**6.08%** 11	**5.52%** 10	**9.94%** 18	**37.57%** 68	**18.78%** 34	**17.68%** 32	**4.42%** 8	181	4.28

Q20 Top management in my organization is interested in adopting Cloud ERP system.

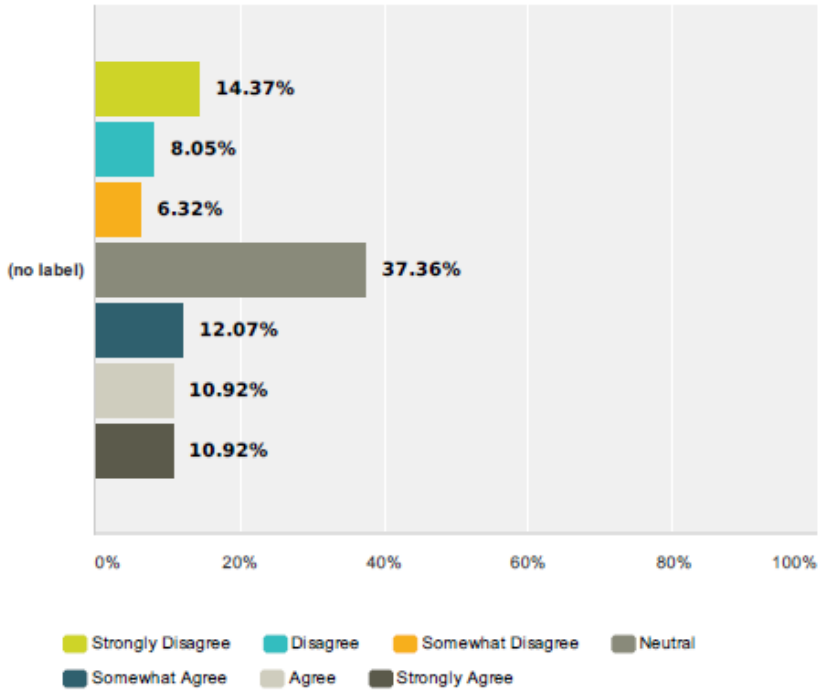
Answered: 173 Skipped: 40



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	**12.14%** 21	**10.98%** 19	**5.78%** 10	**34.68%** 60	**12.72%** 22	**11.56%** 20	**12.14%** 21	173	4.08

Q21 Top management in my organization considers Cloud ERP system adoption important.

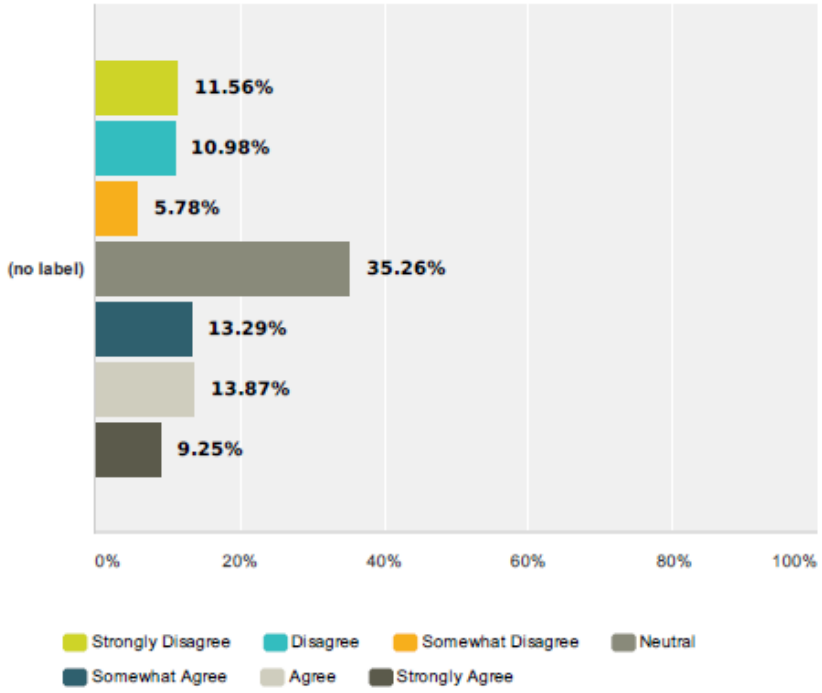
Answered: 174 Skipped: 39



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	**14.37%** 25	**8.05%** 14	**6.32%** 11	**37.36%** 65	**12.07%** 21	**10.92%** 19	**10.92%** 19	174	4.01

Q22 Top management in my organization has shown support for Cloud ERP adoption.

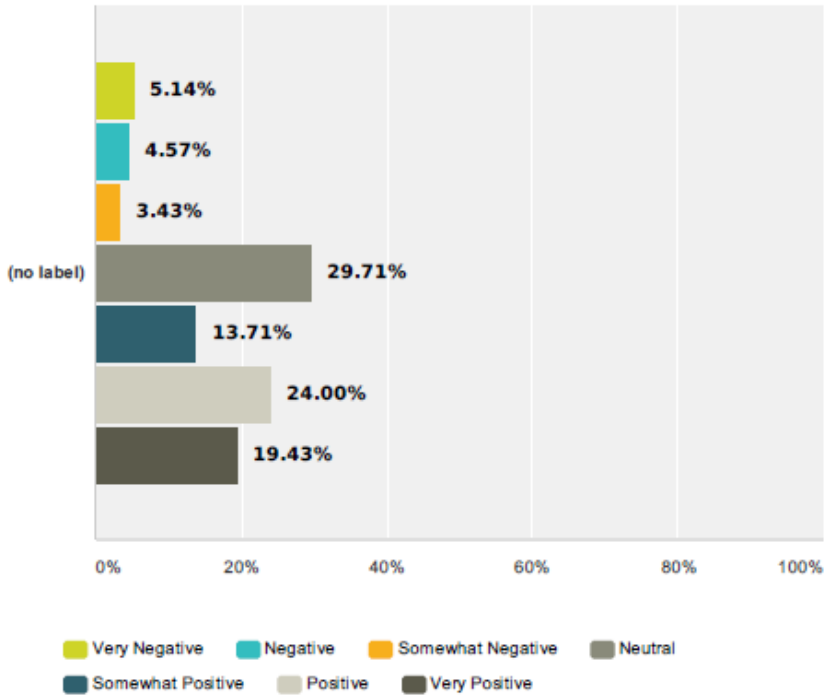
Answered: 173 Skipped: 40



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	**11.56%** 20	**10.98%** 19	**5.78%** 10	**35.26%** 61	**13.29%** 23	**13.87%** 24	**9.25%** 16	173	4.06

Q23 Please rate the attitude of your top management toward the deployment of information technology in your organization.

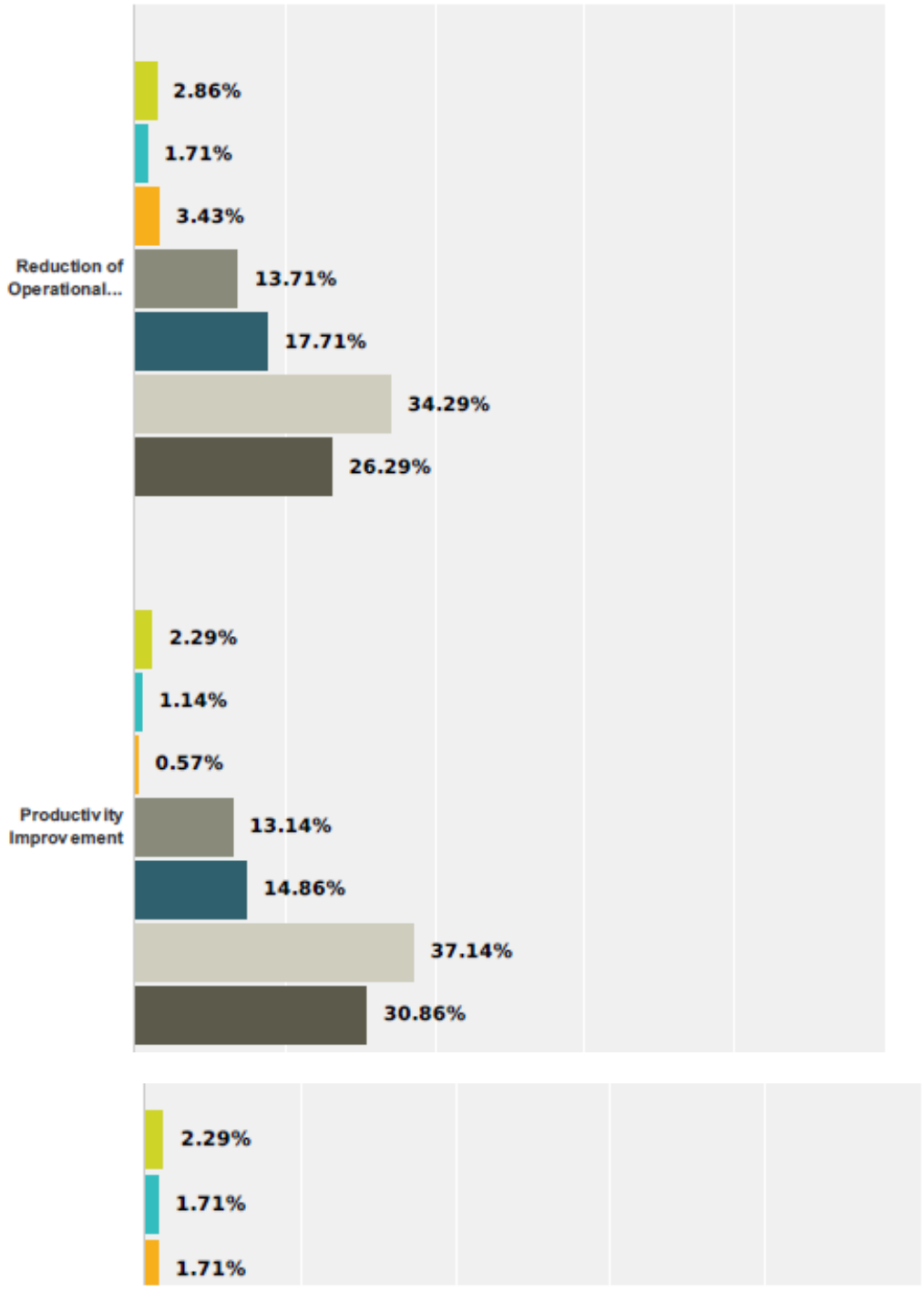
Answered: 175 Skipped: 38

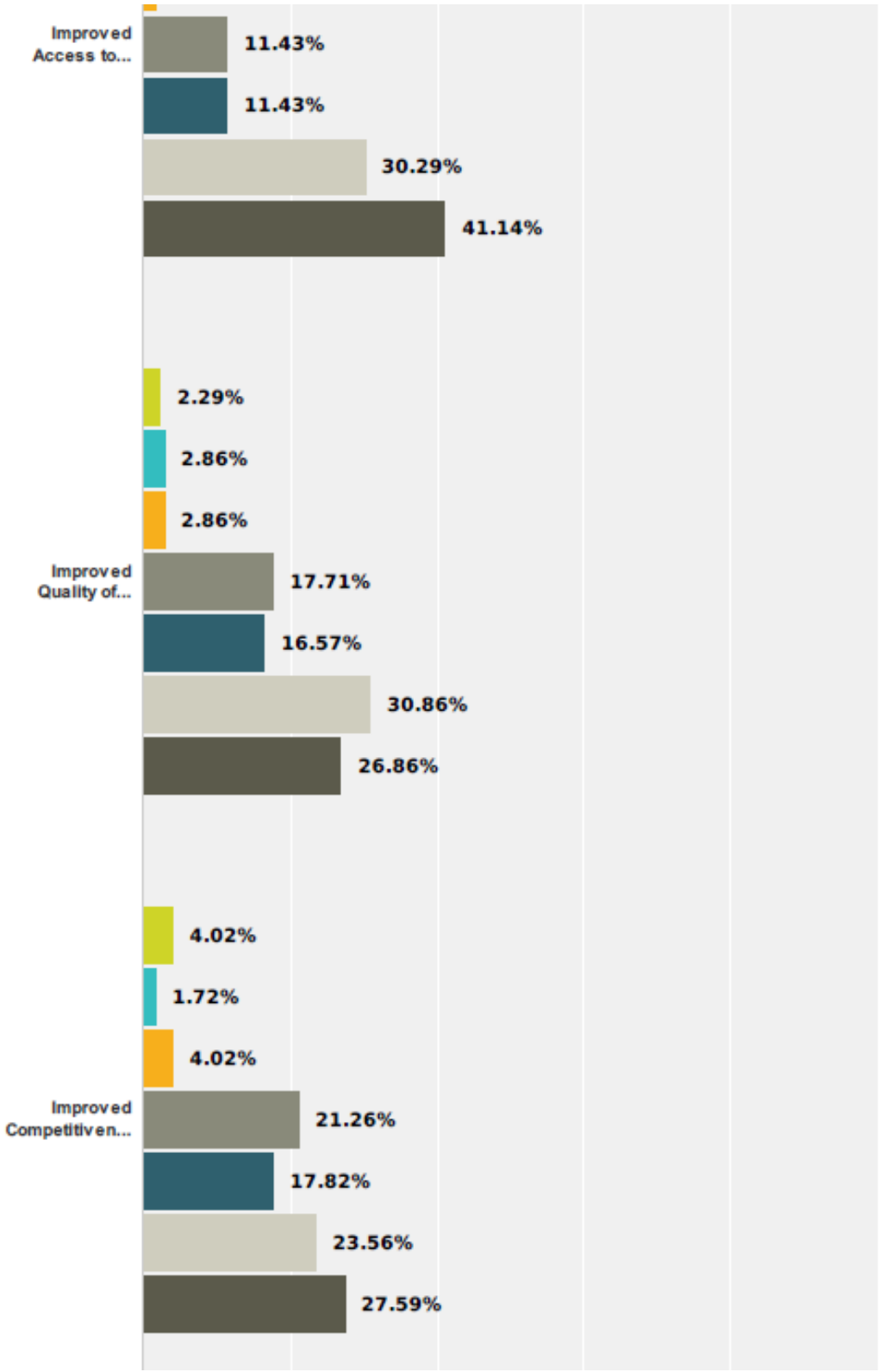


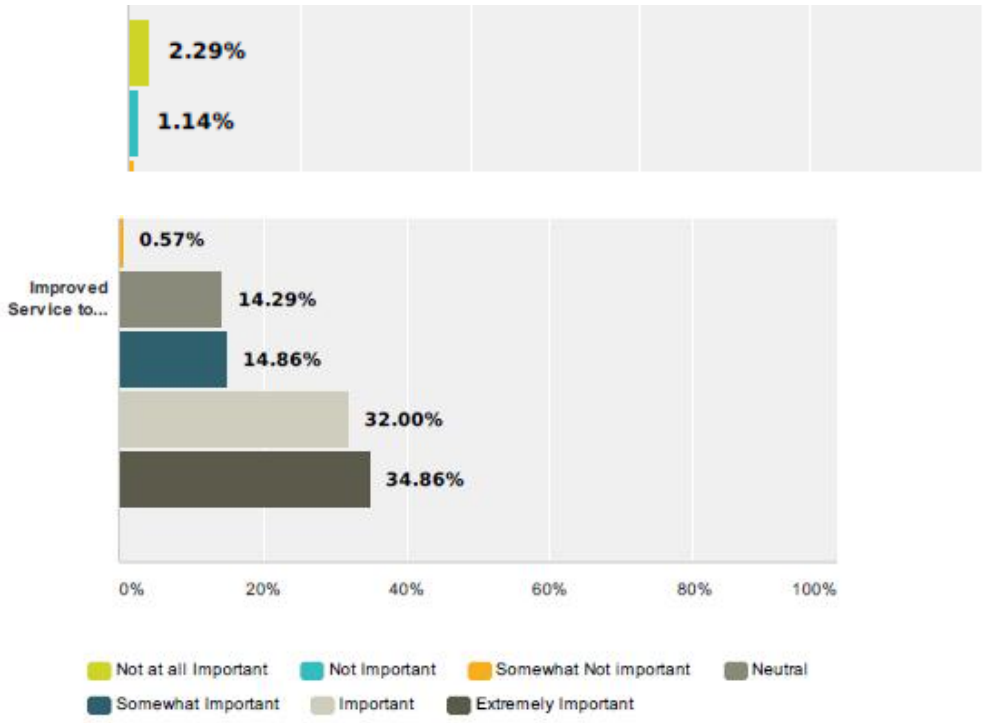
	Very Negative	Negative	Somewhat Negative	Neutral	Somewhat Positive	Positive	Very Positive	Total	Average Rating
(no label)	**5.14%** 9	**4.57%** 8	**3.43%** 6	**29.71%** 52	**13.71%** 24	**24%** 42	**19.43%** 34	175	4.92

Q24 Information technology can be used for a number of objectives. To what extent is information technology important for the fulfillment of the following objectives in your organization?

Answered: 175 Skipped: 38



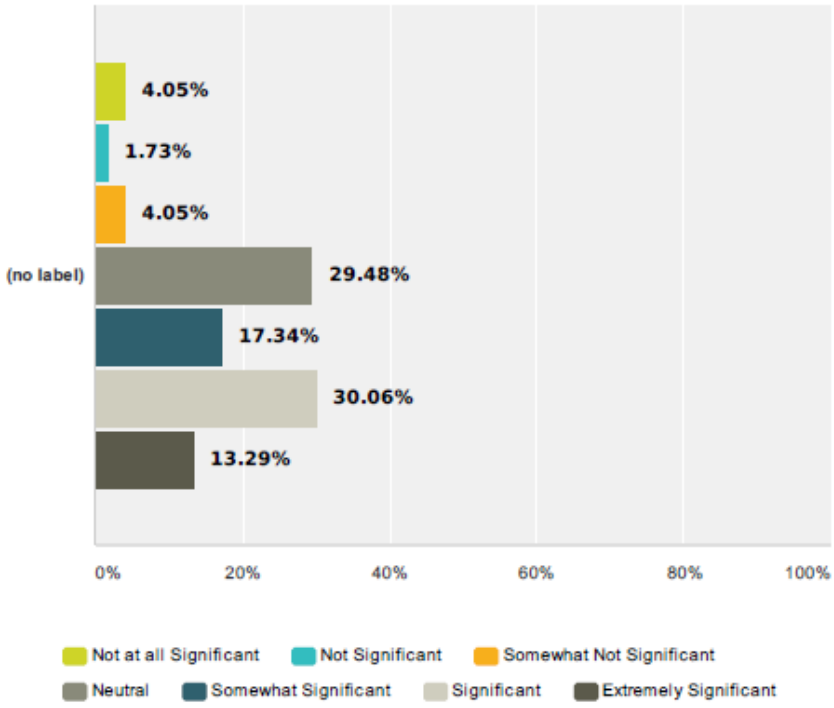

Improved Access to...
11.43%
11.43%
30.29%
41.14%
2.29%
2.86%
2.86%
Improved Quality of...
17.71%
16.57%
30.86%
26.86%
4.02%
1.72%
4.02%
Improved Competitiven...
21.26%
17.82%
23.56%
27.59%



	Not at all Important	Not Important	Somewhat Not Important	Neutral	Somewhat Important	Important	Extremely Important	Total	Average Rating
Reduction of Operational Costs	2.86% 5	1.71% 3	3.43% 6	13.71% 24	17.71% 31	34.29% 60	26.29% 46	175	5.50
Productivity Improvement	2.29% 4	1.14% 2	0.57% 1	13.14% 23	14.86% 26	37.14% 65	30.86% 54	175	5.72
Improved Access to Information.	2.29% 4	1.71% 3	1.71% 3	11.43% 20	11.43% 20	30.29% 53	41.14% 72	175	5.83
Improved Quality of Decision Making.	2.29% 4	2.86% 5	2.86% 5	17.71% 31	16.57% 29	30.86% 54	26.86% 47	175	5.43
Improved Competitiveness.	4.02% 7	1.72% 3	4.02% 7	21.26% 37	17.82% 31	23.56% 41	27.59% 48	174	5.28
Improved Service to Customers.	2.29% 4	1.14% 2	0.57% 1	14.29% 25	14.86% 26	32% 56	34.86% 61	175	5.74

Q25 In the context of your organization's overall Information Systems budget, how significant would the financial cost of implementing a Cloud ERP system be?

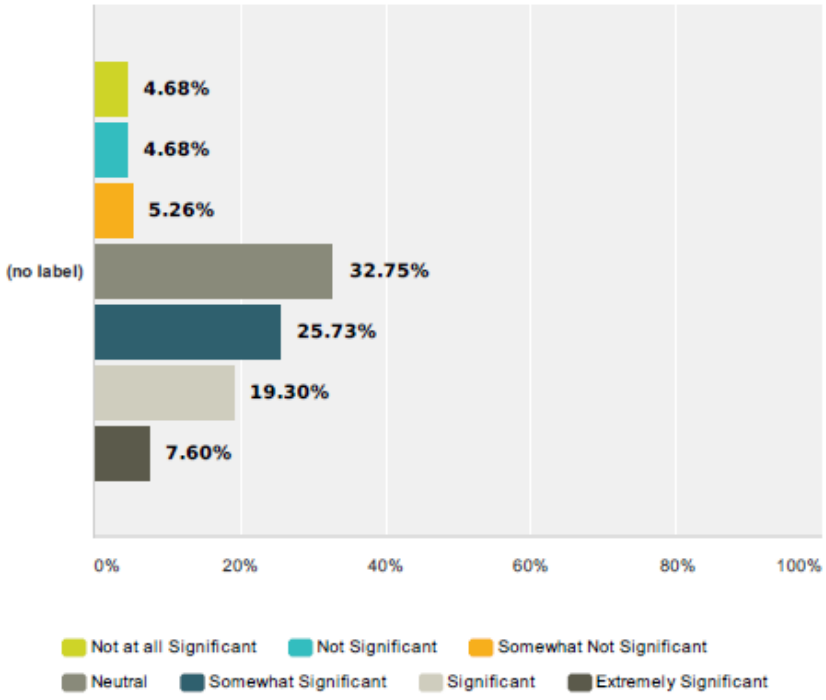
Answered: 173 Skipped: 40



	Not at all Significant	Not Significant	Somewhat Not Significant	Neutral	Somewhat Significant	Significant	Extremely Significant	Total	Average Rating
(no label)	4.05% 7	1.73% 3	4.05% 7	29.48% 51	17.34% 30	30.06% 52	13.29% 23	173	4.98

Q26 How significant is the overall information systems budget in relation to the organization's revenue last year?

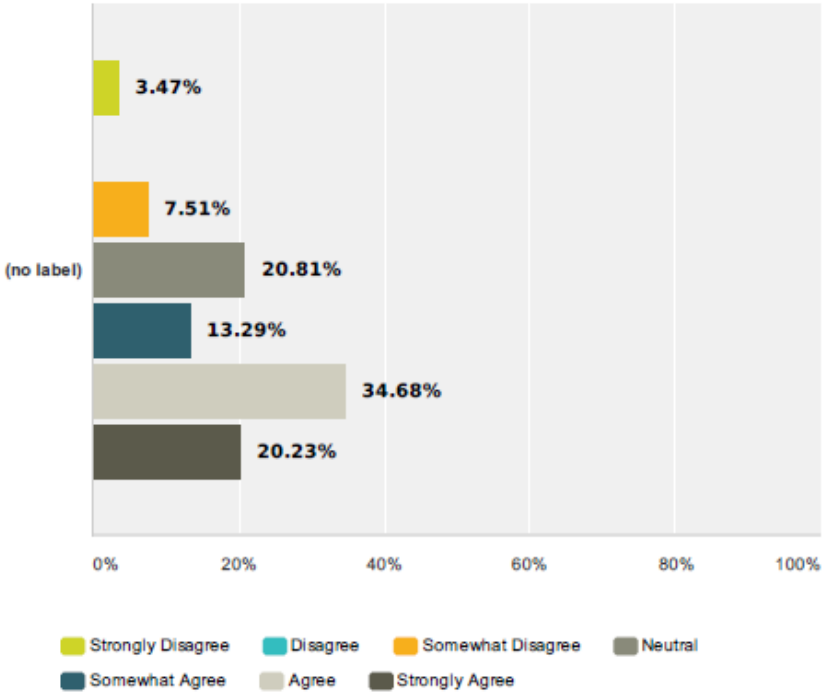
Answered: 171 Skipped: 42



	Not at all Significant	Not Significant	Somewhat Not Significant	Neutral	Somewhat Significant	Significant	Extremely Significant	Total	Average Rating
(no label)	4.68% 8	4.68% 8	5.26% 9	32.75% 56	25.73% 44	19.30% 33	7.60% 13	171	4.58

Q27 The responsibility of making decisions regarding capital budgeting is centralized at the top levels of management

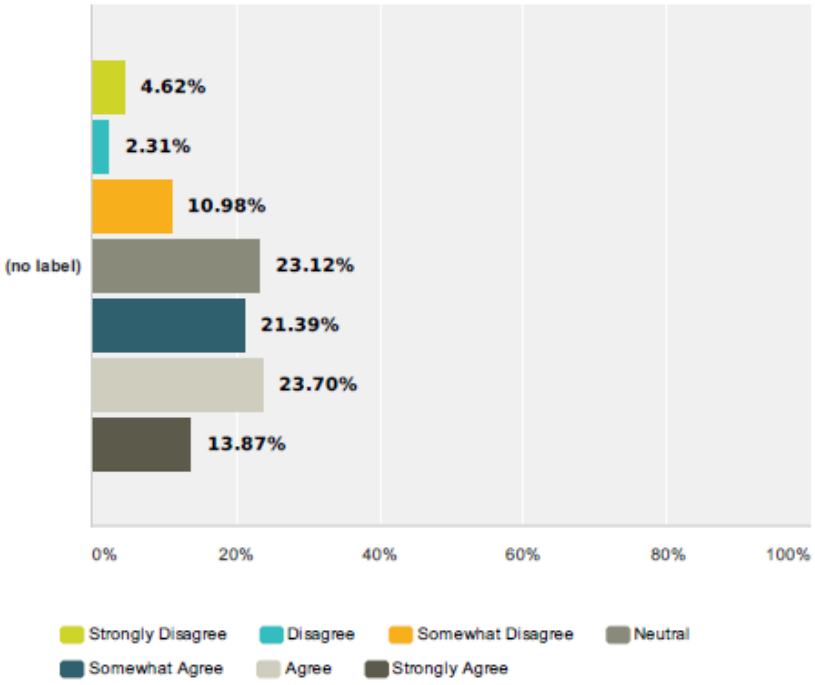
Answered: 173 Skipped: 40



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	**3.47%** 6	**0%** 0	**7.51%** 13	**20.81%** 36	**13.29%** 23	**34.68%** 60	**20.23%** 35	173	5.25

Q28 The responsibility of introducing new products is centralized at the top levels of management.

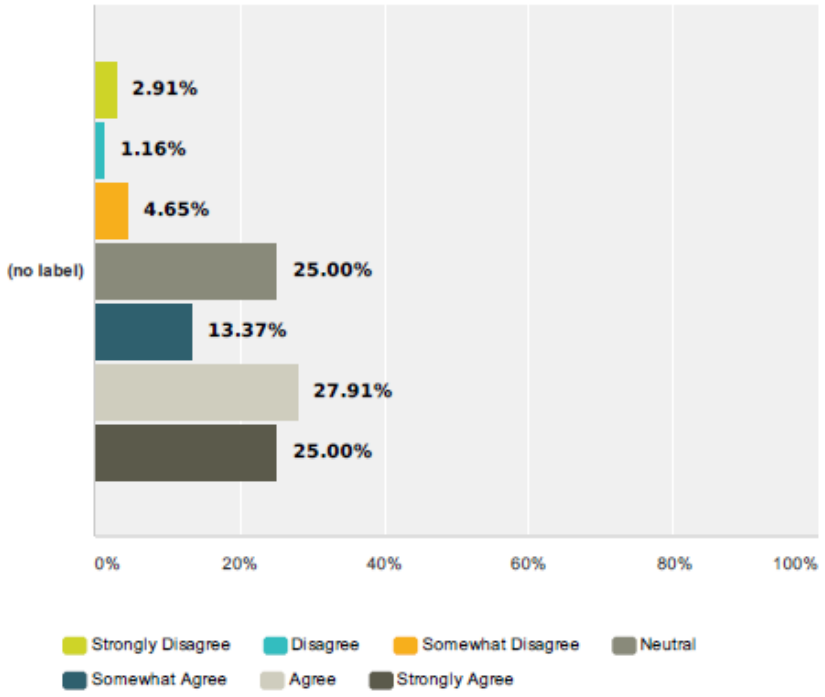
Answered: 173 Skipped: 40



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	**4.62%** 8	**2.31%** 4	**10.98%** 19	**23.12%** 40	**21.39%** 37	**23.70%** 41	**13.87%** 24	173	4.81

Q29 The responsibility of making decisions regarding entry into new major markets is centralized at the top levels of management.

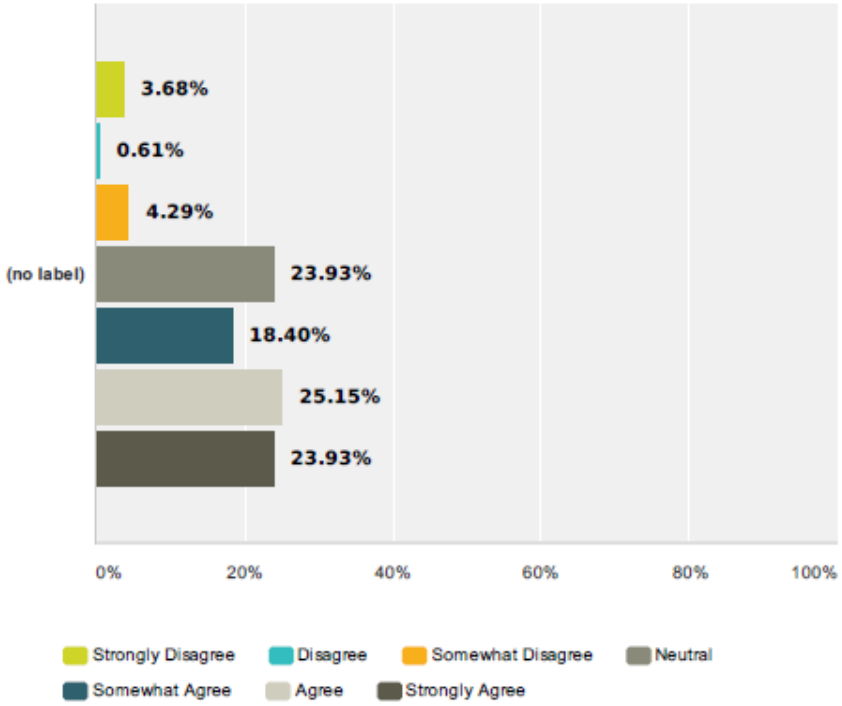
Answered: 172 Skipped: 41



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	2.91% 5	1.16% 2	4.65% 8	25% 43	13.37% 23	27.91% 48	25% 43	172	5.28

Q30 The responsibility of making decisions on pricing of major product line is centralized at the top level of management

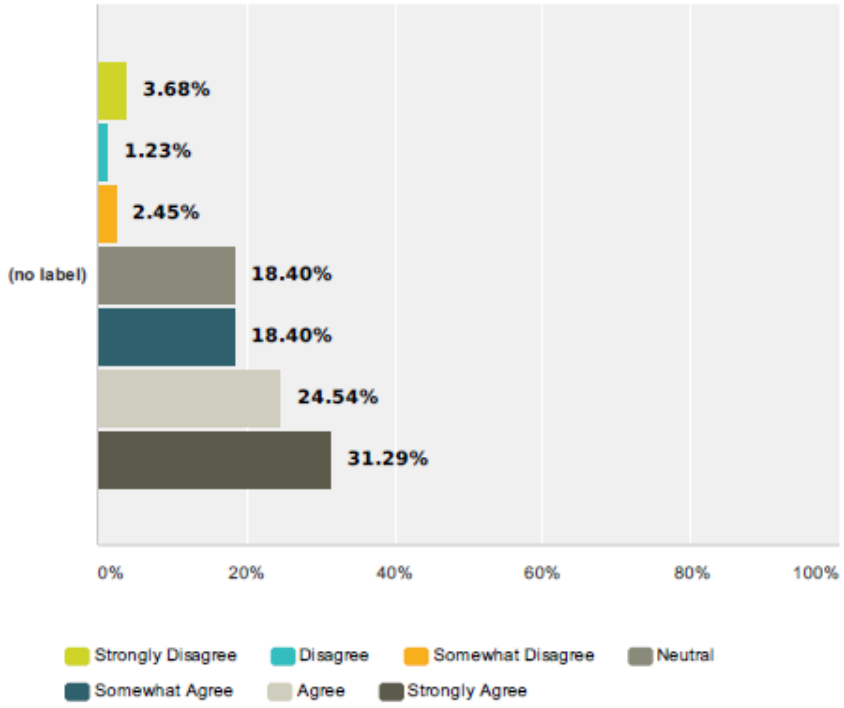
Answered: 163 Skipped: 50



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	**3.68%** 6	**0.61%** 1	**4.29%** 7	**23.93%** 39	**18.40%** 30	**25.15%** 41	**23.93%** 39	163	5.24

Q31 The responsibility of making decisions regarding hiring and firing of senior staff is centralized at the top levels of management.

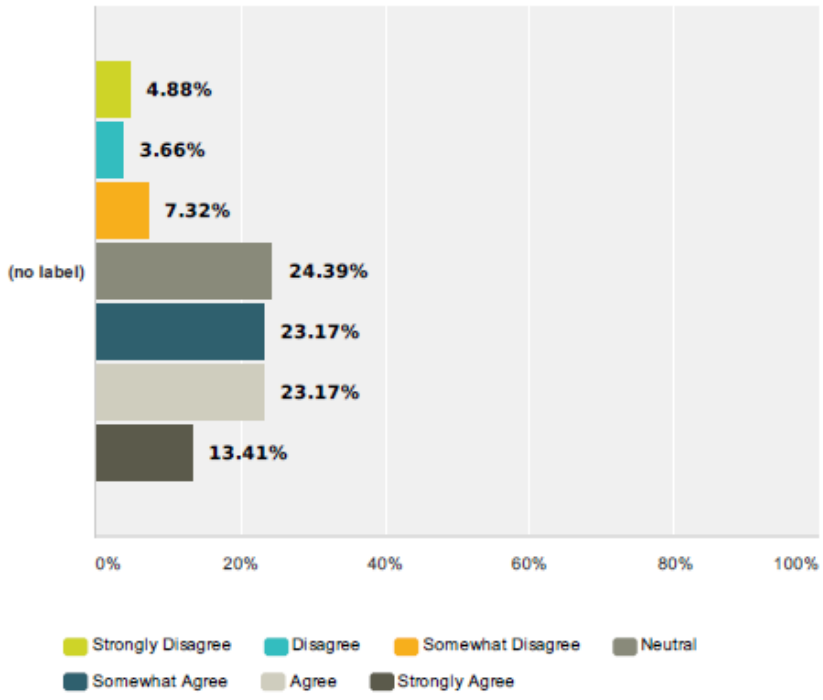
Answered: 163 Skipped: 50



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	3.68% 6	1.23% 2	2.45% 4	18.40% 30	18.40% 30	24.54% 40	31.29% 51	163	5.45

Q32 We have procedures to follow in dealing with whatever situation that arises.

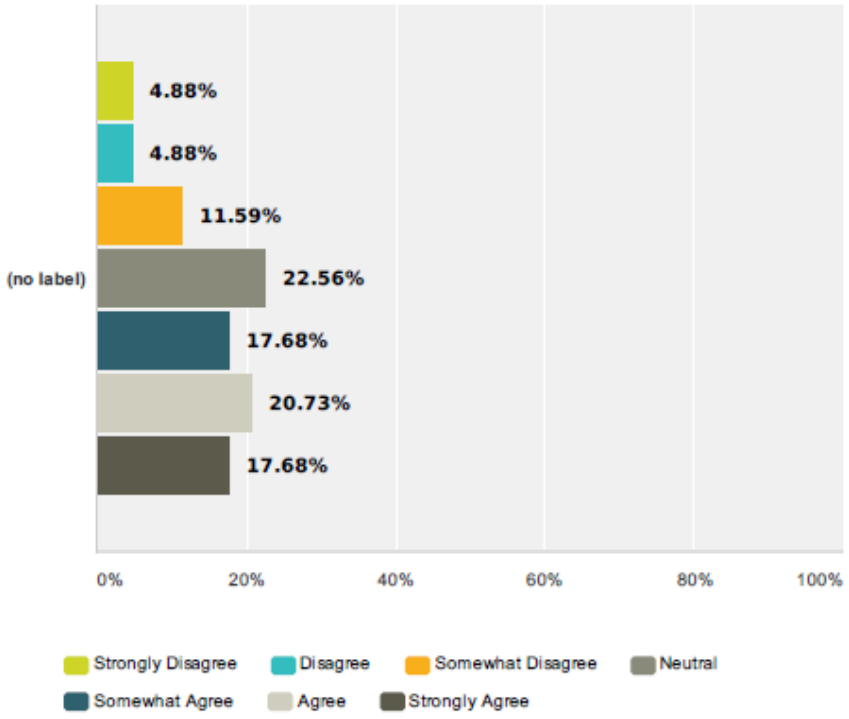
Answered: 164 Skipped: 49



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	**4.88%** 8	**3.66%** 6	**7.32%** 12	**24.39%** 40	**23.17%** 38	**23.17%** 38	**13.41%** 22	164	4.80

Q33 When rules and procedures exist here, they are usually in written form.

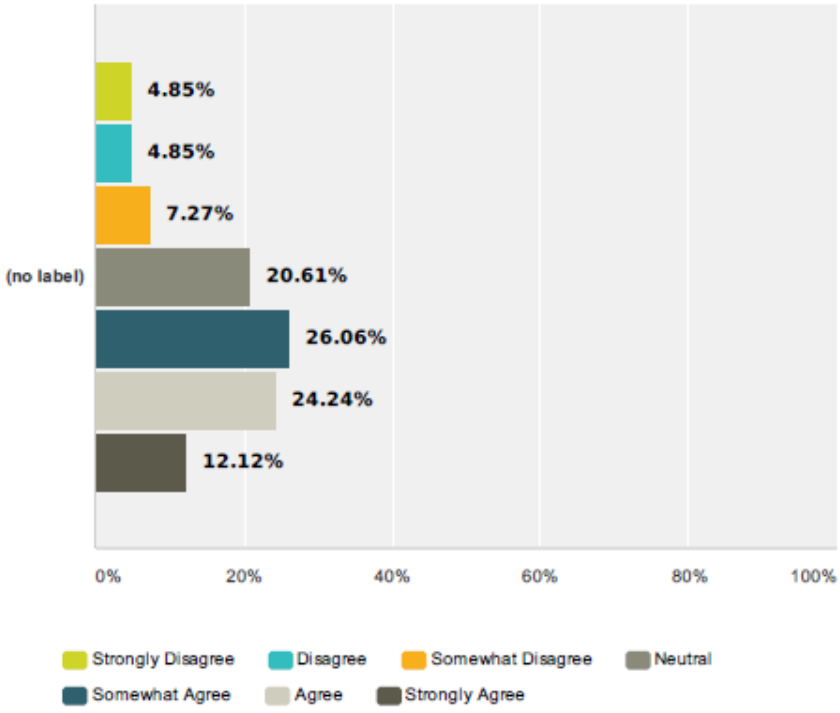
Answered: 164 Skipped: 49



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	**4.88%** 8	**4.88%** 8	**11.59%** 19	**22.56%** 37	**17.68%** 29	**20.73%** 34	**17.68%** 29	164	4.76

Q34 In our organization, errors and failures are treated as opportunities to learn, therefore employees are encouraged to talk about them.

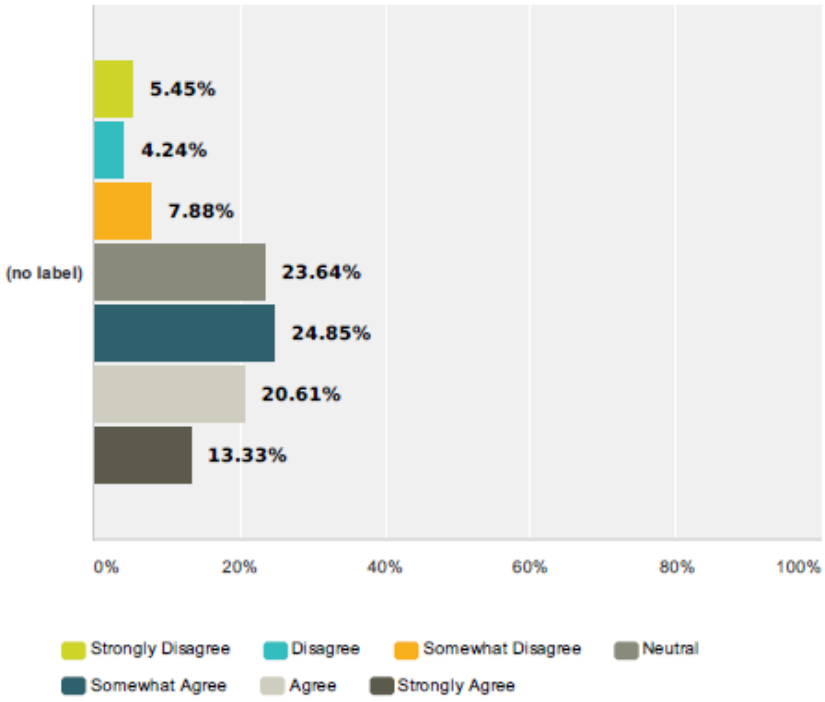
Answered: 165 Skipped: 48



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	4.85% 8	4.85% 8	7.27% 12	20.61% 34	26.06% 43	24.24% 40	12.12% 20	165	4.79

Q35 In our organization, people can speak out openly.

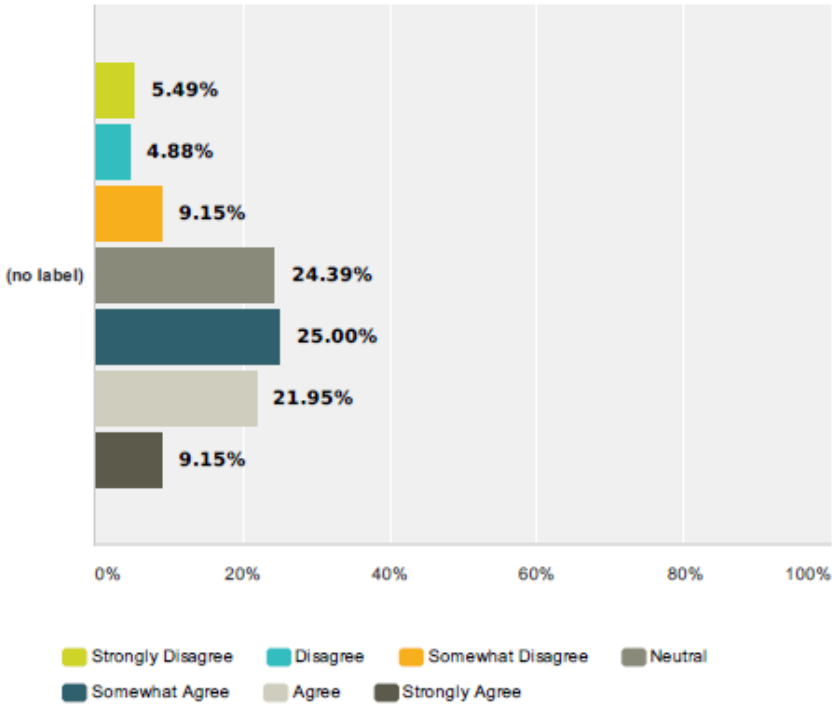
Answered: 165 Skipped: 48



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	**5.45%** 9	**4.24%** 7	**7.88%** 13	**23.64%** 39	**24.85%** 41	**20.61%** 34	**13.33%** 22	165	4.73

Q36 In our organization, people are free to express their view points, even those viewpoints that are unpopular.

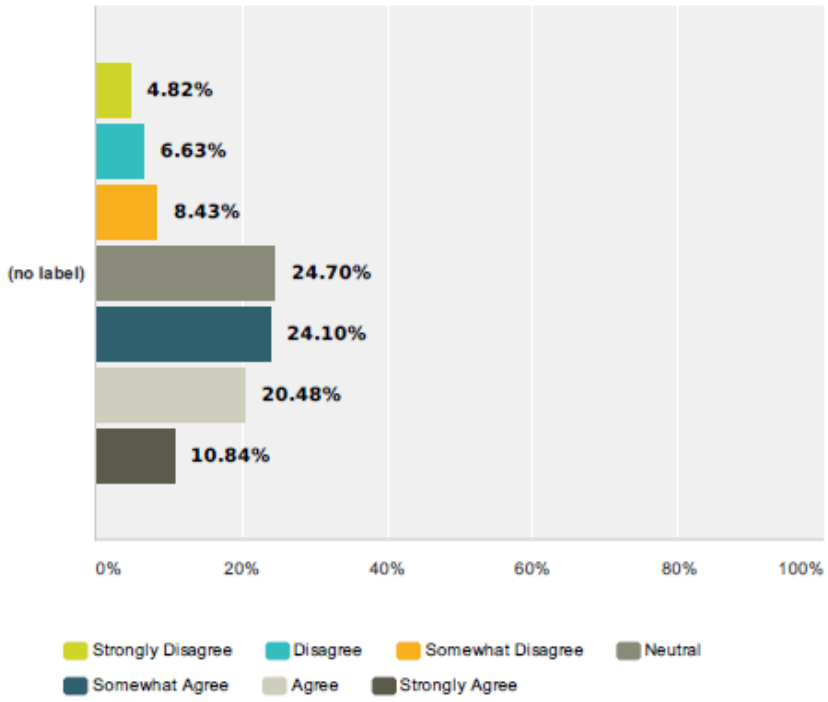
Answered: 164 Skipped: 49



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	5.49% 9	4.88% 8	9.15% 15	24.39% 40	25% 41	21.95% 36	9.15% 15	164	4.61

Q37 In our organization, open-mindedness is considered one of the most respected values that is highly encouraged.

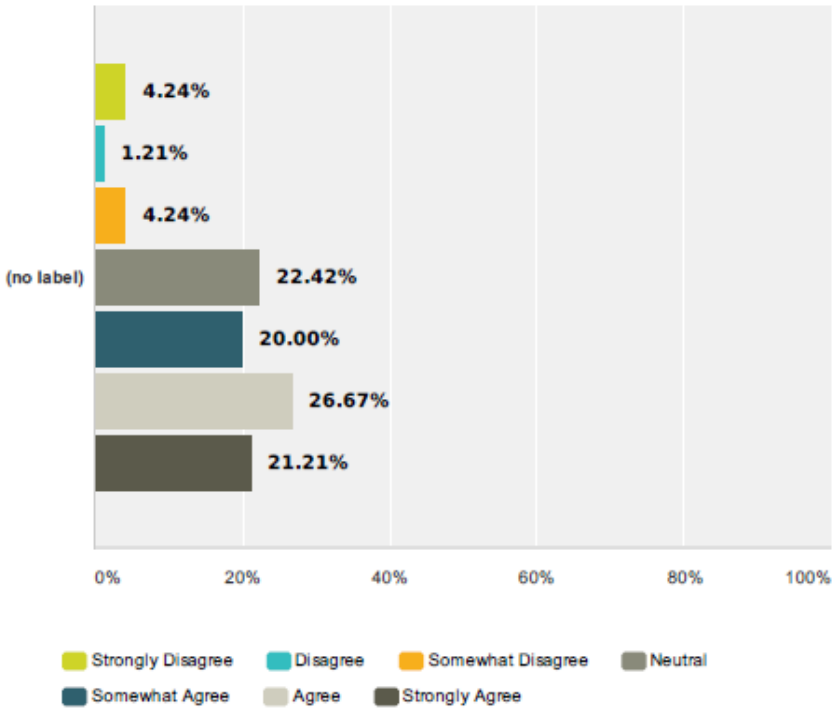
Answered: 166 Skipped: 47



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	**4.82%** 8	**6.63%** 11	**8.43%** 14	**24.70%** 41	**24.10%** 40	**20.48%** 34	**10.84%** 18	166	4.61

Q38 In our organization, thinking of an alternative way in which problems may be solved differently is highly encouraged.

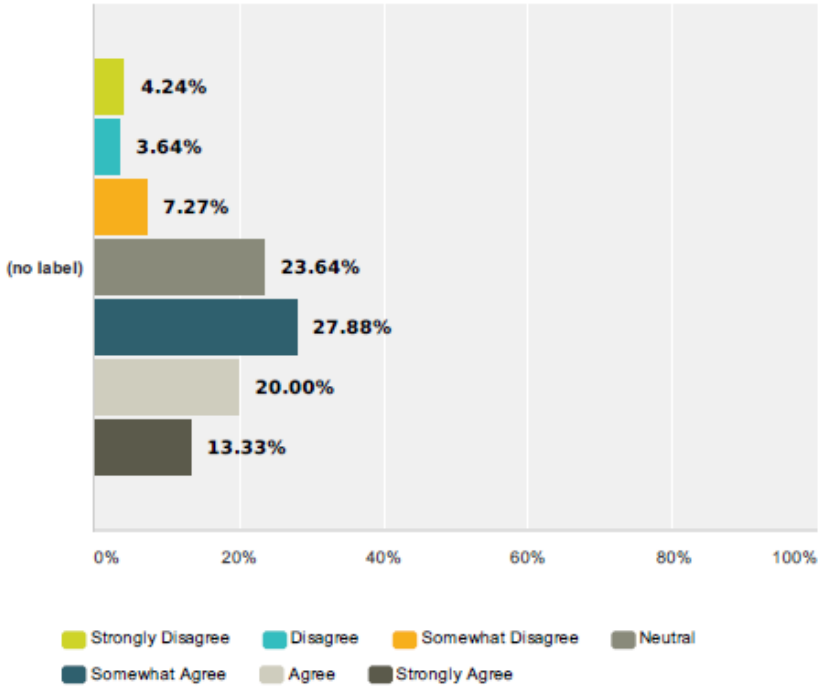
Answered: 165 Skipped: 48



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	4.24% 7	1.21% 2	4.24% 7	22.42% 37	20% 33	26.67% 44	21.21% 35	165	5.18

Q39 In our organization, trying out new ideas is always encouraged.

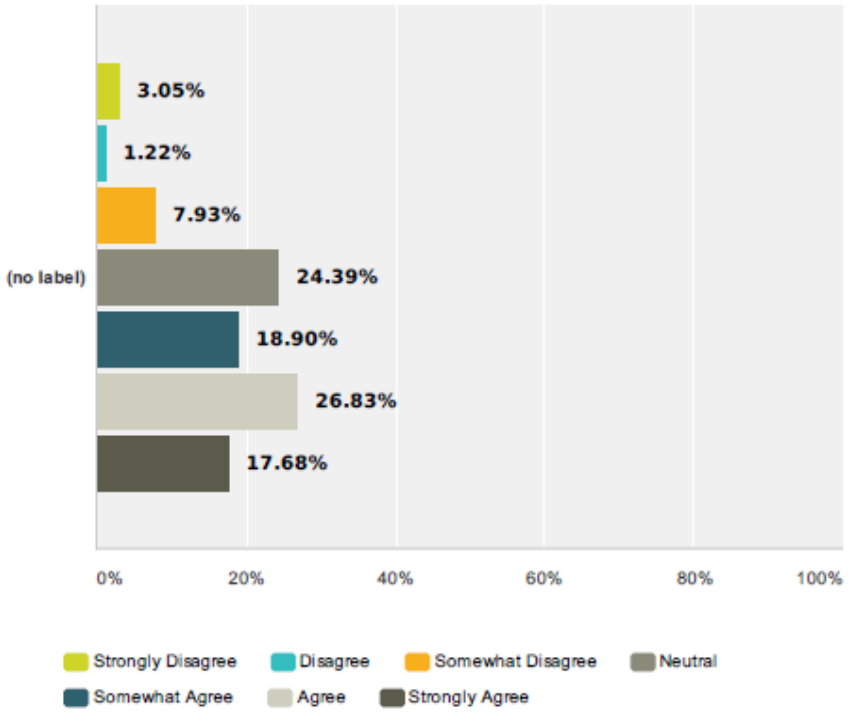
Answered: 165 Skipped: 48



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	**4.24%** 7	**3.64%** 6	**7.27%** 12	**23.64%** 39	**27.88%** 46	**20%** 33	**13.33%** 22	165	4.81

Q40 In our organization, any changes that create a value or enable organizations to meet new conditions is highly encouraged.

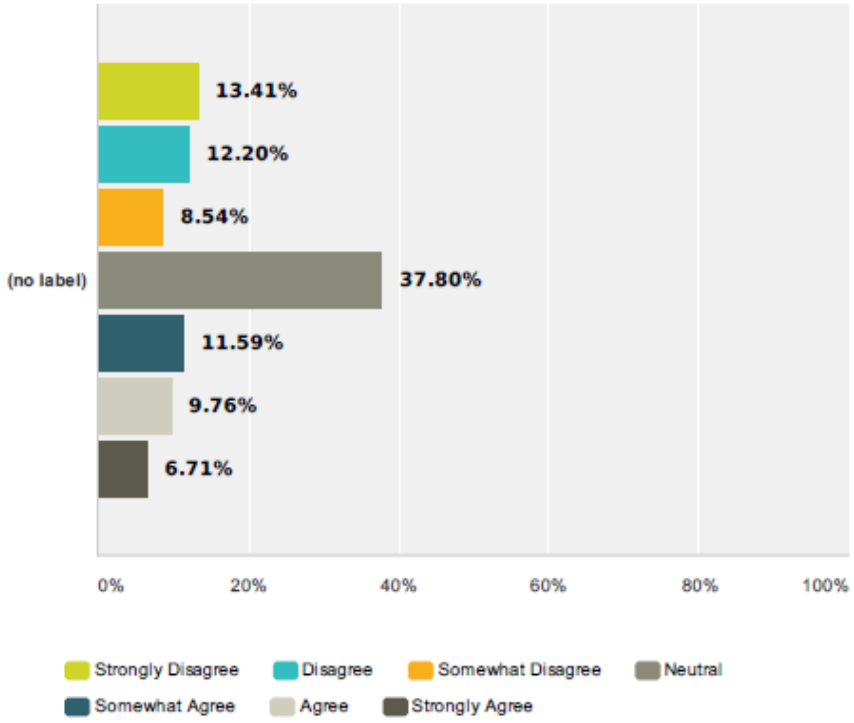
Answered: 164 Skipped: 49



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	3.05% 5	1.22% 2	7.93% 13	24.39% 40	18.90% 31	26.83% 44	17.68% 29	164	5.06

Q42 We feel it is a strategic necessity to use Cloud ERP system to compete in the marketplace

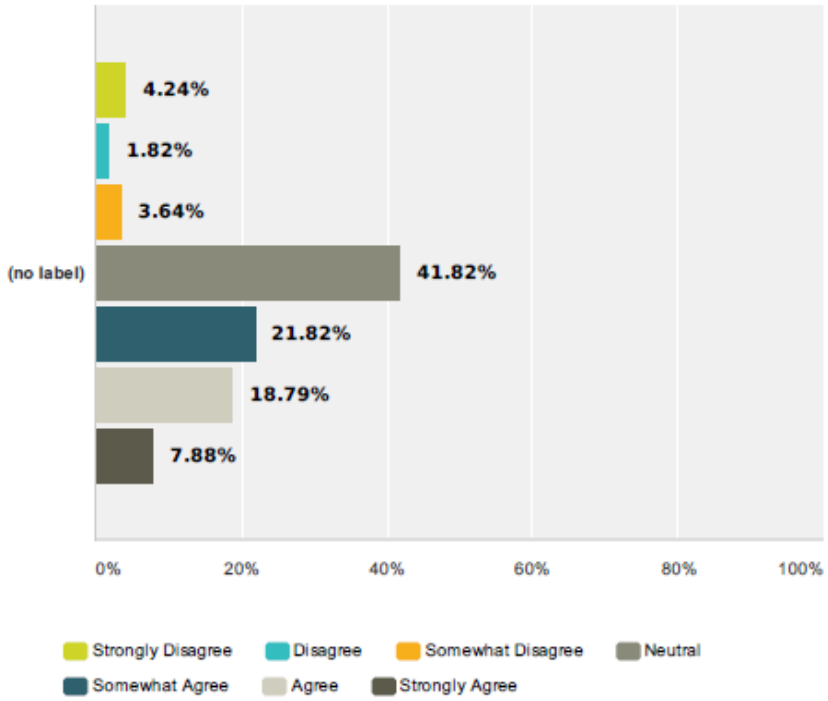
Answered: 164 Skipped: 49



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	**13.41%** 22	**12.20%** 20	**8.54%** 14	**37.80%** 62	**11.59%** 19	**9.76%** 16	**6.71%** 11	164	3.78

Q43 Cloud ERP vendors provide technical support for effective use of Cloud ERP system.

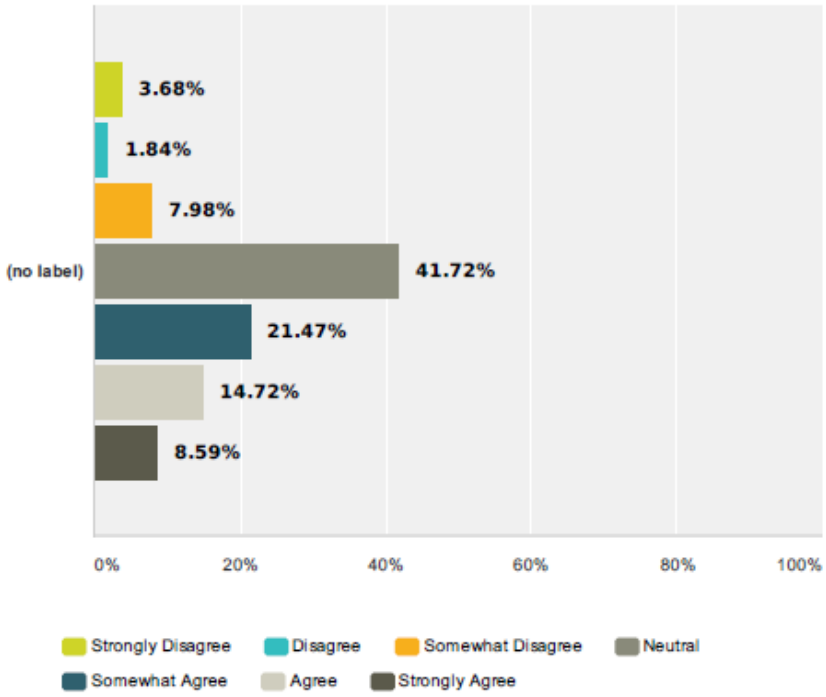
Answered: 165 Skipped: 48



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	4.24% 7	1.82% 3	3.64% 6	41.82% 69	21.82% 36	18.79% 31	7.88% 13	165	4.63

Q44 Cloud ERP vendors actively market their technology by providing incentives for adoption.

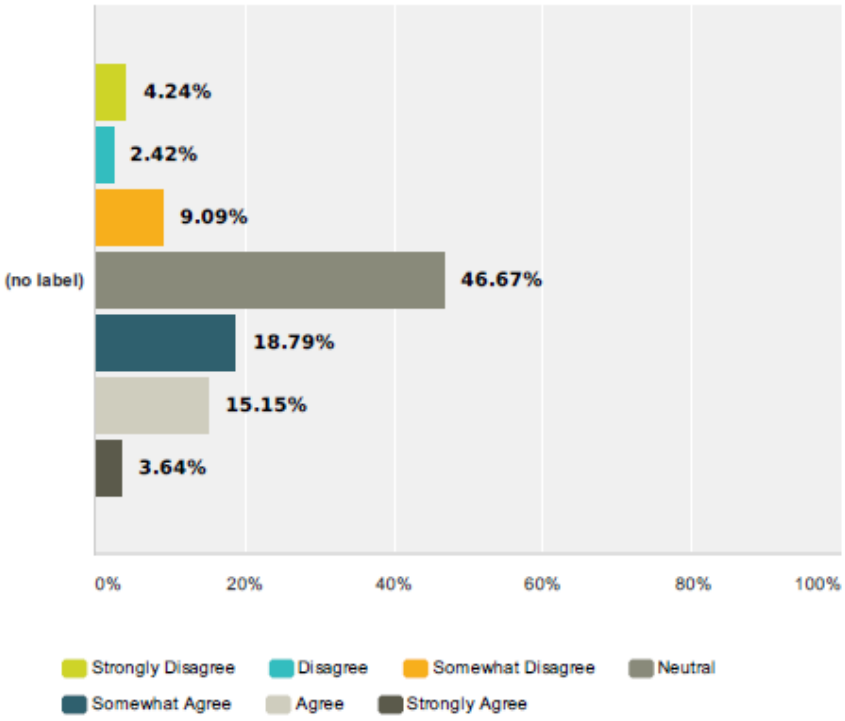
Answered: 163 Skipped: 50



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	3.68% 6	1.84% 3	7.98% 13	41.72% 68	21.47% 35	14.72% 24	8.59% 14	163	4.54

Q45 Cloud ERP vendors promote their technology by offering free training sessions.

Answered: 165 Skipped: 48



	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree	Total	Average Rating
(no label)	**4.24%** 7	**2.42%** 4	**9.09%** 15	**46.67%** 77	**18.79%** 31	**15.15%** 25	**3.64%** 6	165	4.33

Appendix E: Levines Test for Equality of Variances

Levine's Test for Equality of Variances

	Levene's Test for Equality of Variances	
	F	Sig.
S_RADV	2.067	0.153
S_COMPAT	0.099	0.754
S_SCONC	0.038	0.846
S_TOPMNG	0.143	0.706
S_Size	0.758	0.385
S_ORGREAD	5.628	0.019
S_CENTR	3.743	0.055
S_FMLZ	2.129	0.147
S_CPRESS	0.009	0.926
S_VSUPP	1.171	0.281