A Measurement of the Success of an ERP: The Case of a Distribution Center in a Developing Country

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Abstract

Today companies require more knowledge, and information technology in an effort to reduce resource costs, productivity, and product variety and inventory functions. In other words, as a business owner the individual is obligated to develop an enterprise resource planning ERP system, which aids in the unleashing of an organizations true potential with integration of business management systems. The research explores Santiago Castillo Limited use of the Sage cloud inventory system and its effectiveness to its users. The research draws upon the development of IS success models, and ERP success model. Moreover, the methods, measures, and results of this study are highlight using the eight updated IS success constructs: such as information quality, system quality, service quality, use, user satisfaction, complimentary technology quality, computer self-efficacy and perceived net benefit. Additionally, taking into consideration research findings, academic and executive implications, directions for future research are discussed leaning towards needed improvements in the employee's use of Sage Cloud Inventory system at SanCas Ltd.

Keywords: Enterprise Resource Planning (ERP), Management Information System (MIS), Sage Cloud Inventory System, IS Success Model.

Introduction

Santiago Castillo Limited is one of Belize's largest distributors of American, European, and Caribbean goods. The companies large scale operations lead to its integrations of Management information Systems (MIS) which included an ERP (Enterprise Resource Planning) system such as the Sage Cloud Inventory System. The Organization uses the software inventory and billing feature which is very critical to the company's operations. Sage Cloud allows users to manage more than just accounting; it unites the entire business so users can work more collaboratively and meet customer expectations. The system also offers deployment options and add-on solutions to meet every inimitable goal.

The investment in Management information systems have proven to be very beneficial to businesses around the world today. MIS by definition encompasses the study of people technology and organisations. Excellent management system is attainable by providing accurate and timely data. In this case, MIS specifically is performing as a particular category of systems providing report on organizational performance to help middle management monitor and control their businesses.

The continuous stream of innovative management information system (MIS) alongside some of the most recent business practices including sublime management decisions, is transforming the way we do business, generate revenue and interact with customers. The goal of every management information systems (MIS), in any organization is to improve job performance, and this performance efficiency is only achieved when MIS is accepted and used warmly by the concern employees in organizations (Venkatesh and Davis, 2000).

In reference to an Enterprise resource planning (ERP) system, it is a fully integrated business management system covering functional areas of an enterprise like Logistics, Production, Finance, Accounting and Human Resources. It organizes and integrates operation processes and information flows to make optimum use of resources such as men, material, money and machine (A. Ucakturka, 2013)

This research aims to explore the experiences with the Santiago Castillo Limited's Sage Cloud Inventory System and how effective it is to its user. The Sage inventory system is a type of management information system (MIS) that is a secure, cloud-based subscription service that helps you reduce stock outs, excess inventory, and working capital. Moreover, it's affordable, fast to implement, and connects directly to your Sage 100cloud, Sage 300cloud, and Enterprise Management ("Cloud Inventory Software and Solution,"2018).

According to a particular customer review, he stated that since the implementation of the sage inventory management system their revenues have grown by 15% while simultaneously trimming their stock-on-hand investment by one-third (David Adams, n.d). This particular customer experience is testimonial to the performance capabilities of the sage inventory systems that might be foreseen in the outcome of the research findings with Santiago Castillo use of the Sage Cloud inventory System further in this research.

Literature Review

Enterprise Resource Planning (ERP) is special type of information systems. Due to increase competitiveness in the business environment, information technology through information systems is used to improve business processes and integrate business functions. According to Sedera (2006) Enterprise systems are defined as a configurable information systems package that integrates information and information-based processes within and across functional areas in an organization. The sage inventory system is an enterprise system. Information systems must be analyzed after implementation to measure the level of successfulness. (Sedera, 2006)

In 1992, Delone and McLean suggested that the dependent variable for information systems research is Information system Success. From this research, Delone and McLean developed the Delone and Mclean (D&M) IS Success Model. This model indicates that six variables are distinct, but related dimensions of IS success: 1.) System Quality that focuses on ease of use, system flexibility, system reliability 2.) Information Quality, which focuses on relevance, understandability, accuracy, conciseness, 3.) Use which measures amount of use, frequency of use, nature of use, appropriateness of use, extent of use, purpose of use. 4.) User Satisfaction that measures user satisfaction, semantic differential scales to assess attitudes and satisfaction with the system, 5.) Individual Impact, and 6.) Organizational Impact. One distinctive conclusion of this research was that despite the multidimensional and contingent nature of IS success, an attempt should be made to reduce significantly the number of different measures used to measure IS success so that research results can be compared and findings validated. This model has been widely successful and use, as the basis for many more IS Success research.

Delone and McLean (2003) in a ten year update from their original publication, proposed the additional of another construct- Net Benefits that assesses other important factors that influence IS Success. These other factors include work group impacts, inter-organizational and industry impacts, consumer impacts,

and social impacts. The degree to which these constructs are analyzed is dependent on the nature of the IS system being studied. (Delone, McLean, 2003)

Delone, McClean along with Petter expanded in 2013 on the original D&M model to determine if there were factors directly under management control those impacts IS success. The aim of this research was to find out if" the D&M IS Success Model is a reasonably robust description of the dependent variable of IS research, then what are the independent variables that "cause" IS success?"(Delone, McLean, Petter, 2013 p. 45). They reviewed 140 IS Success studies done within the recent 15 years and found 43 variable common within the studies that were said to be independent variables (determinants of IS Success). This 43 variables were grouped in 5 determinant categories which are task, individual, social, project, and organizational. This study resulted in other variables being listed as variables of interest and encourages further research on these variables to be conducted. "The more that we learn about the factors that influence IS success, the more that we, as researchers, are able to help organizations implement successful IS" (Delone, et. al, 2013 p.46)

In 2015, Ghobakloo and Tang developed an integrated model of Information System (IS) success based on the DeLone and McLean (2003) updated D&M IS Success Model. The study is unique as it focuses on the success of information systems in small to medium enterprises: case of developing countries. Information, in the form of a questionnaire, was gathered from 316 Iranian and Malaysian manufacturing SMEs. Their finding was that IS success among SMEs are not limited to the technological factors identified in the DeLone and McLean (2003) IS success model. But in fact, IS success is influenced by other factors such as organizational and environmental factors. "The study contributes to the theory by extending and empirically testing the DeLone and McLean IS success model in a different setting than in previous studies" (Ghobakloo, Tang, 2015, abstract). It seems then that IS success models are influenced differently based on the industry and level of development of the country it is being studied in.

Lin, Hsu, and Ting (2006) studied Information System success models in Enterprise Resource Planning Systems that are implemented in Taiwan In addition to constructs used in the D&M IS Success Model, this study uses the idea of a scorecard to help determine the success of the IS system. The balanced scorecard includes four sets of measures: financial, customer, internal, business and innovation and learning. Unlike traditional measures which scores success based on financials, the scorecard is comprehensive of other areas such as customer satisfaction, growth of employees, improvement of business processes, etc. The conclusions of this study were drawn from 548 mail responses from Taiwanese firms that have implemented ERP systems. The findings of this research were that System quality and information quality were shown to be important to ERP utilization and user satisfaction. In addition, system use and user satisfaction appeared to influence individual performance and productivity. The results show that individual impact has strong direct effects on the four balanced scorecard dimensions. This study encouraged future research on how culture affect the success of IS Success.

Research Model and Hypotheses

The ERP (Enterprise Resource Planning) framework consisted of the staff members of SanCas Ltd. using this system specifically for accounting purposes, generating the ERP as an accommodation and IS prodigy. The revised IS success model created by DeLone and McLean (2003) was modified to the measurement tasks of this ERP (Sage Cloud) framework. Consequently, this research suggests an inclusive model of ERP success, which advocates that information quality, system quality, service quality, use, user satisfaction, complimentary technology quality, computer self-efficacy and perceived net benefit are Sage Cloud's success constructs.

The classifications of the D&M IS success model were evidently examined by the researchers, and were then compared with the exact properties of the ERP (Sage Cloud). Thus, the following success constructs were incorporated:

- Information quality: This construct emphasized on the excellence of the Sage Cloud system formation and its helpfulness for each user. It has been proven that when exploring overall IS success, Information quality is a vital success feature.

- System quality: This construct contained the rations of Sage Cloud as a system in itself. It reflects functionality, performance attributes and usability, in addition to others.
- Service quality: This construct is produced by the service provider and comprises of the inclusive support actions in relation to the Sage Cloud system. The success construct encompasses properties such as aptitude of the staff member, dependability, compassion and receptiveness.
- User satisfaction: This construct is the employee's sentimental attitude towards directly using the Sage Cloud system. User satisfaction is considered one of the most essential constructs when considering overall IS success.
- Use: This construct measures the perceived actual use of Sage Cloud and its users.
- Complimentary Technology Quality: This construct is never considered necessary; however, known to be quite adequate and cannot be assumed in developing countries. It has a 2-item scale to extend the model for developing countries.
- Computer Self-Efficacy: This construct signifies the individuals' perception of his or her capability to use a computer in achieving a particular duty (Compeau and Higgins, 1995).
- Perceived Net Benefit: This construct is the attainment of the objectives and achievement of end-user associated goals from using the Sage Cloud system at SanCas Ltd. This construct involves qualities such as: cost diminution, task presentation, quality development and job competence.

This research focuses mainly on the perspective of the employee, and uses the eight updated IS success constructs: information quality, system quality, service quality, use, user satisfaction, complimentary technology quality, computer self-efficacy and perceived net benefit.

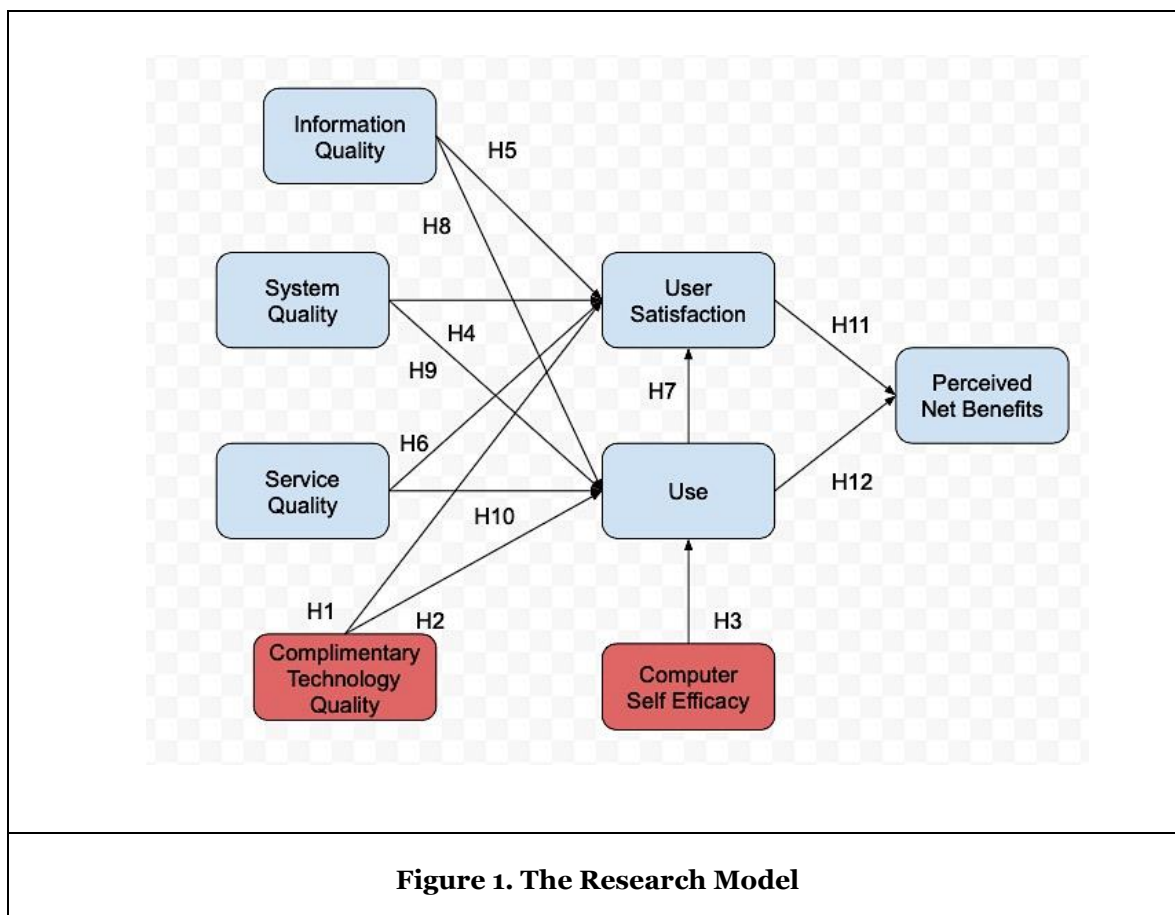**Figure 1. The Research Model**

Figure 1. The Research Model is a hypothesized relationship between the ERP Sage Cloud System and how successful it is using the success dimension; it will only be based on theoretical work reported by DeLone and McLean (2003). This phenomenal masterpiece conveyed by D&M established the theorized relationship between the Sage Cloud system and the IS success constructs. The following twelve hypotheses were verified:

H1. Complementary technology quality will positively impact user satisfaction.
H2. Complementary technology quality will positively impact system use.
H3. Computer self-efficacy will positively impact system use.
H4. System quality will positively impact user satisfaction.
H5. Information quality will positively impact user satisfaction.
H6. Service quality will positively impact user satisfaction.
H7. Use will positively impact user satisfaction.
H8. Information quality will positively impact use.
H9. System quality will positively impact use.
H10. Service quality will positively impact use.
H11.User satisfaction will positively impact perceived net benefit.
H12.Use will positively impact perceived net benefit.

Description of Participants

The participants are employees of Santiago Castillo Ltd.; they are approximately a little under 500 employees throughout the SanCas Branches. Research data was collected from employees that work at the five main branches; which are Save U Supermarket, People's Store, SanCas, Belmex and Angelus Press located throughout the country.

Research Methodology

Construct Measurement

In order to guarantee that legitimate content was produced for the quantitative data collection aspect of this research, questions were based on the thriving and pragmatic IS success model developed by DeLone and McLean (2003).

Firstly, the Information Quality construct was calculated by a seven-item scale from Bailey and Pearson (1983), in which adjustments were made to correctly suit the framework of the Sage Cloud Inventory System, this instrument is undoubtedly acknowledged, whereas it has been verified for dependability and rationality by multiple researchers, therefore becoming the average instrument in the IS domain. Secondly, the Computer Self-Efficacy Measure construct consists of a ten-item scale. Complimentary Technology Quality with only a two-item scale. Service quality construct was estimated using a four-tem scale implemented and refined from instruments operated by Chang et al (2009). User Satisfaction with a four-item measure scale; which recognizes the attitude of the employees at SanCas Ltd. who directly works with the Sage Inventory System (Doll and Torkzadeh, 1988). Use construct was evaluated by a four-item measure modified from foregoing findings (Balaban et al., 2013; Rai et al., 2002). Lastly, Perceived Net Benefits construct with a five-item scale; expresses the accomplishment of SanCas Ltd. aims for using the Sage Inventory System and attainment of end-user related objectives from using this system (Alshibly, 2011; Tansley et al, 2001). Each segment was computed using a 7-point Scale with numbers ranging from agree (7) to disagree (1).

Moreover, after the measurement variables were produced, they were then reviewed and approved by the researchers MIS lecturer who also offered suitable feedback on both the precision and duration of each segment. In regards to the distribution, a total of 80 surveys were given throughout the organization including the different branches countrywide such as People's Store in Orange Walk district, Angelus Press Limited, Belmex Duty Free Store in the Freezone, Corozal and Save-U Supermarket. However, only 45 surveys were answered since only certain departments work directly with the Sage Inventory System.

Table 1 depicts the various research constructs and specific survey questions related to the Sage Inventory System.

Table 1. Measurement Items for Questionnaire	
Construct	**Survey Questions**
Information Quality	IQ1: Sage Cloud Inventory system provides information that is exactly what you need IQ2: Sage Cloud Inventory system provides information you need at the right time IQ3: Sage Cloud Inventory system provides information that is relevant to your banking needs IQ4: Sage Cloud Inventory system provides sufficient information IQ5: Sage Cloud Inventory system provides information that is easy to understand IQ6: Sage Cloud Inventory system provides up-to-date information IQ7: Sage Cloud Inventory system provides sufficient information
Computer Self-Efficacy Measure	CSE1: I could complete the job using Sage Cloud Inventory system if there was no one around to tell me what to do as I go CSE2: I could complete the job using Sage Cloud Inventory system if I had never used an information system like it before CSE3: I could complete the job using Sage Cloud Inventory system if I had only the information system manuals for reference CSE4: I could complete the job using Sage Cloud Inventory system if I had seen someone else using the information system before trying it myself CSE5: I could complete the job using Sage Cloud Inventory system if I could call someone for help if I got stuck CSE6: I could complete the job using Sage Cloud Inventory system if someone else had helped me get started. CSE7: I could complete the job using Sage Cloud Inventory system if l had a lot of time to complete the job for which the information system was provided CSE8: I could complete the job using Sage Cloud Inventory system if I had just the built-in help facility for assistance CSE9: I could complete the job using Sage Cloud Inventory system if someone showed me how to do it first. CSE10: I could complete the job using Sage Cloud Inventory system if I had used similar information systems before this one to do the

	same job
Complementary Technology Quality	CTQ1: The software on the device (desktop, laptop, mobile device) used to access Sage Cloud Inventory system is adequate CTQ2: The speed of the Internet connection used to access Sage Cloud Inventory System is adequate
Service Quality	SV1: The support staff keeps the Sage Cloud Inventory system software up to date SV2: When users have a problem Sage Cloud Inventory system's support staff shows a sincere interest in solving it SV3: Sage Cloud Inventory system's support staff respond promptly when users have a problem SV4: Sage Cloud Inventory system's support staff tell users exactly when services will be performed
User Satisfaction	US1: You have a positive attitude towards Sage Cloud Inventory system US2: You think that Sage Cloud Inventory system is useful US3: Sage Cloud Inventory system has met your expectations US4: You are satisfied with the Sage Cloud Inventory system
Use	U1: Your frequency of use of Sage Cloud Inventory system is high U2: You depend upon Sage Cloud Inventory system U3: You were able to complete a task using Sage Cloud Inventory system even when there was no one around to tell you what to do U4: You have the knowledge necessary to use Sage Cloud Inventory system
Perceived Net Benefits	NB1: Sage Cloud Inventory system helps you improve your financial planning NB2: Sage Cloud Inventory system helps you save time and costs NB3: Sage Cloud Inventory system helps you achieve your financial goals NB4: Using Sage Cloud Inventory system improves your financial budgeting NB5: Overall, using Sage Cloud Inventory system enhances your productivity

Table 1. Survey Instrument

Sampling and Data Collection

The statistics for this research were gathered from a number of SanCas Ltd. employees' from the different branches throughout Belize actively using the Sage Cloud system. Researchers used the "purposive sampling" technique with the advantage of personally selecting appropriate individuals based on their own judgment. First and foremost, employees of SanCas were all kindly asked if they would like to participate in the survey to gather information as to how well they use the ERP Sage Cloud System. If permission was granted the employee(s) were then given their perspective questionnaire.

An entirety of 80 questionnaires were distributed to the employees in which only 45 usable questionnaires were received, generating a response rate of 56.25 percent, which is considered acceptable. Female participants represented a slightly higher percentage of the completed sample (approximately 68.8%) compared to male participants (approximately 31.1%). 60% of the participants were aged 25-35 years. The completed sample was composed of approximately 57.7% of educated participants who obtain an Associates degree. The participants were mostly skilled with 11-15 years working experience at 31.1%.

Table 2. Characteristics of Respondents		
Characteristics	Number	Percent
Gender		
Male	14	31.1%
Female	31	68.8%
Age		
< 25	6	13.3%
25-35	27	60%
36-45	9	20%
46-55	3	6.6%
>55	0	0
Education		
PHD	0	0
Masters	1	2.2%
Bachelors	8	17.7%
Associates	26	57.7%
High School	9	20%
Primary School	0	0
Working Experience		
<5	10	22.2%
5-10	13	28.8%
11-15	14	31.1%
15+	8	17.7%

Table 2. Characteristics

Data Analysis and Discussion

This is an applied research analysis of data collected from Santiago Castillo Limited. The research aim to test how effective the Sage Inventory System is for employees at the organization. A sample size of forty-five (45) employees was used to carry out the research. The survey instrument used was a questionnaire, respondents were asked to answer questions with a rating from one (1) which is strongly disagree to seven (7) being strongly agree.
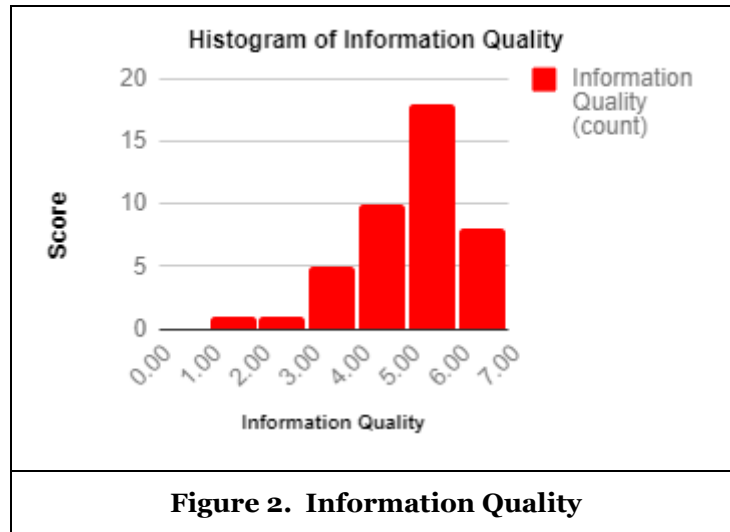
Figure 2. Information Quality

Figure 2 shows responses for information quality of the Sage Inventory System. Eighteen (18) of the employees, which is the majority rate the information quality a five (5) out of seven (7). This is showing that the Sage Cloud Inventory System provides sufficient and understandable information for employees.
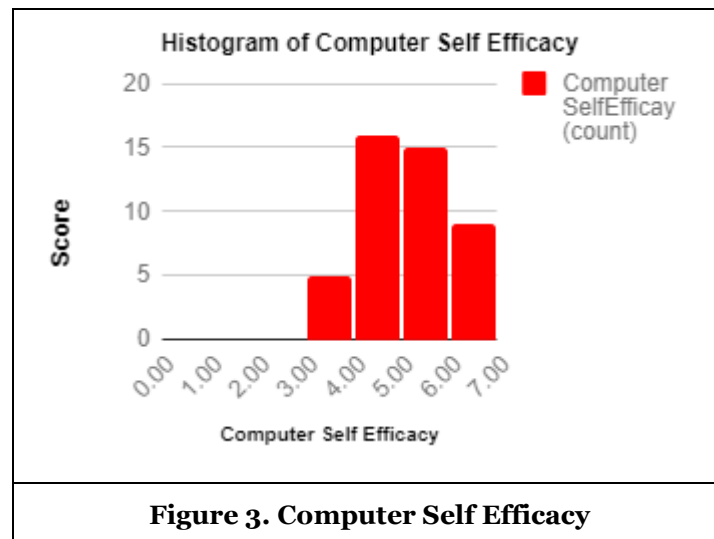

Figure 3. Computer Self Efficacy

Figure 3, Computer Self Efficacy shows that of the forty-five (45) employees surveyed, 16 participants rated computer self-efficacy a four out of seven, which is an average. This shows that on average the employees can use the Sage system if there was no one around showing them what to do. Out of the forty-five (45) employees, 15 of them rate the system at a five out of seven.

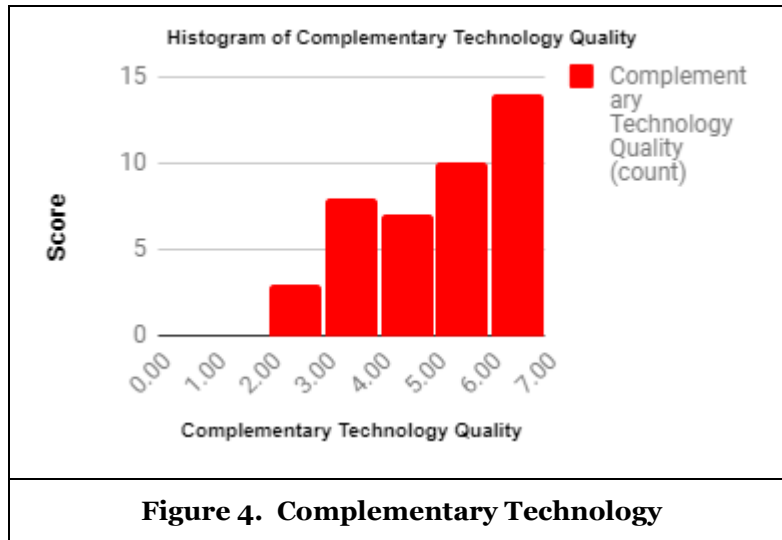**Figure 4. Complementary Technology**

Figure 4, Complementary Technology revealed that fourteen (14) of the employees rate the complementary technology a six (6) out of seven (7). This data revealed that the technologies that accompany the Sage System are adequate for the use of the system.

Figure 5. Service Quality

Figure 5, Service Quality revealed that fifteen (15) employees rate the quality a four (4) out of seven (7). The support given to employees is Service quality pertain to how well the support staff assist them when they have a problem with the system.
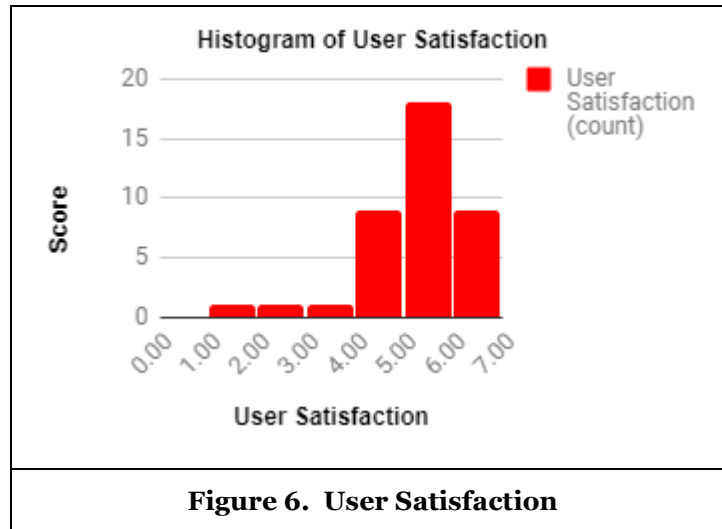
Figure 6. User Satisfaction

Figure 6, User Satisfaction revealed eighteen (18), which is the majority of the employees rating the use if the system a six (6). This shows that the users of the Sage system are very satisfied with it.
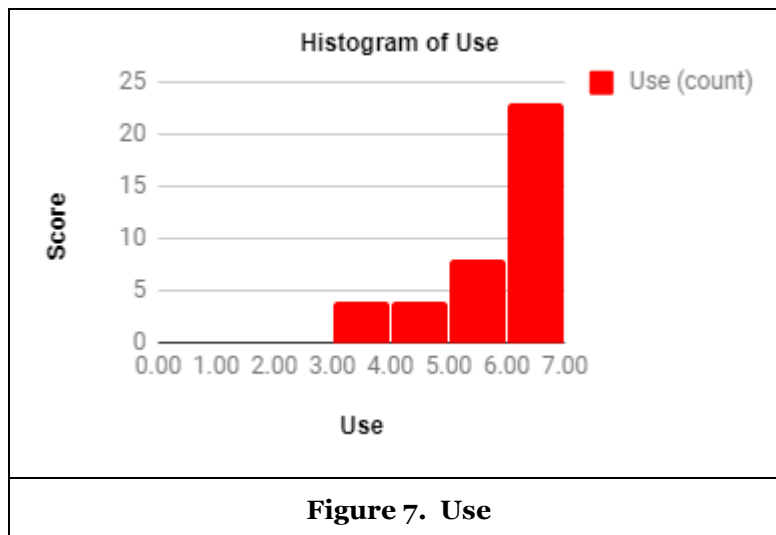

Figure 7. Use

Figure 7, Use of the Sage Inventory System revealed that the majority of the employees, twenty-three (23) out of the 45 uses the system frequently and depend on it to do their job. These employees rate the use a six (6).
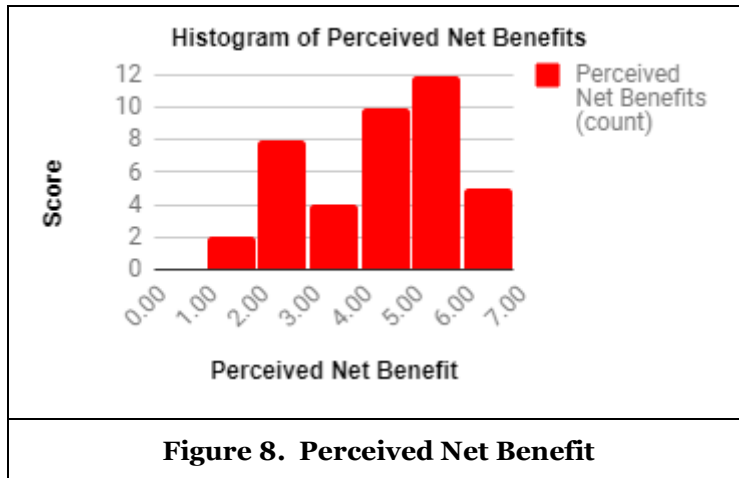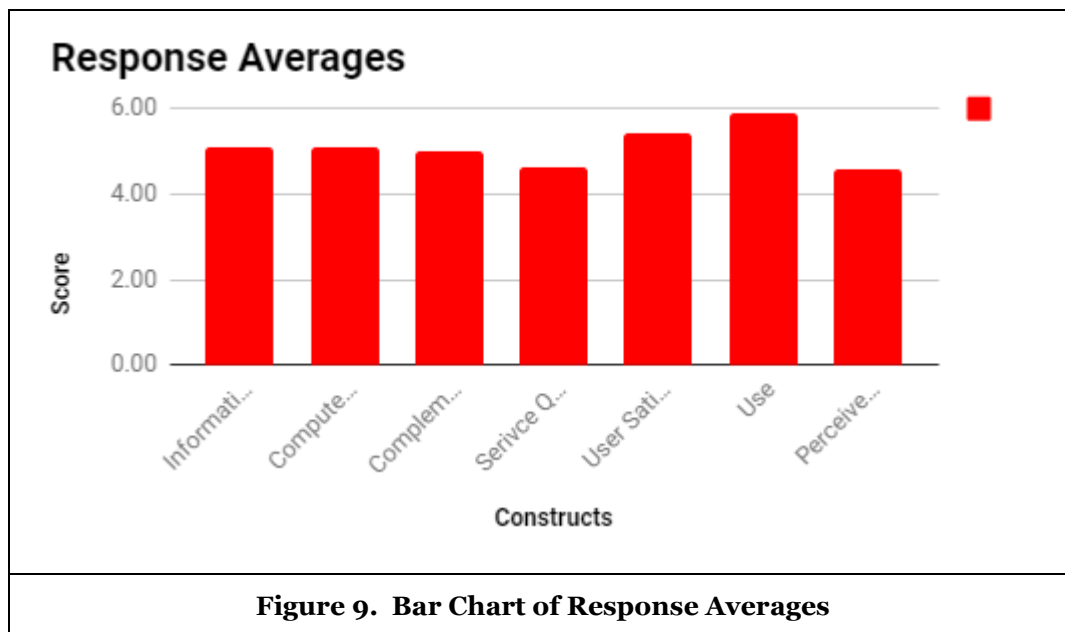
Figure 8. Perceived Net Benefit

Figure 8, Perceived Net Benefit revealed that most of the employees, twelve (12) of them believe that the Sage System is somewhat successful rating it a six (6) out of seven (7). Out of the respondents five of them rate the Sage system a seven (7) they believe that the system is extremely successful.

Figure 9. Bar Chart of Response Averages

The bar chart is an average of all the responses that was collected from the staff at Santiago Castillo Limited. Its shows that the service quality of the system is the lowest rated from the model with an average of 4.64. The highest rate of the model was Use at an average of 5.88. There is a lack of communication between the IT technician who are responsible for the system and the employees who uses it.

Discussion

The research was aim towards measuring the success of the Sage Cloud Inventory ERP system at Santiago Castillo Limited. The Sage system model was developed based on the Delone and McLean (2003) IS success model with two additional construct added to give it a developing world perspective. The construct, information quality, computer self-efficacy, complementary technology, service quality, user satisfaction, use and the perceived net benefits are a rational measurement for the success of the system. A test of the two independent variable, user satisfaction and use, showed that employees do use the system on average 5.88 but there are not satisfied completely satisfied with it. The user satisfaction average was 5.41; we attribute this be a causal effect from the service quality, which was the lowest rated. The perceived net benefit is usually an average of the use and user satisfaction.

Conclusion

Implication

The outcome of the research revealed that the system is somewhat successful at Santiago Castillo. To give the research a developing world prospective two additional construct was added, Complementary Technology and Computer Self –Efficacy. Research showed that the two construct did not add any value the effectiveness of the Sage system.

Limitation and Future Research

The research was aimed towards measuring the success of Santiago Castillo Limited Sage Cloud System. We found that the system is somewhat successful and the technicians need to improve the line of communication with the staff. Due to the limited amount of time given to complete the study, time played a major role in limiting the results of the research. Researchers faced time constraint; hence not enough data was collected. The study provided beneficial information for the company to improve on so that their system can be successful in the future.

For future research we recommend that more data be collected to improve on the effectiveness of the responses and do a basic analysis of the model. To perform a quantitative analysis of the collected data, run it in the SPSS software system.

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