Measuring the Success of Hospital Information System (HIS) at La Loma Luz Adventist Hospital

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Abstract

One of the most important things that an organization does is to evaluate the success of their information system. A research was conducted to measure the success of the hospital information system at La Loma Luz Adventist Hospital. Information was gathered from 30 respondents (employees) at La Loma Luz Adventist Hospital with the use of survey questions. This research adapts the empirical test of DeLone and Mc Lean. These models consist of six constructs which are system quality, service quality, information quality, use, perceived benefits and user satisfaction. In addition, another construct was added which is the self-efficacy measure. The information system utilized at La Loma Luz Adventist Hospital is used by both administration and middle employees to input information, extract information, and to create reports for decision making. The objectives of this research are to determine whether the information system is being successful and to determine the benefits the information system provides for the creation of reports and decision making. The conclusion of the research states that there is a neutral result. This indicates that there is room for improvement so that for future success the users are fully satisfied.

Keywords: Information System, Success Model, Decision Making, Benefits

Introduction

La Loma Luz Adventist Hospital first introduced Microsoft Excel to employees in 2002 to aid employees in the creation of reports and to store information. Since then the hospital started to introduce Lotus to the front desk and Quick books to the financial department. Eventually with the advancement in technology in 2003 the IT department proposed for a Hospital Information System to be adapted for the administrational needs of the hospital. Fortunately, Doctors from abroad who came to serve community service were present the year this was proposed and collaborated financially as a donation to the hospital for this information system to be adapted.

Hospital Information System (HIS) is an information system which focuses mainly on the administrational needs of hospitals. This manages all the aspects of the hospital's operation that is,

medical, administrative, financial, and legal issues for the corresponding processing of services. This information system is also known as Hospital Management Software. This system helps to safeguard information for the hospital such as patient's health history. This is one of the mostly used information system around the world within hospitals since they were first introduced in the 1960's and have been evolving with time and the modernization of healthcare facilities.

The drive of this study is to determine the success of Hospital Information System, finding ways in how it can be improved and the net benefits it provides to the users at La Loma Luz Adventist Hospital. Over the past 16 years since the Hospital Information system has implemented it is rather important to determine the value and importance of whether it is being successful. Since it was implemented this is the first time that there is an evaluation of the system. This research benefits the hospital since it will provide the IT department and upper management with feedback directly from users on the success of the Information System. The information gathered would help the IT department with ways on how they can improve the usage of the Hospital Information System to meet their organizational goals efficiently.

We aim to examine the efficiency and success of the system and to gather information which will help in the improvement and advancement of the system for future use. With the easiest method of research, which is, distributing questionnaires to employees, necessary data will be complied and analyzed. This would be presented in table forms, graphs and charts.

Literature Review

The Healthcare institution selected is a leading institution within its community and country and is also known internationally as mission groups' host. This healthcare institution has no specific IT management software for management's internal control of the operations. The finance Department operates with Quickbooks and Front Desk operates with Lotus. According to Petter, Delone and Mclean Information System is developed using IT to aid an individual in performing a task (2008). This is exactly what the institution needs in order to facilitate the IT personnel to get their tasks done effectively and efficiently as it is easy for them to manage their networks.

Information system (IS) success is of great matter of interest for managers and Information Technology (IT) professionals. Delone and Mclean (2003) developed a model that measures the success of an information system. This model uses the constructs to measure the connection between the quality and satisfaction of the user to the system. Under this model, six major IS factors are relisted. This model for evaluating an information system's success includes: System Quality measures the quality of the information processing within the system; The IS output is measured by Information Quality; Use is seen as the demand or consumption of IS output; User Satisfaction describes the reaction of the recipient to the use of the IS output; The impact of information on user/receiver behaviour is measured by Individual Impact; and finally, Organizational Impact describes the influence of information on overall organizational success (Delone & Mclean, 2003).

Richard Heeks published a research on the Information Society, on Information Systems and Developing Countries stated that, "Failure, Success, and Local Improvisations provided verification that various Information Systems in developing countries even though successful they can still be categorized as failing either totally or partially." The study also continued in developing a new model in which its aim is to explain the high rates of failure. This model contributes in identifying two high-risk archetypes that is believed to affect Information systems in Developing Countries. The model and the theories carry a dual relationship with information systems in developing countries (Heeks, 2002). According to Heeks, the Model is also beneficial because it leads to explaining the constraints that exist in the improvisation of the local Information system in developing countries.

Ghobakloo and Tang (2015) developed another integrated model of Information Systems (IS) based on Delone and Mclean model of Information Success: A ten-year update. The study was conducted to provide small and medium-sized enterprises (SME'S) in developing countries to show the importance and knowledge of IS success. Within the study, it was noted that Information System among SME's is not limited to the technological factors identified in the Delone and Mclean (2003) Information Model. Furthermore, Information System success (SME's) is also determined by some key organizational and environmental determinants. Some of the organizational determinants of SME's include top management suppor,t which also provides financial and technical support. With the support from top management, it

is easier to ensure a sufficient allocation of resources and can function as an agent to provide a more conducive environment for Information System Success. Ghobakloo and Tang (2015) also stated that many SME's are suffering from the lack of internal IS expertise. Their emphasis was that smaller businesses in developing countries must overcome this fact of lack of Internal IS expertise. This would be done by either getting assistance from external sources or developing their own internal end user's computing skills.

A research was conducted by Poddar (2017) to understand constraints of the user interface of the banking software package being used by different commercial banks in India. They used eight checkpoints (the compatibility, consistency, flexibility, learnability, minimal action, memory load, perceptual limitations, and provide user guidance) of various categories to identify and analyze the user interface of the software packages and noted that they did not matched with the user's expectations. Furthermore, Poddar (2017) found that the software packages which has been designed for fulfilling the purpose of core banking and generate revenue for the financial organization were not perceived that usable by the bank employees. Their research concluded that there is a need to reconsider the design of the user interface aspects of the banking software.

David Miller and Mark Woodman (2010) stated, "Over a forty-year period, there have been many surveys at frequent intervals by different organizations designed to understand the success rates of projects that deliver software or, more generally, IT systems." There is a great demand for IT systems by many organizations across every continent; however, despite the fact that there are large amounts of information available, it is indicated through surveys that there is no correlation between the practical use of current tools and successful business results. The article states that the best way to successfully target and meet the customer's expectations is by recognizing and accepting that a service-oriented approach is the best way to meet the needs of the customers' software needs. Here, the author emphasized that software engineers are not treating their customers with the right approach or quality of service; hence, there is a gap between the customers and the software. It could be that the software that was sold to the customer might not achieve all that the customer would want it to achieve and that the software might have added features that deemed useless by the customer. Because of this, the useless feature of the software makes it be perceived with low remarks and takes away from the functionality of the software and customer satisfaction in using IT, such as a Business Service Management IT system.

The research paper Strategic Integration of IT and Business Service Management which was conducted by Brenda F. Richardson and Ahmed Y. Mahfouz indicates that IT (Information Technology) can solve problems related to business management. The software industry is growing ever since the early decades of the introduction of personal computers being used to aid in work setting within an organization. Richardson and Mahfouz (2009) stated, "The IT management industry consists of information technology and management which focuses on the management of a collection of systems, infrastructure, and information that originated from the practice of IT Portfolio Management". This means that the IT management leads way to a better and more efficient control in an organization through the collection of the system, infrastructure, and information. IT has its focus on managing information technologies towards a business form, whereby Business Service Management reduces the various business processes. Business Service Management software is gearing up for the future to be an automated form of management solutions. One of the ways of achieving efficiency in an organization is to attempt to automate as much as possible; when it is possible. Decade by decade, software are becoming more sophisticated and are outperforming humans in some areas of forecasting and solving problems.

Methodology of the Study

Construct Measurement

La Loma Luz Adventist Hospital system is utilized at the hospital and is providing staff the opportunity to provide high-quality patient-focused health care that is readily accessible, cost effective and meets the needs of the communities we serve.

This research used Delone and McLean, to measure the Information Quality, System Quality, Complementary Technology Quality, Service Quality, User Satisfaction, Use, and Perceived Net Benefits.

The Information Quality consists of six questions, System Quality three questions, Complementary Technology two questions, Service Quality four questions, User Satisfaction four questions and the Use section consists of four questions. The perceived net benefits section consists of five questions. The instrument has proven to be effective for consistence and valid by several researchers.

Construct	Survey Questions	Source
Information Quality	IQ1: La Loma Luz Hospital online system provides information that is exactly what you needed IQ2: La Loma Luz Hospital Information System provides information you need at the right time IQ3: La Loma Luz Hospital Information System provides information that is relevant to your task IQ4: La Loma Luz Hospital Information System provides sufficient information IQ5: La Loma Luz Hospital Information System provides information that is easy to understand IQ6: La Loma Luz Hospital Information System provides up-to-date information.	Bailey and Person (1983)
System Quality	SQ1 La Loma Luz Hospital Information System is easy to use SQ2: La Loma Luz Hospital Information System is user-friendly SQ3: La Loma Luz Hospital Information System provides interactive features between users and the system.	Bailey and Person (1983)
Complementary Technology Quality	CTQ1: The device (desktop, laptop, mobile device) you normally use to access La Loma Luz Hospital Information System is adequate CTQ2: The device (desktop, laptop, mobile device) you normally use to access La Loma Luz Hospital Information System has a fast and reliable internet connection	Bailey and Person (1983)
Service Quality	SV1: The support staff La Loma Luz Hospital Information System software up to date SV2: When users have a problem La Loma Luz Hospital Information System support staff show a sincere interest in solving it SV3: La Loma Luz Hospital Information System support staff respond promptly when users have a problem SV4: La Loma Luz Hospital Information System support staff tell users exactly when services will be performed	Bailey and Person (1983)

User Satisfaction	US1: You have a positive attitude towards La Loma Luz Hospital Information System function. US2: You think that La Loma Luz Hospital Information System is useful. US3 La Loma Luz Hospital Information System has met your expectations. US4: You are satisfied with La Loma Luz Hospital Information System	Bailey and Person (1983)
Use	U1: Your frequency of use of La Loma Luz Hospital Information System is high U2: You depend upon La Loma Luz Hospital Information System U3: You were able to complete a task La Loma Luz Hospital Information System even when there was no one around to tell you what to do. U4: You have the knowledge necessary to use La Loma Luz Hospital Information System	Bailey and Person (1983)
Perceived Net Benefits	NB1: La Loma Luz Hospital Information System helps you improve your job performance NB2: La Loma Luz Hospital Information System helps you save time and costs NB3: La Loma Luz Hospital Information System helps the organization achieve its goal NB4: Overall, using La Loma Luz Hospital Information System system enhances your productivity NB5: Overall, using the La Loma Luz Hospital Information System enhances recruitment and performance management	Bailey and Person (1983)

Sampling and Data Collection

The information gathered was received from the Hospital whereby it pooled to thirty respondents. All respondents are current employees from La Loma Luz Adventist Hospital who have access to the Hospital Information System for completing their perspective job tasks.

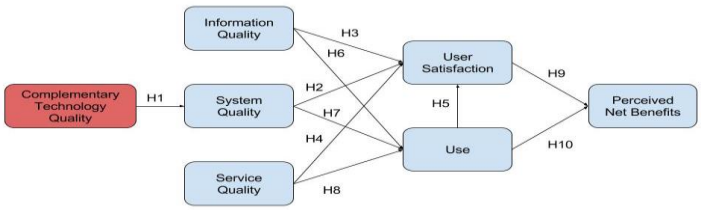
Research model and hypothesis

Information Quality was measured in terms of how accurate the information is, the time frame, completeness, relevance, and reliability (Delone & McLean, 2003). In addition, the Information Quality showed the importance of a successful factor when conducting the investigation in the overall success of the information system. System Quality was measured on how easy it is for the information to be retrieved. Complementary Technology Quality measured how the hardware is successful to properly access the information within the system. Service Quality covers aspects such as responsiveness, dependability, understanding, and capability of the responsible service personnel (Pitt et al., 1995). User

Satisfaction is one of the most important measures when investigating overall information system success.

In the research the Perceived net benefits serves as a core benefit to the Hospital since it sets out the achievements towards the company's goals and objectives from using the system. This tested the professed individual and organization benefits that personnel receives when using the Hospital's Information System. The benefits cater for features such as, how responsibilities are done, occupation competence, quality administration enhancement and cost lessening. The opinions made towards the benefits perceived from the system varies from employee to employee (Delone & McLean, 2003)

This research caters mainly on an employee perspective and uses the six updated Information System Success dimensions: Information quality, system quality, service quality, system use, user satisfaction, and perceived net benefit



Proposed Hypothesis

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.

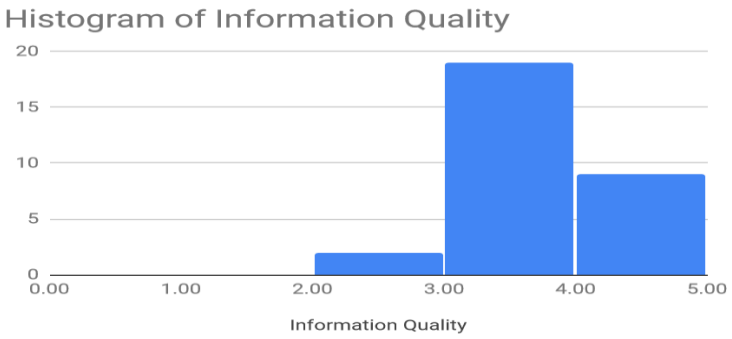
H11.User satisfaction will positively impact perceived net benefit.

H12.Use will positively impact perceived net benefit.

Data Analysis

The use of questionnaires was utilized for basic research used for measuring the success of the Hospital Information System used by the employees of La Loma Luz Adventist Hospital. This research was conducted to determine the success and efficiency of different constructs in the Hospital Information System. Furthermore, charts and histograms are being utilized to display the data gathered on an average base for each respondent and the overall average of the constructs. Figures are attached below:

Figure 1:



The histogram above shows the averages for Information Quality. As it can be seen most of the results are between the rates 3 and 4 which is good. The results show that majority are satisfied with the quality of information within the Hospital Information System. On a last note, no users are dissatisfied with the information quality of the Hospital Information System.

Figure 2:

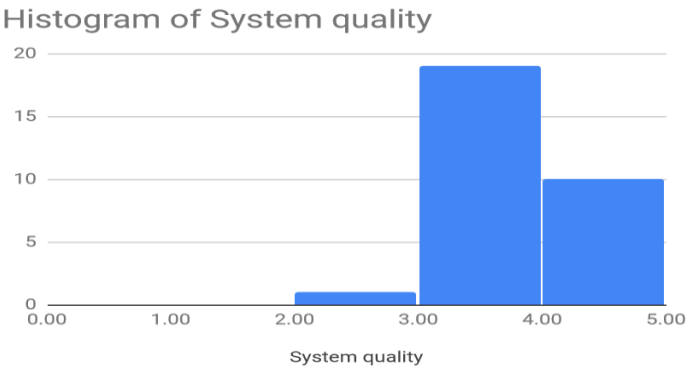
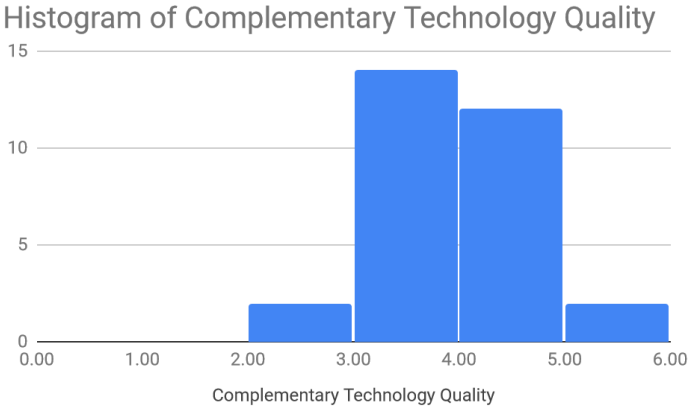


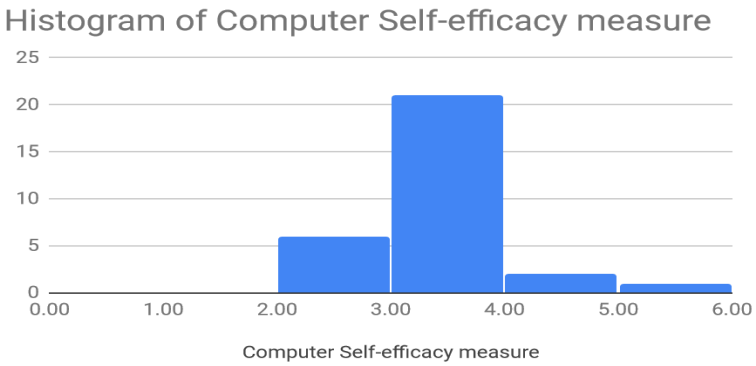
Figure 2 histogram shows the averages of the system quality. Results shows that most results rely on rates 3 and 4 which provides neutral results. Between the ranges 3 to 5 most results fall. The results show that most employees are not fully satisfied with the system quality of the HIS. Finally, no users are dissatisfying of the system quality but room for improvement.

Figure 3:



The above figure 3 depicts results showing the average of the complementary technology. Most of the results as can be seen are between ranges 3 and 4. Most results rely between the ranges of 3 to 5, this means that most users are satisfied with the complementary technology but some are not fully satisfied. No users are dissatisfied. This portion have room for improvement.

Figure 4:



The above histogram illustrates the averages of self-efficacy measure. As can be seen most results falls between the ranges 3 and 4 whereby 5 to 6 being the highest depicts that users are not really satisfied with the computer self-efficiency. Minimal respondents fall under the range 5 to 6 which depicts high satisfaction.

Figure 5:

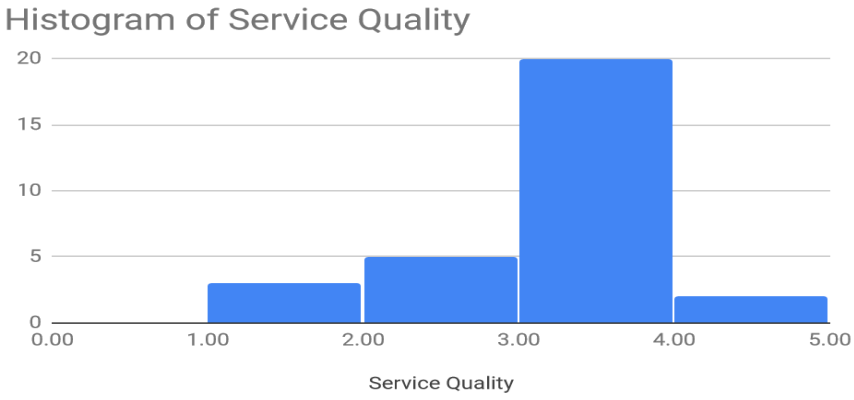
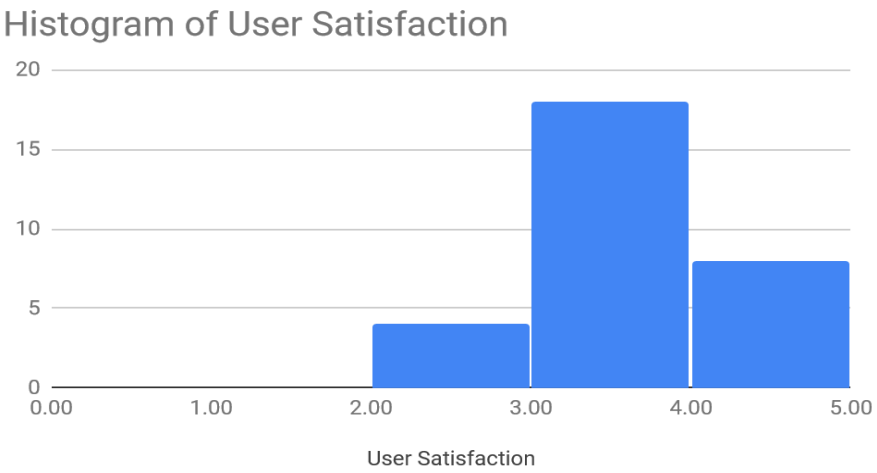


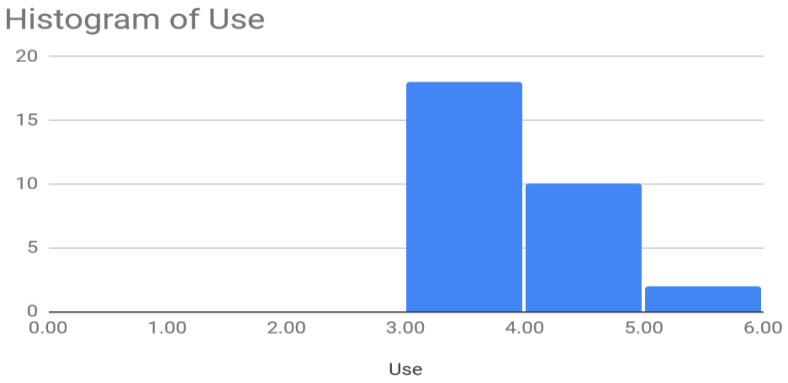
Figure 5 depicts the averages for the service quality. Based on the histogram it shows that most responses fall between the ranges 3 and 4 which are neutral results. In this situation there is a warning flag to the IT department to improve the service quality since they are not working as how they are expected to work with the users of the Hospital Information System.

Figure 6:



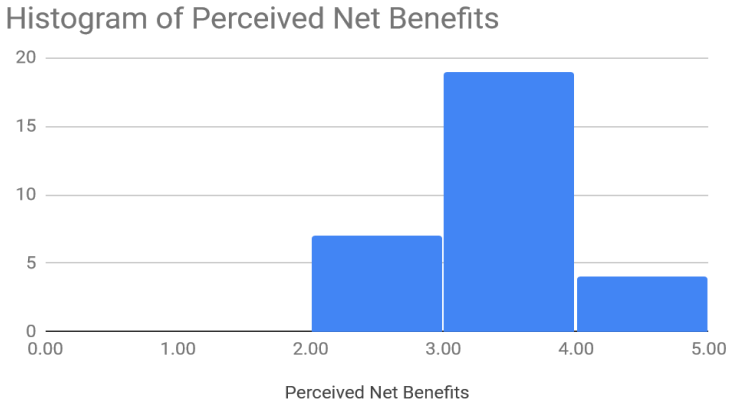
The above histogram illustrates that most results fall between ranges 3 and 4 having neutral results for the user's satisfactions. This result illustrates that users are not fully satisfied and that there are improvements to be done with the information system.

Figure 7:



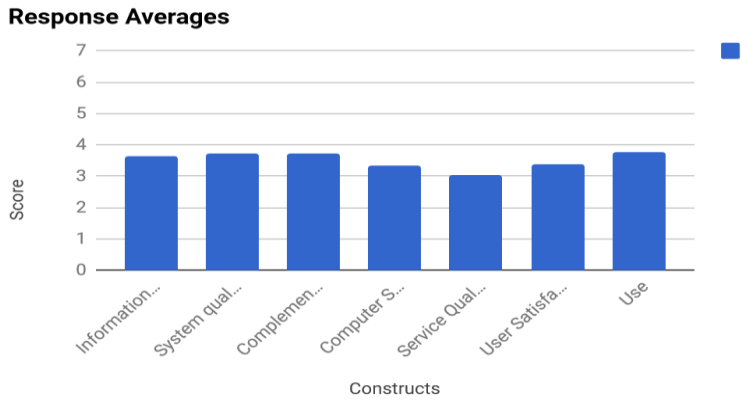
The histogram above depicts the averages for the use. Most results fall between the ranges 3 and 4 also giving neutral results. Very few falls between the ranges 5 and 6 showing few with the usage of the Hospital Information System.

Figure 8:



The above histogram shows the average for perceived net benefits. Most results fall between the ranges 3 and 4 which shows the overall satisfaction of the users have toward the hospital information system. Results also remain neutral.

Figure 9:



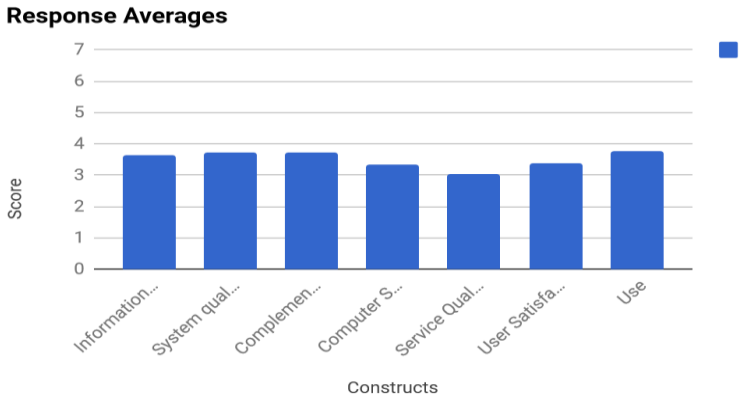
The histogram above shows the average responses on all 8 constructs by respondents. All constructs illustrate a score of 3 and 4 range whereby they show neutral results. This brings us to the conclusion that there is a lot of improvements to be done.

Conclusion

Discussion

The research conducted strived to measure the level of success of Information system implemented within the organization by the administration of the healthcare institution. In order to measure the Information System's success, an existing model created by Delone and Mclean (2003) was chosen. This model takes a glance at the dimensions that mainly contribute to the system implementation; this framework is used to show the level of success of the Information System. To further support the research, self-efficacy and complimentary technology quality measure were added to get more data that are viable.

This research indicates that different constructs result in different variances. The difference can be explained by the various responses by the employees of the organization. The fact is that the perceived net benefits are due to the perceived information quality, user satisfaction, and system use. These three constructs should be closely monitored by the organization so as to result in higher users' satisfaction with the system. Therefore, it is a significant management decision to monitor these constructs since employee satisfaction leads to a higher level of productivity and organization thrives.



This graph used 7 constructs by respondents. All constructs illustrate a score of 3 and 4 range whereby they show neutral results. This brings us to the conclusion that there is a lot of improvements to be done. It indicates that the employees are not fully satisfied with the quality of maintenance.

Limitations

The research was successful in locating the necessary construct models for the adequate measurement and success of the information system. However, the success didn't come without some limitation. Time and resources played a huge part of developing this research study. Time was limited since we only had a few weeks to develop the research, along with some other factors that was added to our hours of work. Moreover, another limitation of this research is that it was based on the response of 30 participants. This healthcare institution did not have more employees that used IT; hence the reason why it was limited. Therefore, the results properly represents all the employees that uses the system. As previously mentioned, time allocation was a huge limitation due to our conflicting schedule and individual priorities we all have.

In conclusion, Information System is widely accepted as being useful and practical for a healthcare institution. The results indicate that there is not much positive attitude towards the IT system in the workplace. However, the perceived net benefit is low due to the employees feeling that the system doesn't fully help in all aspects of their job task or enhance their productivity. They note that it is a genuine system; though, it doesn't benefit them in ways they wished it did in areas such as time-saving and

performance management. All this could be as a result of not having the appropriate IT system installed in this healthcare institution.

A recommendation that could aid is to engage the IT System in a way that will allow the user to be able to integrate it more in their daily task. A satisfied worker in his job will lead to them being more productive with their jobs, which benefits the organization in a whole.

This study provides a structure for understanding IT management software success. The detailed framework we have developed from theory and empirical research provides a foundation for future research.

Reference

Delone, W. H., & McLean, E. P. (2003). The Delone and McLean Model of Information Systems Success: A Ten-Year Update. Journal of Management Information Systems, 19, 9-30.

Ghobakhloo, M., & Tang, S. H. (2015). Information system success among manufacturers SMEs: case of developing countries. Information Technology for Development, 21, 573-600.

Heeks, R. (2002). Information Systems and Developing Countries: Failure, Success, and Local Improvisations. The Information Society, 101-112.

Miller, D., & Woodman, M. (2010). Software Engineering Systems as Services Using A Business-Focused Service Framework. Evaluation of Novel Approaches to Software Engineering, 1-6.

Petter, S., Delone, W., & McLean, E. (2008). Measuring information systems success: models, dimensions, measures, and interrelationships. European Journal of Information Systems, 236-263.

Poddar, E. (2017). Analysis on User Interface Aspects of Software Used by Commercial Banks in India. The XXIXth Annual Occupational Ergonomics and safety conference, 142-148.

Richard, B. F., & Mahfouz, A. Y. (2009). Strategic Integration of IT and Business Service Management. Communications of the IIMA, 9, 65-78.