Quality Management System Success Model at the International Merchant Marine Registry of Belize

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Abstract

Delone & Mclean model has been used to conduct a substantial amount of research regarding information success systems. The Delone and Mclean IS Model includes the following six dimensions: Information quality, system quality, service quality, use, user quality and perceived net benefits. This study provides an empirical test with modifications to the IS model consisting of complementary technology quality and self-efficacy as constructs. This research paper focuses on the eight altered dimensions in order to prove ascertain the success of the Quality Management System at the International Merchant Marine Registry of Belize. QMS is a system in charge of documenting all processes, responsibilities, and procedures for achieving quality objectives and policies at IMMARBE. Structural equation modeling techniques was applied to the data collected by questionnaire from 30 employees. While there are many information systems around the world and continuous research is being conducted on them, this research shows that the employees find the QMS to be successful and effective.

Keywords: Information System, Success Model, Quality Management System, Perceived Net Benefits

Introduction

Over the past few years, companies have invested heavily in information and communication technologies to improve various functions of the business. The organizations' Quality Management System (QMS) responsibilities are no exception. The purpose of quality systems has evolved in recent years. The Quality Management System (QMS) is a formalized system documenting processes, procedures, and

responsibilities to achieve quality policies and goals. It can also be defined as a set of business processes which are implemented to help an organization deliver products which consistently achieve customer satisfaction. This system helps coordinate and direct the activities of an organization in order to meet customer and regulatory requirements and continuously improve their efficiency and effectiveness. It captures raw data from organizational or external environments and converts it into a meaningful form which is then transferred in the form of information to people or wherever it is needed.

Quality is the standard something holds when compared to something else of the same nature. (Munich, 2006) The precise definition of business language quality can vary from one industry to another. (Cooper, 2002) Quality is exceptional, consistency, fitness for purpose, value for money, and transformative. (Becket , et al., 2007) In a small engineering company, the methods and metrics used for quality assurance are completely different from highly regulated industries.

Quality is a complex singularity described by the desires and satisfaction of the consumer. By understanding the preferences and needs of the customer, QMS is designed to provide a framework for organizations to create and maintain customer relationships. Customer satisfaction is accomplished with QMS by lifecycle integration with individuals, procedures, and technologies.

However, other than just stating it improves quality, QMS can be broken down into several other purposes, ranging from improving processes, reducing waste, lowering costs, facilitating and identifying training opportunities, and engaging staff. Implementing a quality management system has an impact on every aspect of the performance of an organization. The benefits of a documented quality management system include: meeting the requirements of the customer, which in turn increases the level of trust that customers place in the organization, resulting in an overall increase of customers, increase in sales and increase in customers who come to the business. It ensures compliance with regulations and the delivery of products and services in the most profitable and resource-efficient way, creating space for advancement, growth and profit, while also meeting the requirements of the organization.

For the purpose of this paper, we will be focusing on the following business objectives that entails the use of QMS. They are improving operational excellence, ability to offer new products, services and business models, supplier and customer intimacy, improved decision making, have a competitive advantage (Priede, 2012), and survival of the business (if applicable.) The QMS is designed to improve the efficiency of the business thus reducing costs and in turn makes for higher profit. It delivers a better performance than other business who do not invest in technologies such as these.

The system focuses on quality principles which are reflected in other QMS standards: being customer focused, being leaders, engagement of people, process approach, continuous improvement, evidence-based decision making and relationship management.

The QMS have nine core elements which make up the system. These elements include quality objectives, quality manual, organizational structure and responsibilities, data management, processes, customer satisfaction with product quality, continuous improvement, quality instruments, and document control. The QMS literature suggests that, ultimately, each element of a quality management system helps achieve the overall goals of meeting the customers' and organization's requirements. Quality management systems should address an organization's unique needs. The elements all systems have in common include: the organization's quality policy and quality objectives, quality manual, procedures, instructions, records, data management, internal processes, customer satisfaction (from product quality, improvement opportunities), and quality analysis.

Literature Review

The main purpose of this literature review is to evaluate the level of success in the implementation of Quality Management. The evaluation will focus on how the information system within the organization is compatible with the constructs developed by DeLone and McLean (2003) and other researchers. The Quality Management System (QMS) is a special type of information system that is used in the core business area of an organization, its main purpose is to document the structure, procedures, responsibilities and processes needed for effective quality management. Therefore, in this section we establish the theoretical foundation and conceptualization of QMS success in the business based on prior information system success studies.

A quantitative study was conducted using a questionnaire to gather the data needed to structure the variables associated with the diversity of the information system success. Research surveying the accomplishment of Information Systems (IS) has been continuous for about three decades and its determinants have long been considered a critical field of information system (Bailey and Pearson, 1983). The data collection was analyzed and 30 empirical papers containing information system success measured in the year 2019; which used the six (6) major factors that DeLone and McLean created. They argued that there was little relevance in calculating input variables like user's participation or IT investment with respect to information system, if the dependent or output variable, IS success or IS effectiveness, could not be evaluated with similar accuracy (DeLone & McLean, 1992). These six major factors used are: 1. System Quality - the quality characteristics of the IS itself, 2. Information Quality - the quality of the output of the IS, 3. Use - consumption of the output of the IS, 4. User Satisfaction - the IS user's response to the IS, 5. Individual Impact - the effect of the IS on the behavior of the user and 6. Organizational Impact - the effect of the IS on organizational performance.

Over the years the business sectors in Belize has encouraged more stakeholders to ask more questions about decisions made in the business sector (Moses, 2000) and this has contributed to the increased demand for information systems and greater transparency in the decision-making process. Information Systems such as QMS has facilitated work processes and expanded the provision of information in IMMARBE. According to DeLone and McLean (2003) in a ten-year update from their original publication, proposed the addition of another construct- Net Benefits that assesses other important factors that influence information system 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 information system being studied (DeLone, McLean, 2003). In addition, a core characteristic of the DeLone and Mclean model is that user satisfaction is considered as an IS success variable and is incorporated in their IS success model as an antecedent of Individual Impact. DeLone and Mclean (1992) made many important contributions to our understanding of the QMS success in the organization.

The QMS used at the firm is successful because of many factors including computer that enhances the business service; it is the entire information sharing system with all elements of networking, software, hardware elements, data entry and application used in the process that creates a success for the flow of operations in the business system. QMS allow uses to make better decision can be used to facilitate the storing of and access to accurate, timely and reliable data/information for effective management, policy formulation and decision-making process in the business sector. The use of QMS in the organization has assisted users from the in accomplishing their administrative task. According to Zain, Atan and Idrus, studies done in Malaysia on the use of IS at the business management level revealed positive changes including better accessibility to information, more effective administration and higher utilization of organizational; resources both human and financial. The implementation of QMS has made management processes more efficient and gave users more time to concentrate on business processes and procedures for customers.

Methodology

Research Model and Hypotheses

This research is intended to understand how effective the Quality Management System with the commitment to creating products and services in accordance with pre-defined standards that is implemented in the International Merchant Marine Registry of Belize. The IS Success Model was developed by William H. DeLone and Ephraim R. McLean and it will be used to evaluate the effectiveness of the current QMS. In this research a model of the QMS will show if the information quality, system quality, service quality, use, user satisfaction, complimentary technology, computer self-efficacy and the perceived net benefit are well structure in the cloud base application.

The research meticulously examines the previous D & M IS success with the properties of the QMS. They are examined as follows:

- Information Quality: this was in order to check if the Quality Management System is providing the right excellence needed. It was conformed that yes, the Information Quality is a very important feature used to examine the effectiveness of the IS.

- System Quality: this was to check if the Quality Management System was a very reliable platform in measuring every aspect of the business operations. It was seen that yes it was a very user-friendly, high-speed information access and has a very good usability among on the system and the users.
- Complementary Technology Quality: is one that was used in order to measure if it was an adequate measure to use. It was seen that yes it helps in the development of the QMS and it is more than adequate measure to use.
- Computer Self-Efficacy Measure: This was to check if people have the ability to use their capabilities and skills to perform a computer task. This would demonstrate if they could use it if no one was around or with past experience they have gotten.
- Service Quality: This would help check if they could improve the service and how the QMS is being supported by different situations. It was to measure the dependency of the staff members, responsibility and the compassion for the service provided.
- User Satisfaction: is to measure how employees feel towards the Quality Management System. In order, they have the satisfaction needed which is the overall determinant of the effectiveness of the IS.
- Use: This is to measure how well the Quality Management System works and how effective the users use it.
- Perceived Net Benefits: This will overall measure the objectives and achievements the employees have with the Quality Management System. This will help to determine the organizational goals achievements, trainings, productivity, performance but overall the organizational cost. This is the one that will help to determine how effective and efficient they are using it when it comes to the reduction of cost and the competence of the job within the schools.

Below the research model of the eight updated IS would be display according to the perspective of the employees and the use of the Quality Management System. This includes the information quality, system quality, complimentary technology quality, computer self-efficacy, service quality user satisfaction, use, and perceived net benefits.

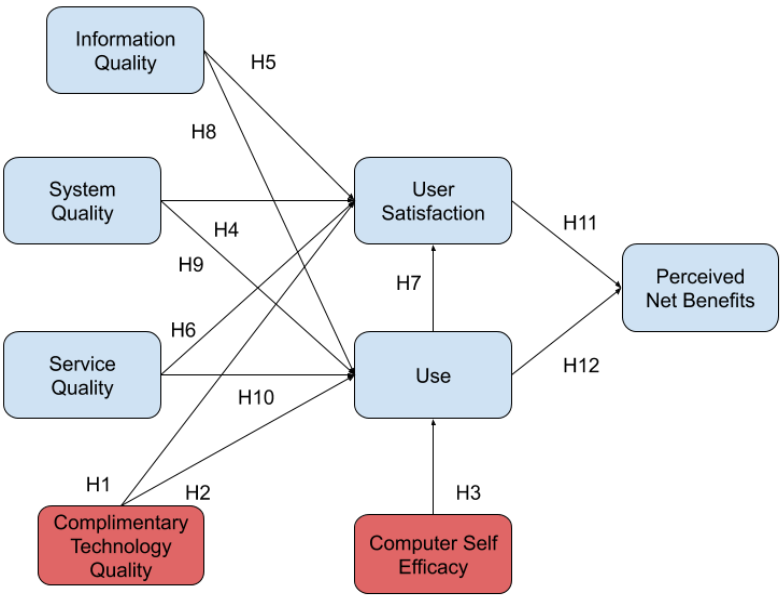


Figure 1. The six constructs of the Delone and Mclean Model including the Additional Measurements used to Authenticate this Study.

Hypothesis

The hypothesize relationship between the Quality Management System would be evaluating their success through the theoretical and empirical work reported by DeLone and McLean (2003). They suggest that the success model needs more development and validation in order it could be stated as an effective IS measured. The following hypothesized are being tested:

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

This research will be using the staff members at the International Merchant Marine Registry of Belize (IMMARBE). The research data will be collected among thirty (30) employees at the organization. The thirty staff members will be participants in the evaluation of the effectiveness of the Quality Management System.

Construct Measurement

In order to get valid information, we used surveys in order to study the eight-dimension focusing on the IS success model developed by DeLone and McLean (2003). To ensure the content validity of the scales, measurement scales for the quantitative data collection were mainly elicited from previously verified instruments.

Firstly, the information quality construct was measured by a seven -item scale from Bailey and Pearson (1983), in which it was modifies in order to focus on the context of Quality Management System. The Bailey and Pearson's instrument is widely accepted, has been tested for reliability and validity by several researchers, and has become a standard instrument in the IS field. Secondly, the four-item scale instrument used by Alshibly (2011) was modified to measure the system quality construct, thirdly, the complementary technology quality was measured with a four-item scale. Fourthly, the computer self-efficacy measure construct of a ten-item scale.

Fifthly, the service quality construct was evaluated using a modified four–item adopted and refined from the Chang et al (2009) instruments. Sixthly, in the research, the user satisfaction was evaluating judgment and affective attitude towards the use of Quality Management System. It was measured with a four-item scale from Seddon and Yip (1992). Then, the use was measured through eight-item scale adapted from previous studies (Balaban et al., 2013; Rai et al., 2002).

Lastly, the perceived benefits were defined as an achievement of a firm's objectives and the end-user related objectives. These elements were evaluated using a six-item scale adopted from (Alshibly, 2011; Tansley et al, 2007). Each segment was computed using a 5- point Likert Scale with numbers ranging from strongly agree (5) to strongly disagree (1).

However, after the measurement variables were developed, the face validity of these variables was tested. The Management Information System lecture reviewed the measurement variables and feedback was

given in regard to each segment. After this was being approved a total of thirty survey questionnaires were given out at the organization. All of the questionnaires were delivered back with a 100% respondent rate. Table 1 shows the research constructs and related survey items used for measurement of the survey questionnaire as it relates to the Quality Management System.

Table 1. Measurement Items for the Questionnaire

Construct	Survey Questions	Source
Information Quality	IQ1: The QMS system provides information that is exactly what you need. IQ2: The QMS system provides information you need at the right time IQ3: The QMS system provides information that is relevant to your job. IQ4: The QMS system provides sufficient information. IQ5: The QMS system provides information that is easy to understand. IQ6: The QMS system provides up-to-date Information. IQ7: The QMS system provides sufficient information.	Bailey and Person (1983)
System Quality	SQ1: The QMS system is easy to use. SQ2: The QMS system is user-friendly. SQ3: The QMS system provides high-speed information access. SQ4: The QMS system provides interactive features between users and system.	Alshibly (2011)
Complementary Technology Quality	CTQ1: The software on the device (desktop computer, laptop, mobile device) used to access the QMS is adequate? CTQ2: The device hardware (desktop computer, laptop, mobile device) used to access the QMS is adequate? CTQ3: The speed of the Internet connection used to access the QMS is adequate? CTQ4: The reliability of the Internet connection used to access the QMS is adequate?	
Computer Self-Efficacy Measure	I could complete the job using the Quality Management System: CSE1: if there was no one around to tell me what to do as I go. CSE2: If I had never used an information system like it before. CSE3: If I had only the information system manuals for reference. CSE4: If I had seen someone else using the information system before trying it myself. CSE5: If I could call someone for help if I got stuck.	

	CSE6: If someone else had helped me get started. CSE7: If l had a lot of time to complete the job for which the information system was provided. CSE8: If I had just the built-in help facility for assistance. CSE9: If someone showed me how to do it first. CSE10: If I had used similar information systems before this one to do the same job.	
Service Quality	SV1: The support staff keep the QMS up to date? SV2: The QMS support staff show a sincere interest in solving problems. SV3: The QMS support staff respond promptly when users have a problem. SV4: The QMS support staff tell users exactly when services will be performed	Chang et al., (2009)
User Satisfaction	US1: Most of the users bring a positive attitude or evaluation towards the QMS. US2: You think that the perceived utility about the QMS high. US3: The QMS has met your expectations. US4: You are satisfied with the QMS.	Seddon and Yip (1992)
Usage	U1: You frequently use the QMS. U2: You depend on the QMS to do your job. U3: The QMS is accurately preparing reports. U4: You have the necessary knowledge to use the QMS. U5: The QMS helps you prepare timely reports. U6: The users of the reports satisfied with results of the QMS. U7: You are able to complete a task using the QMS even if there was no one around to tell you what to do as you go forward?	Balaban et al., (2013) Rai et al., (2002)
Perceived Net Benefits	NB1: The QMS help you improve your job performance. NB2: The QMS helps your organization achieve its goal. NB3: Using the QMS improve the assessment and training. NB4: Using the QMS increases your productivity. NB5: Overall, using the QMS enhances recruitment and performance management. NB6: The QMS help the organization on costs.	Alshibly (2011); Tansley et al., (2001)

Table 1. Measurement Items for Questionnaire

Sampling and Data Collection

The data required for this study were collected from a sample of thirty staff members at the organization, IMMARBE. This research used the "purposive sampling" which gives the researchers to use their own judgment to select suitable people for the sample. Out of the 30 questionnaires distributed to the organization's staff members, all questionnaires were returned, yielding a response rate of 100 percent, which is considered acceptable.

The respondents' characteristics are presented in Table 2. Female participants represented a slightly higher percentage of the completed sample (approximately 53%) compared to male participants (approximately 47%). The participants stated their age range. Additionally, the completed sample was composed of well-educated individuals, approximately 94% of whom were postgraduate students. The others 6% were all undergraduates. The participants in this survey questionnaire had a very pretty idea on how to use computers and the QMS. They had some that had fifteen years of experience and the lowest was of less than one year.

Table 2. Characteristics of the respondents			
Number of Respondents by sex			
Sex	No. of respondents		
Male	14		
Female	16		
Number of respondents by level of education			
Highest level of education completed		No. of respondents	Percentages
High school or less		0	0%
Associates		2	6%
Bachelors		17	57%
Masters or greater		11	37%

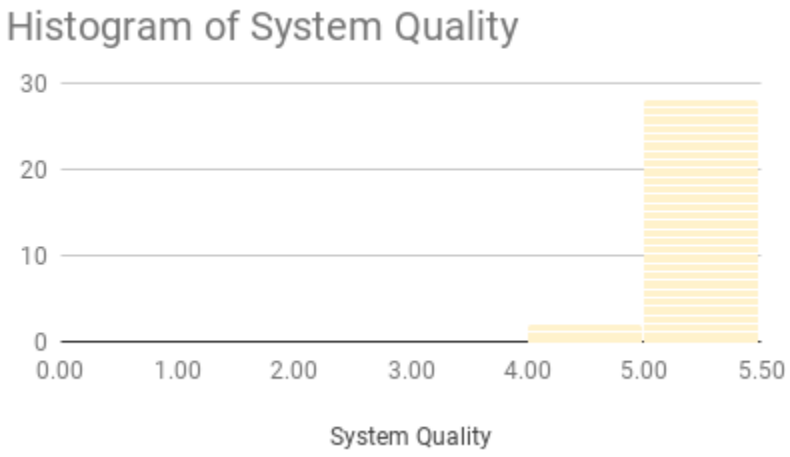
Table 2. Characteristics of the respondents

Data Analysis

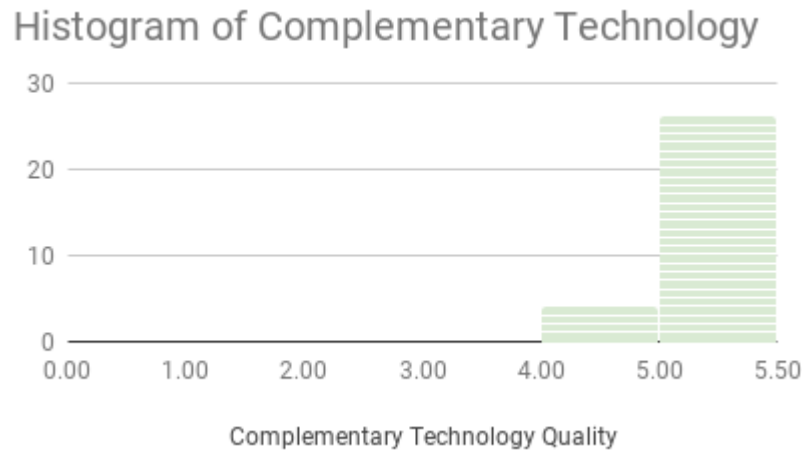
The following section is the start of applied research of the organization, IMMARBE. A total of thirty questionnaires were distributed among the employees at IMMARBE. The study received a one hundred percent response rate. The average respondent age was that of 25 years. 53 percent of respondents were female, and 46 percent were male. 94 percent of respondents had a bachelor's degree or higher. The respondents have, on average, five years working experience with the QMS.

The histogram reflecting the average response rating for information quality is skewed to the left. The average response for this category was 4.96 and the median was 4.80. Moreover, the results are above the average frequency distribution which indicates the vast amount of respondents are satisfied with the information quality on the Quality Management System (QMS). Since the diagram do not demonstrate a wide variance the satisfactory level of the users on the QMS information quality is at a high rank.

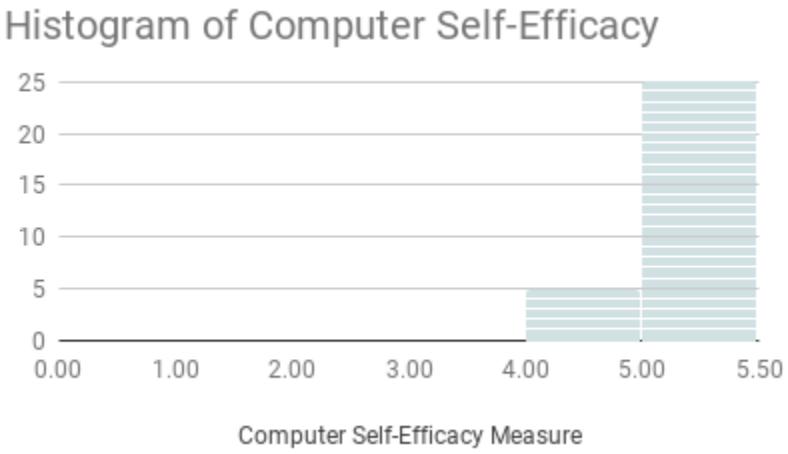
The histogram depicting the average response rating for system quality is skewed to the left. The average response for this category was 4.98 and the median was 4.90. Moreover, the results are above the average frequency distribution which specifies the vast amount of respondents are satisfied with the system quality on the Quality Management System (QMS). Since the diagram do not demonstrate a wide variance the satisfactory level of the users on the QMS system quality is at a high rank.



The histogram depicting the average response rating for complementary technology quality is skewed to the left. The average response rating for this category was 4.97 and the median was 4.90. Additionally, the results are above the average frequency distribution which means the vast majority of respondents are satisfied with the complementary technology on the Quality Management System (QMS). Since the diagram do not demonstrate a wide variance the satisfactory level of the users on the QMS complementary technology is at a high rank.

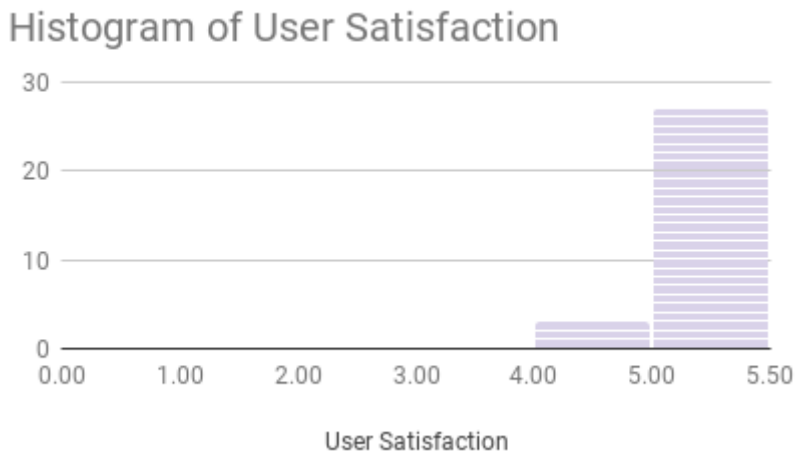


The histogram depicting the average response rating for self-efficacy is skewed to the left. The average response rating for this category was 4.98 and the median was 4.90. Additionally, the results are above the average frequency distribution which means the vast majority of respondents are satisfied with the computer self-efficacy on the Quality Management System (QMS). Since the diagram do not reveal a wide variance the satisfactory level of the users on the QMS computer self-efficacy is at a high rank.

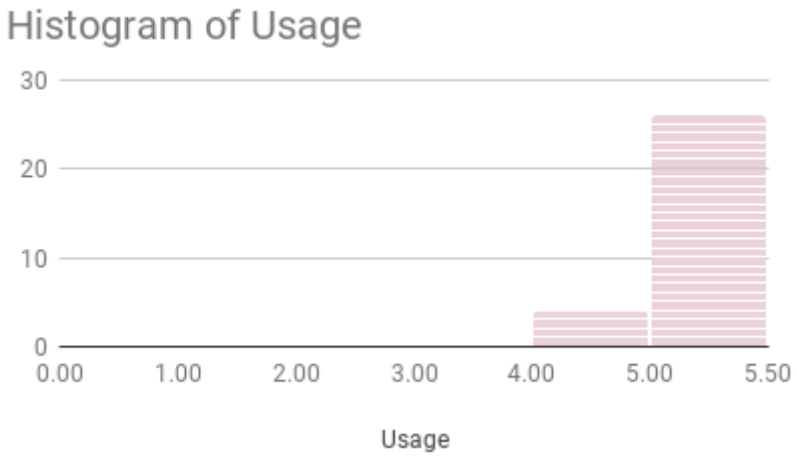


The histogram depicting the average response rating for service quality is skewed to the left. The average response rating for this category was 4.98 and the median was 4.90. Likewise, the results are above the average frequency distribution which shows the vast amount of respondents are satisfied with the service quality on the Quality Management System (QMS). Since the diagram do not demonstrate a wide variance the satisfactory level of the users on the QMS service quality is at a high rank.

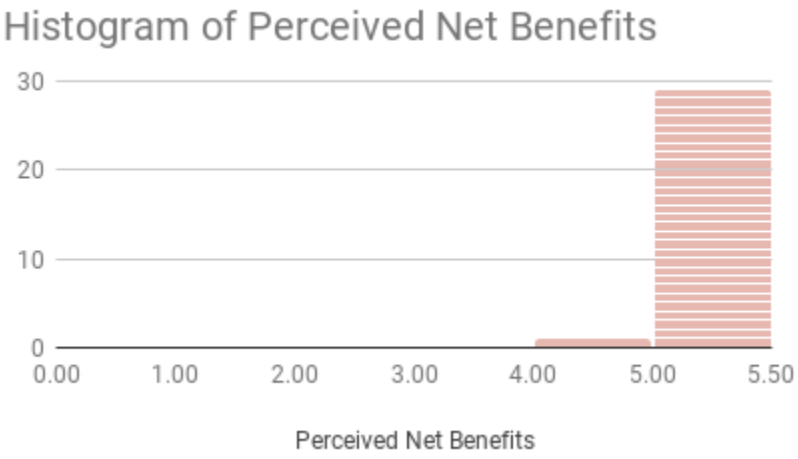
The histogram depicting the average response rating for user satisfaction is skewed to the left. The average response rating for this category was 4.98 and the median was 4.90. Likewise, the results are above the average frequency distribution which shows the vast amount of respondents are satisfied with the Quality Management System (QMS). Since the diagram do not demonstrate a wide variance the satisfactory level of the users on the QMS is at a high rank.



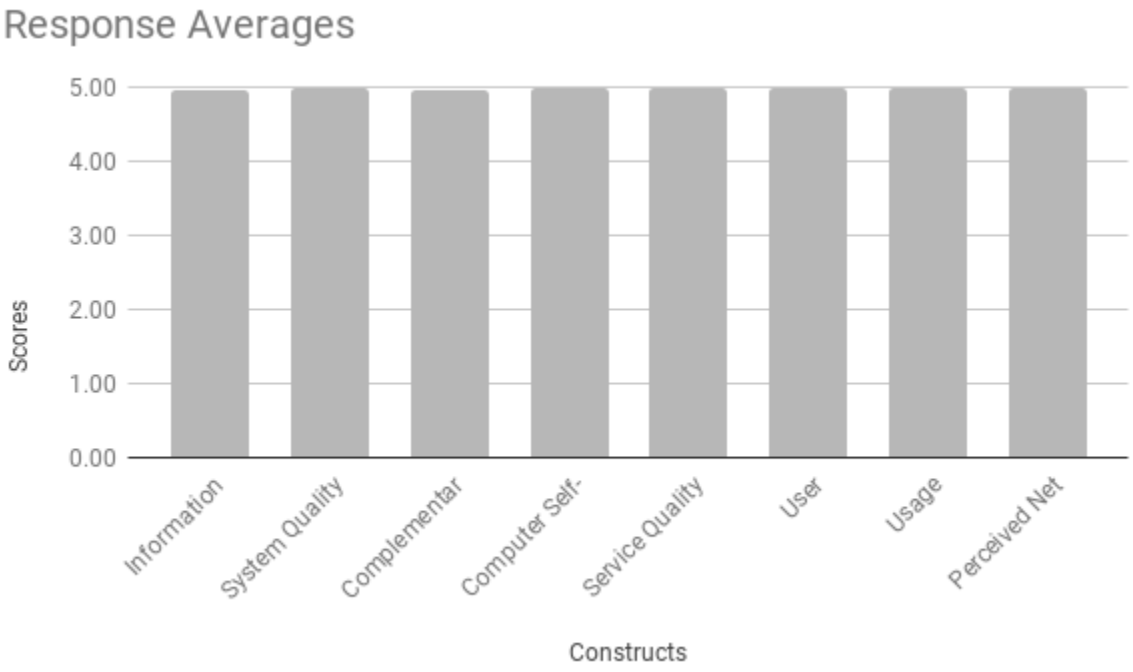
The histogram depicting the average response rating for usage is skewed to the left. The average response rating for this category was 4.98 and the median was 4.90. Moreover, the results are above the average frequency distribution which indicates the vast amount of respondents are satisfied with use on the Quality Management System (QMS). Since the diagram do not demonstrate a wide variance the satisfactory level of the users on the QMS use is at a high rank.



The histogram depicting the average response rating for perceived net benefits is skewed to the left. The average response rating for this category was 4.99 and the median was 4.90. Moreover, the results are above the average frequency distribution which indicates the vast amount of respondents are satisfied with the Quality Management System (QMS). Since the diagram do not demonstrate a wide variance the satisfactory level of the users on the is at a high rank.



The response average demonstrates that majority of the staff members are more than satisfied with the QMS. However, with a few improvements in certain areas such as Information Quality and Complementary Technological Quality can drastically change the entire perception of QMS. For instance, IMMARBE can provide more information to ensuring a good balance of relevant information, up-to-date information and information that is easy to understand to help provide a clearer picture of information quality. In addition, with more improvement in the area of Complementary Technology, IMMARBE should avoid inadequate software and hardware devices, inadequate internet speed and reliability to get a better perspective of their Complementary Technology Quality. Nevertheless, a vast majority of the users of the QMS are highly satisfied with their experience with the IS system at IMMARBE to carry out their daily duties at the organization.



Discussions and Implications, Limitations and Future Research

Discussion and Implications

The main aim of this research was to evaluate the Quality Management System at the International Merchant Marine Registry of Belize, which resulted to be successful. Thus, in order to conduct a complete evaluation, it was compared to DeLone–McLean model of information systems success. This model of information success includes six main features which are, Information Quality, System Quality, Service Quality, User Satisfaction, Use and Perceived Net benefits. However, the researchers felt that using these six main features would narrow the research; therefore, two other components which are the Complementary Technology Quality and Computer Self Efficacy were added. With the use of the eight features, questionnaires were developed to conduct the research and obtain accurate information which would prove the whether hypotheses are true.

The Quality Management System is the main information system used by IMMARBE. Therefore, it is of utmost importance for the information system to be accurate and efficient. The business is very dependent on this system in order to document processes, procedures, and responsibilities for achieving quality policies and objectives.

In order to fully analyze the information system, some hypotheses were developed that eventually guide the direction of the research. The following 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.

In order to test whether the hypotheses were true, a quantitative analysis was done in the form of questionnaires, whereby the overall results gathered proved that all of the hypotheses are accurate. Nevertheless, it can be understood that the QMS is effective and very useful to the employees. In brief, the research did measure the benefit and value that the QMS add to the success of IMMARBE. These data were compared to literature and have proven all hypotheses to be true. Therefore, it can be said with maximum accuracy that the implementation and use of the Quality Management System at the International Merchant Marine Registry of Belize does add substantially to the benefit and success of the organization

Limitations

The research was successful as it served its purpose which was to evaluate the Quality Management System model at IMMARBE. However, there were limitations faced along the way. Due to the large number of employees at the organization, the participants were limited to a small amount. Thus it is not a true indication of the results. The method of research was somewhat intense and time consuming because the SPSS program was not utilized. Additionally, a project of this demand lacked the necessary human resources to gather and process information. Moreover, though limitations were encountered, the study provides beneficial information in regards to the success of the Quality Management System at the International Merchant Marine Registry of Belize.

Future Research

The future research is recommended by increasing the sample size to have a more accurate representation on the success model of the QMS. In addition, a longer time frame for this type of study is recommended that for future studies, in order to have adequate time to collect and analyze a larger sample size.

References

Al-Shibly, H. (2011). Human resources information systems success assessment: An integrative model. Australian Journal of Basic and Applied Sciences, 5(5), 157-169.

Balaban, I., Mu, E., & Divjak, B. (2013). Development of an electronic Portfolio system success model: An information systems approach. Computers & Education, 60 (1), 396-411.

Ballantine, J., Bonner, M., Levy, M., Martin, A., Munro, I., & Powell, P. L. (1996). The 3-D model of information systems success: the search for the dependent variable continues. Information Resources Management Journal (IRMJ), 9 (4), 5-15.

Becket , N., & Brookes, M. (2007). Quality Management Practice in Higher Education –What Quality Are We Actually Enhancing? Retrieved November 17, 2019.

Bondarouk, T. V., & Ruël, H. J. M. (2009). Electronic Human Resource Management: challenges in the digital era. The International Journal of Human Resource Management, 20(3), 505-514.

Brynjolfsson, E., & Hitt, L. (1996). Paradox lost? Firm-level evidence on the returns to information systems spending. Management Science, 42 (4), 541-558.

Chang, H. H., Wang, Y. H., & Yang, W. Y. (2009). The impact of e-service quality, customer satisfaction and loyalty on e-marketing: Moderating effect of perceived value. Total Quality Management, 20 (4), 423-443.

Cooper, T. (2002). Concepts of 'quality': And the problem of 'customers',. Retrieved November 17, 2019.

DeLone, W. H., & McLean, E. R. (1992). Information systems success: the quest for the dependent variable. Information systems research, 3(1), 60-95.

DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean Model of Information Systems Success: A Ten-Year Update. Journal of Management Information Systems, 19 (4), 9-30.

Doll, W. J., & Torkzadeh, G. (1988). The Measurement of End-User Computing Satisfaction. MIS Quarterly, 12 (2), 259-274.

Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. Journal of Marketing Research, 18 (1), 39-50.

Garrity, E. J., & Sanders, G. L. (Eds.). (1998). Information systems success measurement. Igi Global.

Grover, V., Jeong, S. R., & Segars, A. H. (1996). Information systems effectiveness: The construct space and patters of application. Information & Management, 31(4), 177-191.

Gupta, A., & Saxena, S. (2013). Electronic human resource management (e-hrm): growing role in organisations. Management Insight, 8 (1), 60-66.

Heo, J., & Han, I. (2003). Performance measure of information systems (IS) in evolving computing environments: an empirical investigation. Information & Management,40(4), 243-256.

Iivari, J. (2005). An empirical test of the DeLone-McLean model of information system success. ACM Sigmis Database, 36 (2), 8-27.

Ives, B., H.Olsoh, H. E., and J. Baroudi, J. (1983), "The Measurement of User Information Satisfaction," Communications of the ACM, 26 (10), 785-93.

Marler, J. H., & Fisher, S. L. (2013). An evidence-based review of e-HRM and strategic human resource management. Human Resource Management Review, 23(1), 18-36.

Martinez-Ruiz, A., & Aluja-Banet, T. (2009). Toward the definition of a structural equation model of patent value: PLS path modelling with formative constructs. REVSTAT–Statistical Journal, 7 (3), 265-290.

Mason, R. O. (1978). Measuring information output: A communication systems approach. Information & management, 1 (4), 219-234.

McKinney, V., Yoon, K., & Zahedi, F. M. (2002). The measurement of web-customer satisfaction: an expectation and disconfirmation approach. Information systems research, 13 (3), 296-315.

Munich. (2006, November 24). What is quality? Retrieved November 17, 2019.

Parry, E. (2011). An examination of e-HRM as a means to increase the value of the HR function. The International Journal of Human Resource Management, 22 (05), 1146-1162.

Petter, S., DeLone, W., & McLean, E. (2008). Measuring information systems success: models, dimensions, measures, and interrelationships. European Journal of Information Systems, 17(3), 236-263.

Pitt, L., Watson, R., & Kavan, C. (1995). Service Quality: A Measure of Information Systems Effectiveness. Management Information Systems Quarterly, 19(2), 3.

Priede, J. (2012). Implementation of Quality Management System ISO 9001 in the World and its Strategic Necessity. Retrieved November 17, 2019.

Rai, A., Lang, S. S., & Welker, R. B. (2002). Assessing the validity of IS success models: An empirical test and theoretical analysis. Information systems research, 13(1), 50-69.

Ringle CM, Wende S. and Will A. (2005), "SmartPLS 2.0 M3 (beta). Hamburg. Retrieved from http://www.smartpls.de.

Roldán, J. L., & Leal, A. (2003). Executive information systems in Spain: a study of current practices and comparative analysis. Decision making support systems: achievements, trends and challenges for, 287-304.

Ruël, H., Bondarouk, T., & Looise, J. K. (2004). E-HRM: Innovation or irritation. An explorative empirical study in five large companies on web-based HRM. Management Revue, 15(3),364-380.

Schaupp, L. C., Bélanger, F., & Fan, W. (2009). Examining the success of websites beyond e commerce: An extension of the IS success model. Journal of Computer Information Systems, 49(4), 42-52.

Seddon, P. and Yip, S. K. (1992), "An Empirical Evaluation of User Information Satisfaction (UIS) Measures for Use with General Ledger Account Software," Journal of Information Systems, 6(spring), 75-92.

Seddon, P. B. (1997). A respecification and extension of the DeLone and McLean model of IS success. Information systems research, 8(3), 240-253.

Seddon, P. B., Staples, S., Patnayakuni, R., & Bowtell, M. (1999). Dimensions of Information Systems Success. Communications of the Association for Information Systems, 2(1),20.

Shannon, C. E., & Weaver, W. (1949). The mathematical theory of communication. Urbana, IL: The University of Illinois Press.

Stone, D. L., & Dulebohn, J. H. (2013). Emerging issues in theory and research on electronic human resource management (eHRM). Human Resource Management Review, 23(1), 1-5.

Stone, D. L., & Lukaszewski, K. M. (2009). An expanded model of the factors affecting the acceptance and effectiveness of electronic human resource management systems. Human Resource Management Review, 19 (2), 134-143.

Strohmeier, S. (2007). Research in e-HRM: Review and implications. Human Resource Management Review, 17(1), 19-37.

Tansley, C., Newell, S., & Williams, H. (2001). Effecting QMS-style practices through an integrated human resource information system: An e-greenfield site?. Personnel Review, 30 (3), 351-371.

Urbach, N., & Müller, B. (2011). The Updated DeLone and McLean Model of Information Systems Success. Information Systems Theory: Explaining and Predicting Our Digital Society, Vol. 1, 28, 1.

Urbach, N., Smolnik, S., & Riempp, G. (2010). An empirical investigation of employee portal success. The Journal of Strategic Information Systems, 19(3), 184-206.

Wang, Y. S., & Liao, Y. W. (2008). Assessing eGovernment systems success: A validation of the DeLone and McLean model of information systems success. Government Information Quarterly, 25 (4), 717-733.

Wetzels, M., Odekerken-Schroder, G., & Van Oppen, C. (2009). Using PLS path modeling for assessing hierarchical construct models: guidelines and empirical illustration. Management Information Systems Quarterly, 33(1), 11.

Wong, K. K. K. (2013). Partial Least Squares Structural Equation Modeling (PLS-SEM) Techniques Using SmartPLS. Marketing Bulletin, 24.

Yusliza, M., & Ramayah, T. (2012). Determinants of attitude towards QMS: an empirical study among HR professionals. Procedia-Social and Behavioral Sciences, 57, 312-319.

Appendix A

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Effectiveness of IMMARBE Quality Management System

Informed Consent Letter

Dear Participant,

You are invited to participate in a research study being conducted by Britney Bowers, Neidy Reyes, Michael Chiu, Nathalie Bowman and Ailanie Escalante enrolled in the faculty of Management and Social Sciences at the University of Belize.

The purpose of this research study is to ask about your experience using the Quality Management System. Your participation will contribute to a better understanding of how the introduction of information system has impacted business processes.

The questionnaire will evaluate the information quality, system quality, service quality, complimentary technology that contributes to user satisfaction which in turn represents net benefits for the user and the organization. The questionnaire will take approximately 15 minutes.

There are no known risks for partaking in this research study. Your participation is voluntary, and you may decline to answer any questions. In addition, you hold the right to withdraw from participating at any time. The research participants will remain anonymous. Confidentiality of participants will be maintained at all times.

If you have any questions about the study, please feel free to contact the Research Team Leader, Britney Bowers at the email provided in bold on this letter. This study is approved and endorsed by Kieran Ryan, MIS Instructor at University of Belize.

Thank you for your time and your participation.

Regards,

BBowers

_____

Britney Bowers

Research Team Leader

Section A. Demographic Information	
A1. Gender:	Male ☐ Female ☐
A2. Please indicate age range:	Less than 25 ☐ 25-35 ☐ 36-45 ☐ 46-55 ☐ Older than 55 ☐
A3. Please indicate education level:	High school or less ☐ Associates ☐ Bachelors ☐ Masters or higher ☐
A4. Years of work Experience:	Less than 5 ☐ 5-10 ☐ 11-15 ☐ More than 15 ☐
A5. Years working with the QMS:	Less than 5 ☐ 5-10 ☐ 11-15 ☐ More than 15 ☐

Section B. Information Quality	**Strongly Disagree** **Strongly Agree**
IQ1: QMS provides information that is exactly what you need	1☐ 2☐ 3☐ 4☐ 5☐
IQ2: QMS provides information you need at the right time	1☐ 2☐ 3☐ 4☐ 5☐
IQ3: QMS provides information that is relevant to your task	1☐ 2☐ 3☐ 4☐ 5☐
IQ4: QMS provides sufficient information	1☐ 2☐ 3☐ 4☐ 5☐
IQ5: QMS provides information that is easy to understand	1☐ 2☐ 3☐ 4☐ 5☐
IQ6: QMS provides up-to-date Information	1☐ 2☐ 3☐ 4☐ 5☐

Section C. System Quality	
SQ1: QMS easy to use	1☐ 2☐ 3☐ 4☐ 5☐
SQ2: QMS user-friendly	1☐ 2☐ 3☐ 4☐ 5☐
SQ3: QMS provides high-speed information access	1☐ 2☐ 3☐ 4☐ 5☐
SQ4: QMS provides interactive features between users and system	1☐ 2☐ 3☐ 4☐ 5☐

Section D. Complementary Technology Quality	
CTQ1: Software on the device used to access the QMS is adequate	1☐ 2☐ 3☐ 4☐ 5☐
CTQ2: Device hardware used to access the QMS is adequate	1☐ 2☐ 3☐ 4☐ 5☐
CTQ3: Speed of the Internet connection used to access the QMS is adequate	1☐ 2☐ 3☐ 4☐ 5☐
CTQ4: Reliability of the Internet connection used to access the QMS is adequate	1☐ 2☐ 3☐ 4☐ 5☐

Section E. Computer Self-Efficacy Measure	
I could complete the Job using the Student Information Database:	
CSE1: if there was no one around to tell me what to do as I go.	1☐ 2☐ 3☐ 4☐ 5☐
CSE2: If I had never used an information system like it before.	1☐ 2☐ 3☐ 4☐ 5☐
CSE3: If I had only the information system manuals for reference.	1☐ 2☐ 3☐ 4☐ 5☐
CSE4: If I had seen someone else using the information system before trying it myself.	1☐ 2☐ 3☐ 4☐ 5☐
CSE5: If I could call someone for help if I got stuck.	1☐ 2☐ 3☐ 4☐ 5☐
CSE6: If someone else had helped me get started.	1☐ 2☐ 3☐ 4☐ 5☐
CSE7: If l had a lot of time to complete the job for which the IS was provided.	1☐ 2☐ 3☐ 4☐ 5☐
CSE8: If I had just the built-in help facility for assistance.	1☐ 2☐ 3☐ 4☐ 5☐
CSE9: If someone showed me how to do it first.	1☐ 2☐ 3☐ 4☐ 5☐
CSE10: If I had used similar information systems before this one to do the same job.	1☐ 2☐ 3☐ 4☐ 5☐

Section E. Service Quality	**Strongly Disagree** **Strongly Agree**

SV1: The support staff keep the QMS up to date	1☐ 2☐ 3☐ 4☐ 5☐
SV2: The QMS system support staff show a sincere interest in solving problems	1☐ 2☐ 3☐ 4☐ 5☐
SV3: The QMS support staff respond promptly when users have a problem	1☐ 2☐ 3☐ 4☐ 5☐
SV4: The QMS support staff tell users exactly when services will be performed	1☐ 2☐ 3☐ 4☐ 5☐

Section F. User Satisfaction

US1: Most of the users bring a positive attitude or evaluation towards the QMS	1☐ 2☐ 3☐ 4☐ 5☐
US2: The perceived utility about the QMS is high	1☐ 2☐ 3☐ 4☐ 5☐
US3: The QMS meets your expectations	1☐ 2☐ 3☐ 4☐ 5☐
US4: You are satisfied with the QMS	1☐ 2☐ 3☐ 4☐ 5☐

Section H. Usage

U1: You frequently use the QMS	1☐ 2☐ 3☐ 4☐ 5☐
U2: You depend on the QMS to do your job	1☐ 2☐ 3☐ 4☐ 5☐
U3: The QMS is accurately preparing reports	1☐ 2☐ 3☐ 4☐ 5☐
U4: You have the necessary knowledge to use the QMS	1☐ 2☐ 3☐ 4☐ 5☐
U5: The QMS helps you prepare timely reports	1☐ 2☐ 3☐ 4☐ 5☐
U6: Users of the reports are satisfied with results of the QMS	1☐ 2☐ 3☐ 4☐ 5☐
U7: You are able to complete a task using the QMS even if there was no one around to tell you what to do as you go forward	1☐ 2☐ 3☐ 4☐ 5☐

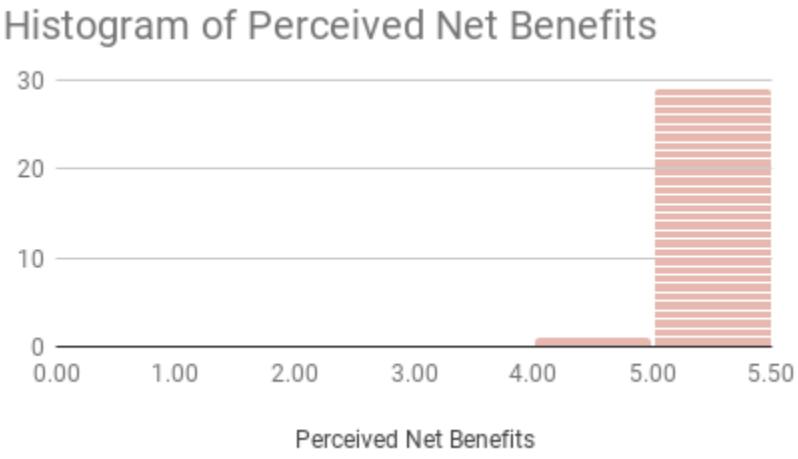
Section I. Perceived Net Benefits

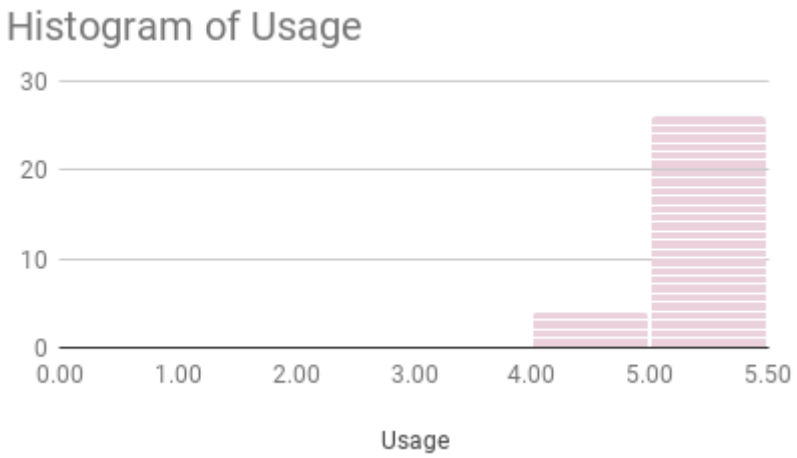
NB1: The QMS helps you improve your job performance	1☐ 2☐ 3☐ 4☐ 5☐
NB2: The QMS helps your organization achieve its goal	1☐ 2☐ 3☐ 4☐ 5☐
NB3: Using the QMS improves the assessment and training	1☐ 2☐ 3☐ 4☐ 5☐
NB4: Using the QMS increases your productivity.	1☐ 2☐ 3☐ 4☐ 5☐
NB5: Overall, using the QMS enhances recruitment and performance management	1☐ 2☐ 3☐ 4☐ 5☐
NB6: The QMS helps the organization save on costs	1☐ 2☐ 3☐ 4☐ 5☐

Please return the completed survey.

Thank you for your participation.

Appendix B


Histogram of Perceived Net Benefits
30
20
10
0
0.00
1.00
2.00
3.00
4.00
5.00
5.50
Perceived Net Benefits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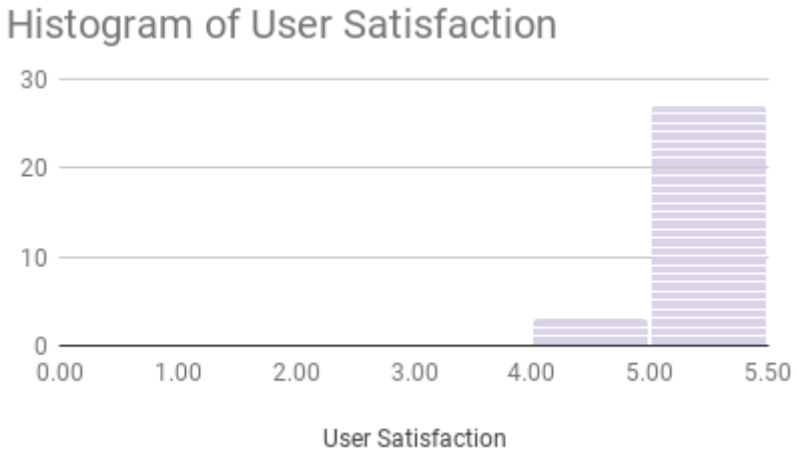
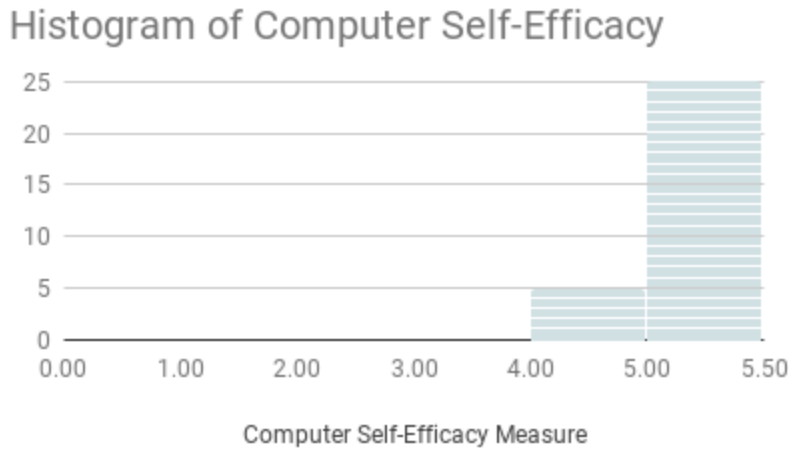
20
10
0
0.00
1.00
2.00
3.00
4.00
5.00
5.50
Usage


Histogram of User Satisfaction
30
20
10
0
0.00
1.00
2.00
3.00
4.00
5.00
5.50
User Satisfaction


Histogram of Service Quality
30
20
10
0
0.00
1.00
2.00
3.00
4.00
5.00
5.50
Service Quality


Histogram of Computer Self-Efficacy
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15
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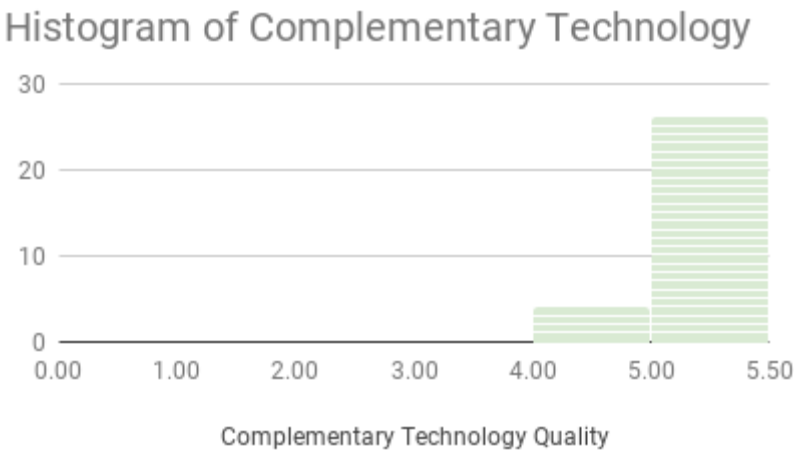
1.00
2.00
3.00
4.00
5.00
5.50
Computer Self-Efficacy Measure


Histogram of Complementary Technology
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2.00
3.00
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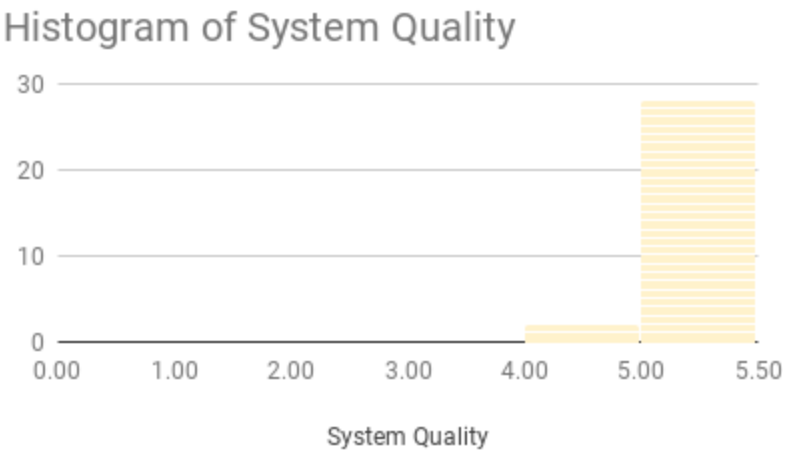
5.50
Complementary Technology Quality


Histogram of System Quality
30
20
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0.00
1.00
2.00
3.00
4.00
5.00
5.50
System Quality


Histogram of Information Quality
30
20
10
0
0.00
1.00
2.00
3.00
4.00
5.00
5.50
Information Quality