Effectiveness of Landfolio Information System. Ministry of Natural Resources Lands Registry Dept.

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ABSTRACT

In recent years, information systems (IS) encompass one of the main fields of study in an organization, caused by the need to identify their organizational value. Therefore, in this research and based on a theoretical review, a questionnaire is developed for the evaluation of the success of the Landfolio Information System for The Ministry of Natural Resources, Land Registry Department, to determine the effectiveness of the IS in order to achieve organizational results. To reach this goal, the Convenience Sampling technique was used through a survey made to Seven (7) units within the Ministry of Natural Resources, Belize. The results obtained allow deducing that the department pays more attention to precisely imputing data in the Landfolio System, trying to improve the quality of the system to best suit the business process, and using information gathered to make daily decisions for the successful operation of the department. This work contributes to the literature on the measurement of the success of the IS in the context of a country with an emerging economy, particularly by allowing to identify in a broader manner the measurement of its effectiveness and its incidence in the business performance

Key words: *Ministry of Natural Resources, Registry Department, Organization, Information system, Landfolio, Effectiveness*

Introduction

In today's modern society, the effects of technological change can be visibly seen across the globe creating immense transformation in the way many NGO and governmental organizations operate, conduct business, and develop new products or services. With this new era of the interdependence of technology, the dynamics of many businesses have been changing in order to compete with international businesses. In such a very small and developing country as Belize, where e-government and technology are not changing as radically as other developing countries, it is difficult to compete with international businesses. The major problem in a developing country such as Belize is the lack of e-governance and research on the effectiveness of information systems to generate reports in order to make accurate decisions. With the increase of technology, the more accurate a system is, the more valuable the system is to the institution. Information systems (IS) have proven to be one of the most relevant components of an organization's environment. IS offers great opportunities for success for any organization; given that they have the capability of collecting, processing, distributing, and sharing data in an integrated and timely manner. Additionally, IS can help narrow geographical gaps, allowing employees to be more efficient at what they do, which can be reflected in an improvement of the processes, administration, and the management of information, resulting in a positive impact on the productivity and competitiveness of the organization.

Defining Information System (IS).

For the purpose of this research, Laudon and Laudon 14th edition (2016) have technically defined Information System as "as a set of interrelated components that collect (or retrieve), process, store, and distribute information to support decision making and control in an organization. In addition to supporting decision making, coordination, and control, information systems may also help managers and workers analyze problems, visualize complex subjects, and create new products. Information systems contain information about significant people, places, and things within the organization or in the environment surrounding it. By information, we mean data that have been shaped into a form that is meaningful and useful to human beings. Data, in contrast, are streams of raw facts representing events occurring in organizations or the physical environment before they have been organized and arranged into a form that people can understand and use."(Laudon, 2016)

Originality of the research

The Ministry of Natural Resources is considered to be one of the largest ministries within the Public Service of Belize. The ministry is a key agency responsible for the management of the country's vital natural resources. The Ministry of Natural Resources undertakes the immense responsibility, to foster an integrated approach of coordination, protection, and sustainable management of Belize's vital natural resources. The Ministry works diligently, to ensure sound management and better quality of life for present and future generations of Belize.

The ministry, for the past couple of years, has been utilizing a system that is called Landfolio Information System. This System Software was originated in Dallas, Texas, United States of America. The software is a leading land management software suite that automates and integrates all key elements of land administration management. It is a very large program that features different functions that are used in the different units associated with the Ministry of Natural Resources. Landfolio software system's main network is currently located in Belmopan, with small operating stations in the different districts including; Toledo, Corozal, Belize City, Orange Walk, San Ignacio, and Dangriga.

Landfolio automated and integrated the public land records and cadastral maps under a single software platform that is providing the government of Belize with an advanced property management tool kit to oversee and administer their property record. Supporting activities in the project included a needs assessment, process re-engineering, participatory workshops, data conversion and scanning, public awareness, field data collection (parcel corner surveys, solution implementation, legal compliance, training, certification, and ongoing support.) Overall, the implementation of the solution supported 250 users in seven locations across the country of Belize.

Previous research on the Information System models has been conducted by Delone and Mclean and updated the model which is the most currently used today. Landfolio system has not been studied indebt enough to scientifically determine how effective the system is within the Ministry of Natural Resource or

any other department that uses the system. This research poses a challenge in terms of gather information about this system due to the limited research information found online of organizations or government departments who use this system. Within the Ministry of Natural Resources, information is the basis for the daily decision making, making it dependent on the system because it provides real-time data for its management.

What is known, is that with the introduction of Landfolio, it is evident that technology has improved the Lands department; as the integrations of information system continue to expand beyond the traditional roles it is important to develop the complementary assets associated with the information systems such as developing new business models and processes, changing management behavior and organizational culture to information systems, training employees to use the system effectively, and creating new relationships with customers. But the truth is that institutions such as the Ministry of Natural Resources, simply can't change as rapidly as the technology does.

Importance of the topic

This research is of great importance for the reason being that it is being conducted on a system used by Public Officers working at the Land Registry Department in the Ministry of Natural Resources, throughout the entire country of Belize. The research conducted here will assist in determining the success on the use of the Landfolio IS. The IS success model can provide a practical way to evaluate, for example, user satisfaction and impacts, as well as determining the satisfaction and effectiveness level on the use of information systems within the department. This system is used to make management decisions that affect the entire country thus, it is important to conduct more studies on these systems because the decision made can affect us directly or indirectly as a country.

Goal of the research

The goal of this research though is to explore the extent to which Landfolio Management Information systems are used to make effective decisions of long and short term planning within the Ministry of Natural Resources, Land Registry Department. Using Delone and Mclean Model study of Is success, the study will examine whether using the systems is being effective at all levels of service delivery the users are comfortable and trained to execute their duties while using the IS to deliver quality, timely, and efficient customer service to the Belizean public.

The Study Problem and its Questions

The technological advance and the information revolution that is taking place in today's society, particularly at the public sectors, have made the government departments to cope with these developments on one hand and the proper utilization of these ISs on the other hand. Therefore, an urgent need arises to determine the effectiveness of IS in the public sector and how to take an advantage of the management for information that provides in field of planning, establishing goals and observing their implementation, and take suitable action for its execution. The information systems is one of the essential elements that management are based on, for their daily decision making and planning process; Do these systems meet the goals that government departments and its management attempt to achieve? The study topic emerged to discuss effectiveness of the Landfolio information systems at the Ministry of Natural Resources, Lands Registry Unit from the management prospective because it is considered to be the main beneficiaries of the information provided by these systems, besides attempting to figure out the extent to which these systems meet their desired goals by the department's management.

The study problem can be summarized through the following question:

1. Is the IS in the Belize Public Sector effective, particularly at the Ministry of Natural Resources, Registry unit, to meet the needs of the planning process?

2. Is the IS at the Ministry of Natural Resources, Registry unit effective to meet the needs of providing quality and timely service to the general public?

3. Is the IS at the Ministry of Natural Resources, Registry unit effective to meet the needs of the decision-making process?

Hypothesis:

The following hypotheses are summarized based on the study problem:

H_1: The Landfolio IS at the Ministry of Natural Resources, Registry unit, is ineffective to meet the needs of the planning process

H_2: The Landfolio IS at the Ministry of Natural Resources, Registry unit, is ineffective to meet the needs of providing quality and timely service to the general public

H3: The Landfolio IS at the Ministry of Natural Resources, Registry unit, is ineffective to meet the needs of the decision-making process

Literature Review

There is numerous research on the approaches, techniques, and technologies for the design and development of MIS. However, there are a few articles that discussed the impact of Management Information Systems on planning strategies and decision making within a Government Department. Below are literature reviews that were discovered using other IS. Due to the limited availability of research done on Landfolio IS, the researcher decided to use systems that can be compared to Landfolio.

According to research conducted by Kenneth A Shay, an efficient and effective land information system is of great importance and can be something very critical for a country's national development. When IS is properly implemented, it drives decision making and policy creation in a government. It also manages and appropriate property taxes and revenue which is fundamental to a country's economic viability and secure land tenure for the citizens of a country.

The website "Habitat for Humanity", its states that "A Land Information System is a tool for legal, administrative and economic decision-making and an aid for planning and development. A land information system consists, on the one hand, of a database containing spatially referenced land-related data for a defined area and, on the other, of procedures and techniques for the systematic collection, updating, processing, and distribution of the data. The base of a land information system is a uniform spatial referencing system, which also simplifies the linking of data within the system with other land-related data." (UNECE)

One of the most fascinating models in the area of measuring information systems success is Delone and Mclean's model (D&M) presented in 2003 (Figure 1). This model enables the applied theories in the area of IS measurement to take place. The model also specifies the dimensions of IS success in six groups and associated the relationship between those groups. In addition, the model takes into consideration the perspectives of all information systems recipients.

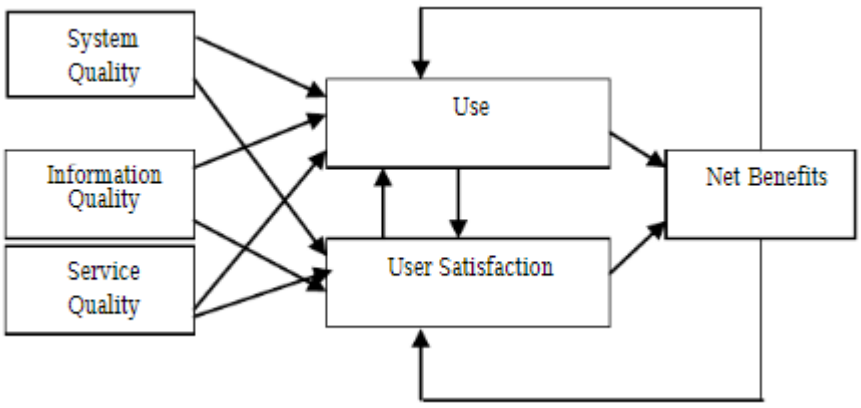


Figure 1: D&M model

The studies done by Delone & McLean, IS represent three most important dimensions namely: Service quality, Information quality, System quality which must be monitored for the user's satisfaction. Delone & McLean proposed this model but it was lacking in showing the benefits of IS and support for e-commerce success in government departments. Therefore in this research, IS success factors that will be used includes information quality, system quality, service quality, system use, user satisfaction, and perceived net benefits.
The following are brief definitions of each dimension that are used in the questionnaire to gather data:

Information quality-Information quality is the degree to which information presents the required benefits. Those constructs are refined from the literature and include; availability, timeliness, relevance, interpretability, accuracy (up to date), and completeness.

System Quality- As with information quality, the overall quality of a system is also one of the most common dimensions along which information systems are evaluated. System quality indirectly impacts the extent to which the system is user friendly and able to deliver benefits by means of mediational relationships.

Complementary Technology Quality- Complementary Technology dimension of an information system includes; hardware and software. Management uses the technology dimension to store its data in a safe custody. For example, Computer Hardware is adequate, reliable internet connections.

Service quality-Service quality is a set of characteristics related to services done to the IS which includes keeping the system up to date, support staff solving IS problems or connections, informing users when servicing will be performed. Additional characteristics include service reliability, assurance, empathy, and security.

User satisfaction-User satisfaction refers to the recipient's response to the use of IS output. User satisfaction is associated with positive or negative attitudes towards IS which depends on system availability, meeting expectations, and overall satisfaction with the system.

System use-The extent to which end-users use the results presented by the information systems. The measures of use are refined from the literature and include; the frequency of system use, dependency, responsiveness, adaptability, and knowledge necessary to use the system.

Perceived Net benefits-A measure for the positive and negative impacts of the IS on all individuals and departments affected with the IS (customers, employees, organizations). Net benefits can be identified with a set of constructs that includes improving job performance, cost savings, achieving departmental goals, career productivity, and overall enhancement of employee performance.

In their study, Laudon and Laudon (2016) have defined IS as "as a set of interrelated components that collect (or retrieve), process, store, and distribute information to support decision making and control in an organization. In addition to supporting decision making, coordination, and control, information systems may also help managers and workers analyze problems, visualize complex subjects, and create new products." The above-mentioned definitions showed that IS has underlined the development, application, and validation of relevant theories and models in attempts to encourage quality work in this research conducted at the Ministry of Natural Resources, Land Registry Dept. Therefore, the definition stated by Laudon applied and fits directly with the goals of the Ministry. The Landfolio collects, process, store, and distribute information effectively. The data gathered and imputed in the system, allows managers to make sound decisions in the daily operation of the ministry. When it comes to controlling, supervisors use the Landfolio system to generate reports to see the performance of each officer. Officers not performing much are placed on the front line so that they can meet their expectations in order to get a good appraisal.
Research, conducted by Ismail M. Romi to test the Delone and Mclean's system, was carried out to ensure its validity and explanations to IS success factors. Data were collected from IS end users in Palestinian

financial institutions using a questionnaire in order to test the research hypotheses. A total of 189 usable surveys were used in analyzing their data. Therefore; evaluating IS success considered to be critical to the organization's overall success. The results indicated that the explanation of the model variables needs more contributing variables to be embedded in the model. After conducting this research, this study focused more research on system use, and user satisfaction.

In an article entitled "Penmap field Software for Land Administration" used the Landfolio Software system for data collection and cadastral surveying, mapping and land registration tasks. Penmap revolutionary user interface provides the industry's largest map real-estate. It is designed to operate with your fingers and provides the world's first right or left-hand modes for better ergonomics.
Penmap Field Software is:

- Compatible with the controls running Windows 8, 7, vista, XP or mobile operating systems.
- It provides the industry largest map real -estate, which can be operated at the tip of the fingers.

Benefits of using Penmap:

- Quick and simple survey and GIS data collection.
- Customized work flows streamline data collection processes for improved productivity.
- Direct logging to total station and GNSS data save time.
- Revolutionary user interface design enables easy to use finger operation.

Research shows that Penmap Field Software makes cadastral data collection easy and ensures complete data collection with a map view of the location and date are been displayed in real-time. It also improves the quality and completeness of data, this creates a peace of mind at the end of the day because individuals can see what all have been collected and ensuring that everything is correct and completed. (Brochure-Penmap, 2015)
The function of Penmap Field Software is direct logging of total station and GNSS data, area computation, stake out point with a total station and GNSS data, multiple and verification measurement and configurable point numbering, and code table.

Published on March 7, 2017, by Mr. Gilbert, in the article "Malawi's New Map Cadastre-Landfolio for Natural Resources", is implemented in Malawi's to facilitate all aspects of the application, evaluation, granting and compliance monitoring of mineral, surface and water rights, and their related legal agreements. Gilbert state that the online Mining Cadastre Map portal implemented by Trimble is similar in scope and functional of those it has previously rolled out for the Democratic Republic of the Congo, Kenya, Liberia, Namibia, Mozambique, Papua New Guinea, Rwanda, South Sudan, Tanzania, and Zambia.
The findings gathered from the stakeholders using this system (Landfolio) views in early February 2017, including from the private sector, cooperatives, civil society, media, and the GoM. The overall level response rate was excellent, over 25% of all contacted individuals responded as compared to a more typical level response rate for such a listening exercise of more than 10%. (malawis-new-mining-map, 2017).

In 2007, writer Boorda, states the using Landfolio software system in the Barrick Gold Corporation in Africa, for natural resources records and manages all aspects of the relocation and resettlement of local communities, whose land has been acquired for mining or other extractive operations, in one single system. Implemented as a fully integrated community resettlement solution, Landfolio provides comprehensive searching and reporting capabilities on historic data and future obligations. It was mentioned that "Barrick now uses FlexiCadastre not only for managing its surface and mineral land rights as well as the obligations and rights of all types of agreements in all five regions but additionally manages compensation/relocation/resettlement activity in two."
Research has also shown that Barrick Gold Corporation has some benefits using Landfolio for natural resources, it helps mining and other extractive companies by:

- Conduct accurate spatial surveys and valuations of existing land and new resettlement plots.
- Ensure social obligations are fulfilled thereby improving the livelihoods of the communities while protecting the company's industry reputation.
- Efficiently manage the resettlement process, including pay out of transportation and accommodation allowances.

- Ensure tight financial control and budget forecasting.
- Maintain accurate records of historic payments and resettlement activities, which can be used for grievance management purposes.
- Manage the construction of new houses, including contractor details, contractor payments, house inspections and handover.

Magaji Galadima, The Journey so Far (2006), in his words stated categorically that the former Department of Land Administration and Resettlement was operating a manual system of land record management. These were plagued by numerous holdups and cumbersome, widespread forgeries, document laundering, and racketeering of land. According to him, other problems of land administration include cases of multiple allocation, unattended applications, allocations from "Parallel Ministry" mismatches in land use, and encroachments. Other worrisome problems that were mentioned include inefficient revenue generation and collection, as well as delays in issuing and perfecting transactions inland.

This case can be related to the Ministry of Natural Resources, Lands Department. There were assumptions that numerous cases of document laundering and corruption that occurred on a daily basis. It was discovered though, that Landfolio capability reduces the risk of fraud and corruption when it comes to document laundering. As it relates to the questionnaire, it was expected that participants in this research can provide misleading information on the system's efficiency to cover up what is occurring.

Fidel Study (2007) entitled: "The effect of environmental factors, organizational and behavioral and technological effectiveness of accounting information systems at Jordanian banks in Republic Yemeni – Field Study " It intention was to determine the effect of environmental factors, organizational and behavioral and technological effectiveness of accounting information systems, and study sample consists of 340 employees at financial departments and accounting departments in Jordanian banks in Yemen where (172) questionnaires were analyzed. The study concludes several findings: Upon dealing with factors, it was found out that there were positive effectiveness of for technological and organizational factors of accounting information systems, while there was no effect for each of environmental and behavioral factors, but in case in analyzing each factor independently, it was proved existence of a clear and positive impact for all variables in the study effectiveness of accounting information systems used at banks in Yemen. The study recommended the need for participation of both staff and users in design of accounting information systems, in addition to development and necessity to use computers and software, besides expanding use of administrative decentralized system.

According to Yaser Hasan Al-Mamary, Alina Shamsuddin, Nor Aziati, the Technology Acceptance Model, developed by Davis is one of the most influential research models in studies of determinates of information systems and information technology acceptance to predict intention to use and acceptance of information systems and information technology by individuals. In the Technology Acceptance Model, there are two determinants including perceived ease of use and perceived usefulness (Chen, Li, & Li, 2011). Perceived usefulness (PU) was defined by Fred Davis (1989) as "the degree to which a person believes that using a particular system would enhance his or her job performance". Perceived ease-of-use (PEOU) - Davis defined this as "the degree to which a person believes that using a particular system would be free from effort". Perceived usefulness and perceived ease-of-use of the system lead to IS Success. In our study, we focus on how we can adapt the technology to MIS success and improve the quality of MIS. High quality of MIS improves information quality and subsequently effects on managerial decision making.

From the literature presented, we can easily distinguish that the importance of the role of both middle and top management is to maintain a consistent approach to develop, use, and evaluate MIS systems within the department. IS is used at various levels by top-management, middle, and even by the operational staff as a support for decision making that aims to meet strategic goals and strategic objectives.

The above literature also explores the importance of management IS in providing decision-makers with facts, which consequently support and enhance the entire decision-making process. Furthermore, at the most senior level, MIS and DSS supply the data and required information to assist the board of directors and management levels to make accurate and on-time strategic decisions.

Methodology & Analysis

Using a quantitative sample, this study was conducted on Seven (7) different land registry units from all over the country of Belize, which comprise of public officers within the Ministry of Natural Resources. The participants were randomly selected from each unit and they answered a total of (36) Thirty Six questions, characterized under (8) categories namely; Background Information, information quality, system quality, complementary technology quality, service quality, user satisfaction, use, and perceived net benefits.

Selection of Sample

From a total of Two Hundred and Fifty users, eighty (80) questionnaires were issued out. Only sixty-one (61) were received. The sample size that was analyzed and used for this research was 60 questionnaires which yield a responsive rate of 100% percent. For this research, the following methods were used to obtain the information:

Primary data: Questioners were utilized to obtain data from the Public Officers. Participants were selected based on the Convenience Sampling method where the researcher distributed to supervisors at a meeting and then it was handed out to random individuals at each unit.

Data Analysis & Results

Figure 2. Show that out of the sixty (60) participants, there were fifty-two (52) technical/clerical officers and eight (8) supervisors. Out of the technical/clerical officers, there were 25 male and 27 female officers. Whereas there were 4 male and 4 female supervisors. The results were split between Supervisors and Technical/Clerical Officers to try to distinguish the difference of opinions between the two.

A	B	C	D
TOTAL PARTICIPANTS			
	Technical	Supervisc	Total
MALE	25	4	29
FAMALE	27	4	31
TOTAL	52	8	**60**

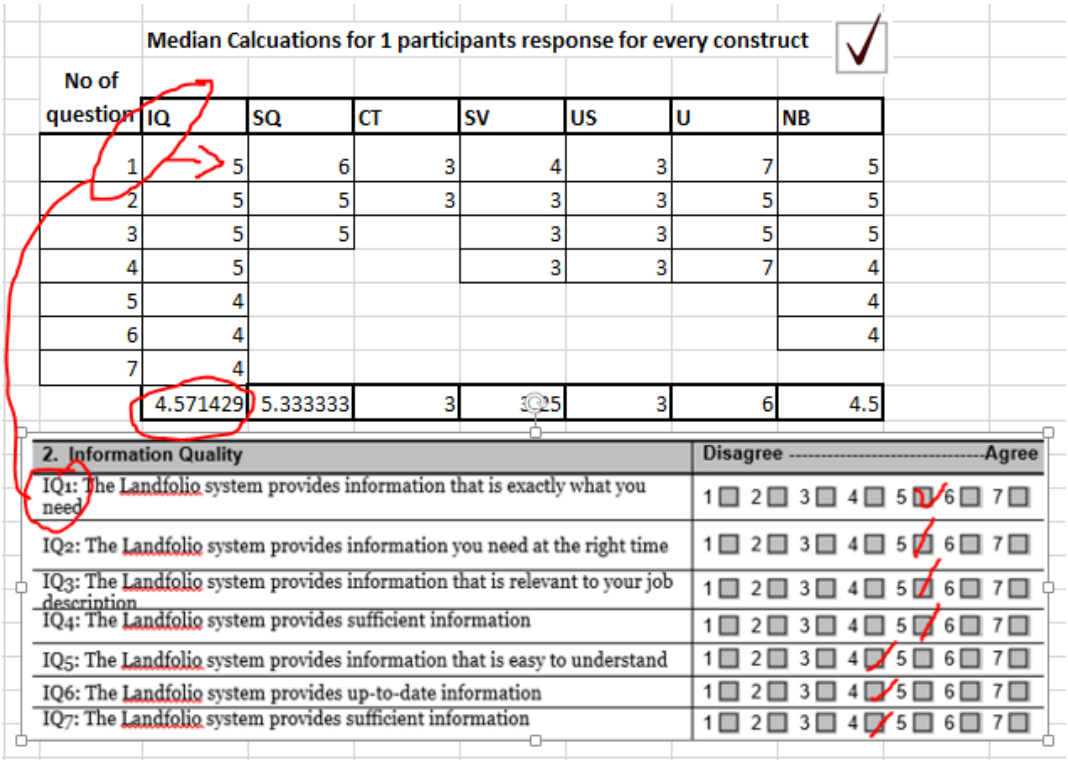
Figure 2. Participants

Figure 2. Shows the total research participants which comprise of technical/clerical/others, supervisors and their gender.

Level of Education	*Primary*	*Diploma*	*Associates*	*Bacherlor*	*Masters*	*PHD*	TOTAL
	0	19	27	12	2	0	60

Figure 3. Level of Education

Figure 3. Shows the participant's educational level being Associates is the highest in number, then followed by diploma and bachelors. This shows that majority of the participants are capable of using the system if and when properly trained to use it effectively.



Median Calcuations for 1 participants response for every construct

No of question	IQ	SQ	CT	SV	US	U	NB
1	5	6	3	4	3	7	5
2	5	5	3	3	3	5	5
3	5	5		3	3	5	5
4	5			3	3	7	4
5	4						4
6	4						4
7	4						
	4.571429	5.333333	3	3.25	3	6	4.5

2. Information Quality	Disagree ----------Agree
IQ1: The Landfolio system provides information that is exactly what you need	1 2 3 4 5 6 7
IQ2: The Landfolio system provides information you need at the right time	1 2 3 4 5 6 7
IQ3: The Landfolio system provides information that is relevant to your job description	1 2 3 4 5 6 7
IQ4: The Landfolio system provides sufficient information	1 2 3 4 5 6 7
IQ5: The Landfolio system provides information that is easy to understand	1 2 3 4 5 6 7
IQ6: The Landfolio system provides up-to-date information	1 2 3 4 5 6 7
IQ7: The Landfolio system provides sufficient information	1 2 3 4 5 6 7

Figure 4: Sample Median Calculation for IQ Construct

Figure 4: The figure above shows an example of how each construct is calculated for (participant number 52) participant's response. The median response for Information Quality (IQ) is 4.5 for one participant's response. This 4.5 is plugged into the master sheet to determine the overall percentage of all participants response. See master sheet below.

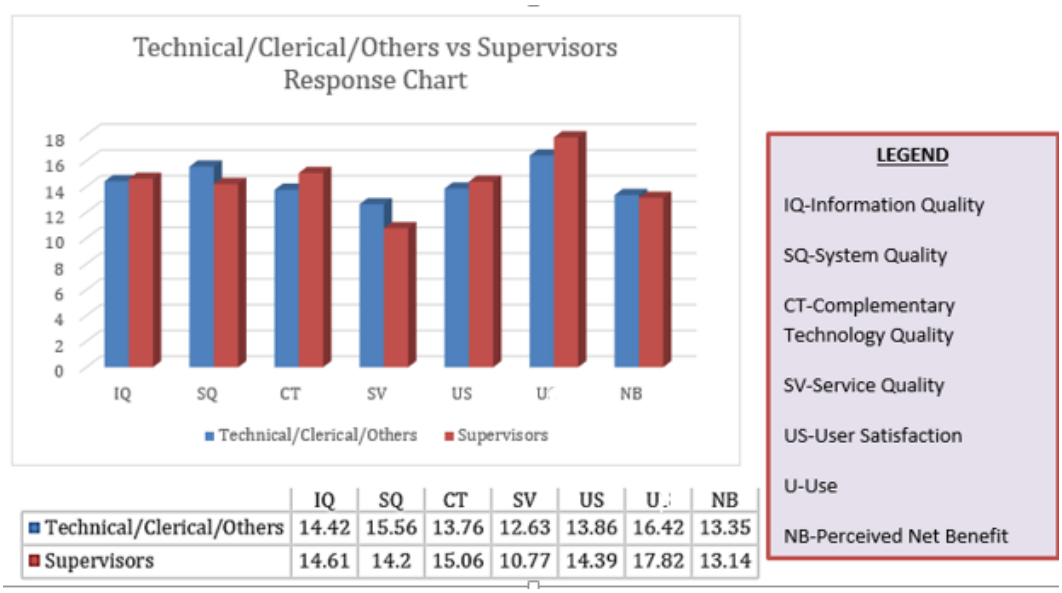
A	B	C	D	E	F	G	H	I
Participant Number	**IQ**	**SQ**	**CT**	**SV**	**US**	**U**	**NB**	**Average**
1	5.57	5	6	6.25	5.75	6.5	4.16	5.60
2	4.42	4	3	5.75	4.5	6.5	4.33	4.64
3	6.28	6.66	6	4.75	5.75	6.75	3.88	5.72
4	5.57	4.66	6	5.75	6	6.75	3	5.39
5	3.71	1.66	5	5.5	3.5	6.25	3.66	4.18
6	6.14	7	6	5	6.5	6.75	4.33	5.96
7	5	5.55	5	4.25	5.75	6.75	5.5	5.40
8	4.85	6.66	5.5	4.5	5.25	6.75	5.83	5.62
9	5	5	3.5	3	5.25	6.5	5	4.75
10	5	5.66	4.5	4.5	5.25	6.25	5.33	5.21
11	3.5	6.33	4	1	3.25	5.75	3.83	3.95
12	4.42	4.33	3.5	2	3.25	2.5	6	3.71
13	4	3.33	6.5	6.25	5.5	3.25	5	4.83
14	3.85	4	3.5	2	3	6	4.83	3.88
15	3	2	2.5	2	2.75	1	1.83	2.15
16	6.42	7	6	6.25	6.25	7	6.66	6.51
17	4.42	4.66	5	5	4.25	6.25	4.83	4.92
18	4.71	4.33	4.5	4	4.75	7	5.5	4.97
19	3.5	3	3.5	2.75	3.5	2.5	3.5	3.18
20	5.28	5	1	7	4	7	5	4.90
21	4.42	5.33	5.5	4	5	7	5.33	5.23
22	3.42	4.33	1	3.5	2.75	5	3.83	3.40
23	6.42	7	7	6.25	6.75	7	5	6.49
24	5.42	5	4.5	4	5.25	5.5	5	4.95
25	6.28	7	6.5	6.5	6.25	5.5	6.33	6.34
26	3.57	4.66	3	2.75	4	4.75	2.66	3.63
27	6.85	6.33	5.5	5.75	6	5.5	6.16	6.01
28	6.42	6.66	5	5	4.5	7	6.83	5.92
29	5.42	5.55	7	3.25	5.75	7	4.5	5.50
30	5.57	5.33	5.5	5.75	5.25	6.5	6.5	5.77
31	6.57	5	7	6.5	6.25	6.5	7	6.40
32	2.57	3.66	2	3	2.5	2.5	4.16	2.91
33	2.42	5.66	6	4.75	3.5	6.5	3.16	4.57
34	5.14	6	5	4.5	4.75	6.25	4.33	5.14
35	5.57	6	4	3	3	3.5	3.5	4.08
36	3.71	2	2	1	3	2	2	2.24
37	4.71	6	6.5	7	6	1.5	2.33	4.86
38	3.42	5.66	3	2.75	4	3.5	3.16	3.64
39	4.28	5	4.5	2.75	4.5	2.5	0	3.36
40	5	7	5.5	3.5	5.25	6.5	4	5.25
41	5.85	3.66	6	5	5.75	6.25	5.5	5.43
42	2.57	6.66	1	1	1.75	0	0	1.85
43	5.28	6	7	4.25	6	7	4.5	5.72
44	5.14	5.33	5.5	5.25	5	7	5.16	5.48
45	3	4.66	2	1.25	1	5.75	3.66	3.05

46	4	4.66	4	4.75	5	5.25	4.33	4.57
47	4.14	5.33	1	2	4.5	6.25	5.16	4.05
48	5.71	5.66	7	5	3	6	4	5.20
49	4.71	3.33	3	3	4.75	4	4	3.83
50	5.28	5.66	6	4.25	5	6.5	4.5	5.31
51	5.28	5.66	4	4.75	4.75	5.75	6	5.17
52	4.57	5.33	3	3.25	3	6	4.5	4.24
AVERAGE	4.76	5.13	4.54	4.17	4.57	5.42	4.41	
100%=	**32.99**							
Technical Response %	**14.42**	**15.56**	**13.76**	**12.63**	**13.86**	**16.42**	**13.35**	
Supervisor's Response %	**14.61**	**14.2**	**15.06**	**10.77**	**14.39**	**17.82**	**13.14**	
Overall Percentage	29.03	29.76	28.82	23.40	28.25	34.24	26.49	.=100%

Figure 5: The figure above shows median for every single participant's response. After which, an average was calculated which yield a total of **32.99 =100%** response. In order to determine Technical Response percentage under IQ, it is calculate as follows: 4.76/**32.99** x100=14.42%. The overall percentage of IQ for both Technical and Supervisor response is calculated as follows: sum of 14.42+14.61 =**29.03%.**

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1		**Supervisors Questionaire results**				**8 person (remainder)**								
2			Male	4										
3			Female	4										
4														
5			Participants No.		1	2	3	4	5	6	7	8	**Median**	**%**
6	**IQ**	**Information Quality**			2.5	3	6.14	5.85	4.71	5.14	5.85	5.14	4.79	14.61
7	**SQ**	**System Quality**			1.6	5	5	6	5	5.33	6.33	3	4.66	14.20
8	**CT**	**ComplementaryTechnology**			6	2	5	6	4	5	5.5	6	4.94	15.06
9	**SQ**	**Service Quality**			1.25	2	3	5.5	3	5.25	5.25	3	3.53	10.77
10	**US**	**User Satisfaction**			2.75	4.75	5.5	6	4.25	5.25	6	3.25	4.72	14.39
11	**U**	**Use**			5.25	4.75	6	5.5	6.75	4.75	7	6.75	5.84	17.82
12	**NB**	**Perceived Net Benefits**			3	2.83	5.5	4.16	5	4.16	6.33	3.5	4.31	13.14
13												100%=	32.79	100%

Figure 6: Supervisor Result (8 participants)

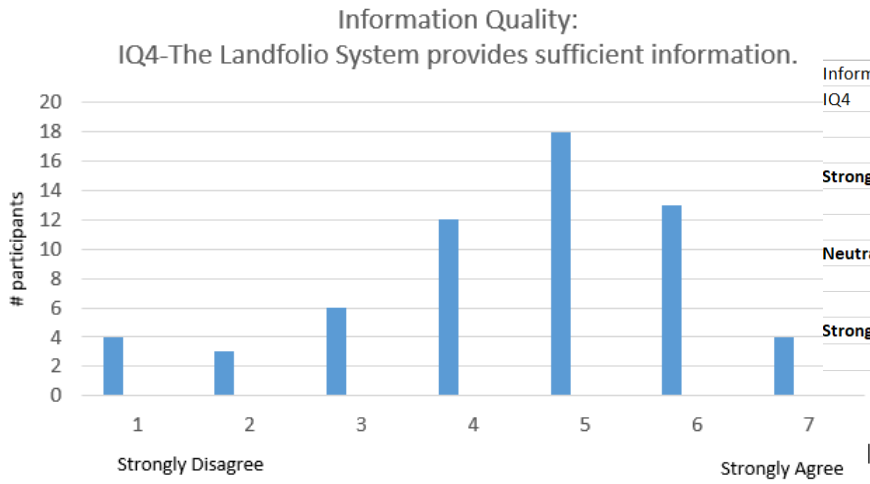


	IQ	SQ	CT	SV	US	U	NB
Technical/Clerical/Others	14.42	15.56	13.76	12.63	13.86	16.42	13.35
Supervisors	14.61	14.2	15.06	10.77	14.39	17.82	13.14

Figure 6.1: Comparison between Technical/clerical/others verses Supervisors

Figure 6-6.1. Comparison between Technical/clerical/others verses Supervisors response with regards to the systems effectiveness

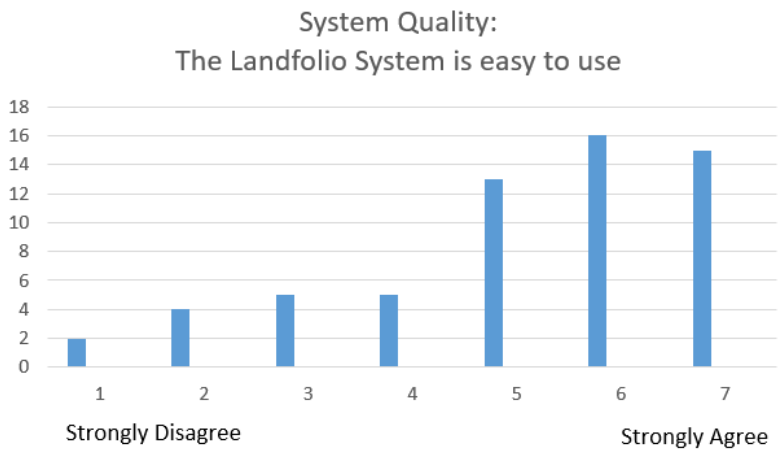
Figure 6.1: The reason why there is a difference between the responses to system quality (SQ) between technical staff verses supervisors is that most supervisors are not up to date when it comes to advance technological changes at the department, they use to doing everything manually. Whereas the younger generation is more susceptible to adapting to new technologies. Another downfall would be the availability of the internet. During the rainy season, the system is up and down and sometimes really slow. In addition, new upgrades affect the system. Upgrades usually slow the system down and staff has to adapt to the new changes. The difference in the dimension Use (U) is because supervisors use the system to generate reports on a daily basis at the request of ministers. The system tracks a user's activities and productivity when using the system. Supervisors use the system mostly to compare results from the previous month in order to make sound daily and monthly decisions.



	A	B	C	D	E	F
	Information Quality					
	IQ4	Does Landfolio System provides sufficient information				
		Rating	**Response**	**%**		
	Strongly Disagree	1	4	6.66667		
		2	3	5		
		3	6	10		
	Neutral	4	12	20		
		5	18	30		
		6	13	21.6667		
	Strongly Agree	7	4	6.66667		
	Total		60	100		

Figure 7. Participant's response on IQ4 question. See Questionnaire

Based on findings, Figure 7 shows that 58.33% (35 participants) of the respondents (#5-7) agreed with the question asked, while 21.6% (13participants) (#1-3) disagreed, and 20% (12 participants) (#4) were neutral. It can be noted that the majority of the respondents do believe that the Land Folio Software System is effective and provide sufficient information for the internal employees to carry out their daily job expectations.



	A	B	C	D
	System Quality			
	SQ1- The Landfolio System is easy to use			
		Rating	**Response**	**%**
	Strongly Disagree	1	2	3.33333
		2	4	6.66667
		3	5	8.33333
	Neutral	4	5	8.33333
		5	13	21.6667
		6	16	26.6667
	Strongly Agree	7	15	25
	Total		60	100

Figure 8. System Quality. SQ1: The Landfolio system is easy to use

Figure 8 is depicting that 73.33% (44 participants) (#5-7) of the respondents agreed that the Software System is easy to use, 18.33% (11 participants) (#1-3) disagreed, and 8.33% (#4) of the respondents were neutral. This 18.33% is as a result that staff is not able to get properly trained to use and maneuver around with the system. Most of the time, a new hire will have to learn on their own, considering one or two days of training only. Another factor that contributes to this is the access to the Land folio system, at times when the internet is down, the staff were not able to complete tasks.

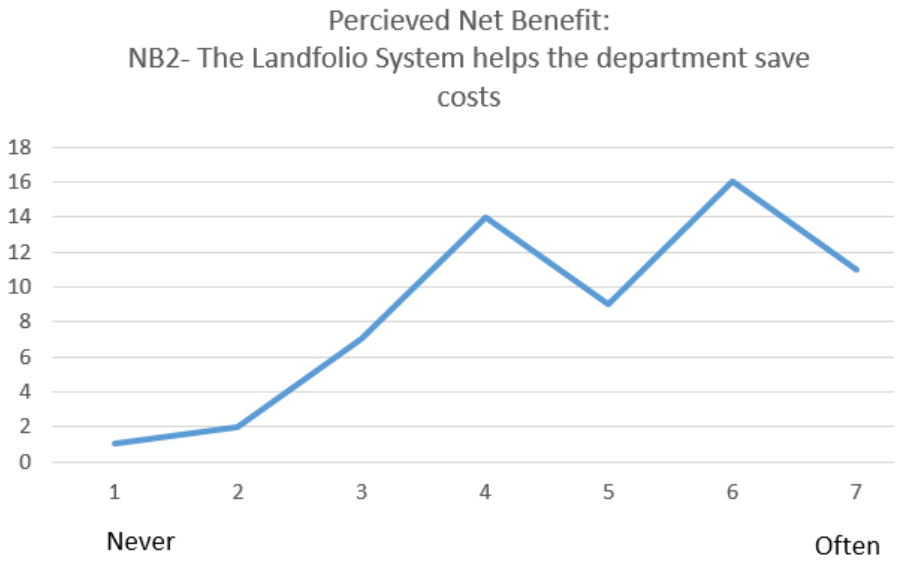


Figure 9. Participants response on cost saving

	A	B	C	D	E
	Percieved Net Benefit				
	NB2- The Landfolio System helps the department save costs				
		Rating	**Response**	**%**	
	Strongly Disagree	1	1	1.66667	
		2	2	3.33333	
		3	7	11.6667	
	Neutral	4	14	23.3333	
		5	9	15	
		6	16	26.6667	
	Strongly Agree	7	11	18.3333	
	Total		60	100	

Figure 9 is showing that 60% (36 participants) (#5-7) of the respondents mentioned that it helps the department save costs by employing less staff, less usage of paper and office supplies, very time efficient when traveling between department to find out data, 16.66% (10 participants) (#1-3) disagreed that it doesn't save costs while on the other hand, 23.33% (14 participants) (#4) were neutral. It shows that 23.33% of the respondents were neutral concerning this question because they are skeptical about the fact that the public if not well informed about the software they will be unable to properly work it.

While conducting this research, findings may not always satisfy or give 100% results. For this research, the information did not conclude with satisfactory data due to the way it has been analyzed. The questionnaire questions asked were just an overall opinion on the effectiveness of the Landfolio system. It didn't test participant's knowledge on every single process of imputing, gathering, and reporting of data for effective decision making. In addition, the rankings used (1-7) is a bit bias to determine if some participants were neutral. Number 4 was used as neutral for the purpose classifying the responses to determine whether it's under or above 50% (under 4-disagree, above 4-agree). While the researchers did give an explanation as to what went wrong, recommendations are that a wider range of data is needed to accurately test the effectiveness of the IS. Only a single questions asked under a construct is being represented in a graph format.

Recommendations

After carefully studying and surveying the Ministry of Natural Resources, here are some recommendations which could be put in place for a more efficient and effective IS:

- Emphasis on continuous improvement of Lanfolio IS in the Ministry of Natural Resources, Registry Unit, which will enable them to keep pace with technological developments in Land Administration fields as it reflects positively on administrative jobs at the registry including planning, observation and decision-making processes.
- Concentrating more on the observation process at the Registry Unit for its major impact on reducing expenses and increasing revenues, besides giving more emphasis on benefit of outputs of the information systems that provide reports on the performance of the different administrative levels Have internal thorough trainings to introduce and educate existing and new public officers on how the system works rather than just experimenting on their own.
- Ensure proper and adequate use of Landfolio IS facilities in generating and disseminating information for better decisions.
- Encourages the department's top management to participate in enhancing IS and make an effective contribution to system design.
- Develop effective communication channels between supervisors and data entry clerks. Good communication facilitates the task of recording, developing relevant and appropriate information into the system.
- Simplified official procedures - a faster and more effective way of moving files should be developed with proper file management techniques put in place. All other departments should carry out the same proper procedures of filing.
- Reduction in waiting times for obtaining information on land matters should be curtailed to the barest minimum. The Survey and Registry should publish a 'Registration Procedure Booklet" to convey the requirements for each of their Registration Procedures
- IT department should be well trained in order to conduct Landfolio internal upgrades on the system rather than waiting for foreign technicians to do upgrades which is very costly and time-consuming.
- Implement a fail-safety backup so that the IS continues to operate in times of drawbacks.
- Purchase the best technological equipment for long-lasting service.

Research Limitations

The researchers encounter many limitations during the process of accomplishing the final research paper. Some of the limitations were; due to lack of time, only eighty (80) participates were selected to participate in the survey of which only sixty (60) were useable, because of the small participant group the researchers cannot generalize the results since the Ministry of Natural Resources consists of more than 250 users. Also, the researchers had planned to conduct a cluster sampling; however due to time once again the researchers had to use Convenience Sampling. After the survey was conducted the researchers noticed that several participants left some questions unanswered and 19 of the participants were reluctant to fill the survey. The main limitation while conducting this research is the availability of information regarding research conducted on IS in Belize therefore, foreign research was used as literature reviews in order to support this research. Lastly, the impact of COVID-19 has caused a tremendous impact on this research for reasons that government offices were shut down and information is difficult to process through telecommunications, and access to internal information is limited.

Conclusion

Today, businesses and organizations in virtually every industry are using sophisticated IS software to fuel their growth but many are still struggling to keep up with their growth and managing costs effectively because of a confused mixture of disconnected functional systems causing process holdups and employee productivity issues. IS software suites are transforming how organizations run and enabling them to transcend growing pains that previously were holding them back from taking their business to the next level.

This research was conducted based on Delone and Mclean's (2003) update IS success model. The results show that the use of, system quality, service quality, information quality, and perceived net benefit are valid measures of Landfolio System success. Base on the finding, the hypothesized relationship between Delone and Mclean six dimensions were supported in this research. The interdependence of the dimensions with one another was clearly seen. The Delone and Mclean IS success model illustrates that the objective is to have high perceived net benefits at the Ministry of Natural Resources; the net benefit was moderately above neutral, suggesting that the employees of Natural Resources have an unbiased net benefit of the IS.

The research also provides information that is vital to the Ministry of Natural Resources, about the dynamics of the Landfolio system within their department. According to the Delone and Mclean model, the net perceived benefits are the key to determining IS success, as well as the other dimensions, are also needed to provide a better understanding of the success of the Landfolio. Information system, system use, user satisfaction, quality system, service quality, and complementary technology quality are all contributing factors that influence whether there is perceived net benefits. The results illustrate that all of the dimensions within the Ministry of Natural Resources are slightly above neutral (5-7) rating. Base on the result obtained from the employees, they reiterated that the main factor affecting the information system is the lack of training for new staff, system upgrades, and ethical standards of carrying out daily job duties and responsibilities. This research concluded as follows:

H_1: The Landfolio IS at the Ministry of Natural Resources, Registry unit, is effective to meet the needs of the planning process.

H_2: The Landfolio IS at the Ministry of Natural Resources, Registry unit, is effective to meet the needs of providing quality and timely service to the general public

H3: The Landfolio IS at the Ministry of Natural Resources, Registry unit, is effective to meet the needs of the decision-making process

Acknowledgements

First of all we thank God for giving us strength and skills to complete this report in a befitting manner. We are thankful to the Course facilitator for guiding us throughout the research process. In addition, thanks to the Ministry of Natural Resources for the support given in filling out the questionnaires.

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Appendix

QUESTIONNAIRE

LANDFOLIO INFORMATION SYSTEM RESEARCH QUESTIONAIRE

Purpose

This research is carried out by University of Belize students which is a requirement for the CMPS3012 MIS course. This questionnaire asks for information about yourself and how often you use the Landfolio Information System at your workplace. The data gathered will be analyzed to determine the success and effectiveness of Landfolio at our University.

Please answer each question based on your use of Landfolio. Your individual responses to the questionnaire will be strictly confidential and will be used solely for the purpose of this research.

Instructions

This is a survey, not a test; there are no right or wrong answers. Please tick the boxes to mark your answers.

1. Background Information	Answers:
Please indicate your gender:	Male ☐ Female ☐
Please indicate your age:	<25 ☐ 25-35 ☐ 36-45 ☐ 46-55 ☐ >55 ☐
Please indicate how many years you have been working:	<5 ☐ 5-10 ☐ 11-15 ☐ >15 ☐
Please indicate your level of education:	Primary ☐ Diploma ☐ Associate ☐ Bachelors ☐ Masters ☐ PHD ☐
Which of the following best describes your position:	Clerical ☐ Technical ☐ Supervisor ☐ Other ☐

Indicate your agreement with each statement by rating it from (1) strongly disagree to (7) strongly agree.

2. Information Quality	Disagree ----------Agree
IQ1: The Landfolio system provides information that is exactly what you need	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
IQ2: The Landfolio system provides information you need at the right time	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
IQ3: The Landfolio system provides information that is relevant to your job description	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
IQ4: The Landfolio system provides sufficient information	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
IQ5: The Landfolio system provides information that is easy to understand	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
IQ6: The Landfolio system provides up-to-date information	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
IQ7: The Landfolio system provides sufficient information	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
3. System Quality	**Disagree ----------Agree**
SQ1: The Landfolio system is easy to use	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
SQ2: The Landfolio system is user-friendly	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
SQ3: The Landfolio system provides interactive features between users and the system	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
4. Complementary Technology Quality	**Disagree ----------Agree**
CTQ1: The computer (desktop, laptop, mobile device) you normally use to access Landfolio is adequate	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
CTQ2: The computer (desktop, laptop, mobile device) you normally use to access Landfolio has a fast and reliable internet connection	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

5. Service Quality	Disagree ----------Agree
SV1: The support staff keep the Landfolio system software up to date	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
SV2: When users have a problem the Landfolio system support staff show a sincere interest in solving it	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
SV3: The Landfolio system support staff respond promptly when users have a problem	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
SV4: The Landfolio system support staff tell users exactly when services will performed	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
6. User Satisfaction	**Disagree ----------Agree**
US1: Most of the users have a positive attitude of Landfolio.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
US2: You think that the utility of the Landfolio system is high.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
US3: The Landfolio system has met your expectations.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
US4: You are satisfied with the Landfolio system.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
7. Use	**Never ----------Often**
U1: Your frequency of using the Landfolio system is high	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
U2: You depend upon the Landfolio system	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
U3: You were able to complete a task using Landfolio even when there was no one around to tell you what to do	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
U4: You have the knowledge necessary to use the Landfolio system	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
8. Perceived Net Benefits	**Never ----------Often**
NB1: The Landfolio system helps you improve your job performance	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
NB2: The Landfolio system helps the department save costs	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
NB3: The Landfolio system helps you achieve your departmental goals	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
NB4: Using the Landfolio system improves assessment and teaching	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
NB5: Using the Landfolio system at school increases your academic productivity	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
NB6: Overall, using Landfolio enhances student performance	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

For the research to be successful with accurate findings, Please return this survey to the person who gave you the form.

Thank you for your participation. Have a great day!