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THE IMPACT OF INFORMATION SYSTEMS ON THE DECISION-MAKING PROCESS OF FINANCIAL MANAGEMENT: A RESEARCH IN THE MINISTRY OF EDUCATION IN LIBYA[1]

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ABSTRACT

Information systems are considered one of the essential topics researchers are interested in. The increasing need to collect, process, and use data and information effectively is a crucial requirement for the success of organizations in all its forms. It has become obligatory for institutions to use information systems to make decisions related to administrative and financial functions. This study aims to determine the effect of information systems on the quality of decision-making in financial management. The research data was obtained through a purpose-prepared questionnaire. The population of this study consists of 200 employees working as managers, heads of administrative and financial departments, accountants, and internal auditors in the Ministry of Education in Libya. Following the study's goal, the obtained data have been analyzed using the partial least squares regression (PLS) analysis method. The analysis results show that information system quality affects information quality and decision-making quality.

Keywords: Information System, Decision Making, Information Quality, Financial Management.

JEL Codes: M10, G30

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BİLGİ SİSTEMLERİNİN FİNANSAL YÖNETİM KARAR VERME SÜRECİNE ETKİSİ: LİBYA EĞİTİM BAKANLIĞI'NDA BİR ARAŞTIRMA

ÖZET

Bilgi sistemleri, araştırmacıların ilgilendiği en önemli konulardan biri olarak kabul edilmektedir. Veri ve bilgiyi etkin bir şekilde toplama, işleme ve kullanma ihtiyacının artması, her türlü organizasyonların başarısı için temel bir gerekliliktir. Dolayısıyla, kurumların idari ve mali işlevlere ilişkin kararlarında bilgi sistemlerini kullanmaları zorunlu hale gelmiştir. Bu çalışma, finansal yönetimde bilgi sistemlerinin karar verme kalitesi üzerindeki etkisini belirlemeyi amaçlamaktadır. Araştırma verileri, amaca yönelik hazırlanmış bir anket aracılığıyla elde edilmiştir. Bu araştırmanın evrenini Libya'da Milli Eğitim Bakanlığı'nda yönetici, idari ve mali daire başkanı, muhasebeci, iç denetçi olarak çalışan 200 çalışan oluşturmaktadır. Çalışmanın amacına uygun olarak, elde edilen veriler kısmi en küçük kareler regresyon (PLS) analiz yöntemi kullanılarak analiz edilmiştir. Analiz sonuçları, bilgi sistemi kalitesinin bilgi kalitesini ve karar verme kalitesini etkilediğini göstermektedir.

Anahtar Kelimeler: Bilgi Sistemi, Karar Verme, Bilgi Kalitesi, Finansal Yönetim.

JEL Kodları: M10, G30

INTRODUCTION

The information is necessary for operating and making effective decisions. It determines and explains the different types of information by the internal complex communication links to the research and development department. It discusses the factors determined by the status managers of using information, including the roles, skills, decision-making process (strategic and operational), coherent and alternative behavior, the cognitive style and awareness, hidden agenda element, including the optimal information use as a power supported by readings and selected tables to the types of information, operations, and service. Any organization needs information about its internal processes to guarantee the effectiveness, efficiency, and environment to respond and adapt to external agencies' procedures, positions, and decisions, including governments and social groups. Both the information types should be collected together in an organized way to match the procedures and organization decisions closely with external circumstances (Kaye, 1995).

The previous research focused on accounting information's role in developing the knowledge of its work as entrance on information in specific decisions. In order to facilitate the decision, accounting information in the form of periodic decisions or special analyses is considered a source of information to make decisions (Hall, 2010). It is found that accounting information can be used to facilitate the decision and its features to enhance individuals' knowledge and ability to make better decisions. Nevertheless, focusing on using accounting information by managers for making previously determined decisions is considered a sound and restricted matter. It determines how to look in other more meaningful ways to managers (Sprinkle & Williamson, 2006). The role of accounting information that facilitates decisions can be clarified as the provision of accounting information to facilitate the decisions and features of that information was found to enhance individuals' knowledge and ability to make decisions (Hall et al., 2009).

As an essential source of information about business performance, accounting may help directors develop knowledge in the workplace environment by many approaches to make these activities invisible to managers' daily activities and provide a comprehensive quantitative viewpoint to their job. Accounting information can clarify those hidden problems in daily activities and provide an independent operation examination to help directors know what is happening (Hall, 2010).

In business, financial management handles a company's finances to be successful and compliant with regulations. That takes both a high-level plan, organizing, and boots-on-the-ground execution. This study focuses on the planning and organizing parts of financial management. The most critical role of managers is to make financial decisions and practice monitoring financial affairs in the organization. Managers use different techniques such as ratio analysis, financial prediction, analysis of profits and loss, etc. Financial managers need information while making a decision. So, it can be said that information has an important role in the decision-making process.

Various social sciences research has focused on the relationship between information systems quality and decision-making (Dietrich & Lehtonen, 2005; Martinsuo & Lehtonen, 2007; Raymond &

Bergeron, 2008; Saeed & Abdinnour- Helm, 2008). However, a limited number of research studies have considered information quality's mediating role. The current study examines the relationship between information systems quality and the financial decision-making process, considering information quality's mediating role.

The current study mainly focuses on information quality in the financial decision-making process. However, the literature shows that information quality is affected by information system quality. The light of this information, the study aims to determine the effect of information systems quality on the financial decision-making process, considering information quality's mediating role.

Most non-profit organizations face difficulties that make them unable to manage their financial and human resources efficiently. The research problem lies in measuring the effect of information systems on the efficiency of financial decision-making in non-profit organizations, as we know that successful management requires sufficient and appropriate information in a way that helps to rationalize the decision-making process. After a literature review about information systems' effect on decision making, we found no study focusing on non-profit organizations. Non-profit organizations have different dynamics from the business. So, the relationship between information system quality and decision-making may differ from the results of other studies focusing on business in the literature.

This study differs from other studies with the following points:

- Determine the effect of information systems quality on the financial decision-making process, considering information quality's mediating role and,
- Focus on non-profit organizations.

1. CONCEPTUAL FRAMEWORK

1.1. The Impact of Information Systems on Supporting the Decision–Making Process

IS plays a significant role in the organization and affects the organization's performance, productivity, and functions. The effect of information systems on functions becomes more effective by its management to finance, production, and employees become more efficient. It is easy to follow and monitor the goals of the function. The operational managers are informed by the development, success, and shortcomings in business and goals. The manager is kept alert by providing specific information that refers to the possible directions in many job sides, which helps predict and plan for the long-term. Manager interests in ordinary circumstances and leads him to behave or make decisions in this regard. Disciplined information creates a database for all organization members' structure and knowledge base. Mixing and analyzing information can be used immediately, saving managers time. The IS creates an additional effect on the understanding of the organization for the same job. Information systems start by defining the data and its entities and characteristics. It uses the dictionary of data, commodities, and elements to generate information in the organization. Since all information systems use the dictionary, the common understanding of the terms and meanings clarifies the communication and compares understanding to the event (Mishra & Pradhan, 2019). It is thought that using information systems

changes how organizations work and enhance the decision-making process. Organizations' use of information systems is expanded over the years (Brien & Marakas, 2007).

Quality of decision-making refers to the organization's capability to make accurate, correct, and vital decisions. The process of decision-making in the organization is knowledge-intensive, and the knowledge is considered its raw material (Ghasemaghaei, 2019). The decision-making process is implemented when the organization's policy, goals, and plans are interpreted into main procedures. The main goal of the decision-making process with additional planning is to provide future directions and goals by orientating all human behaviors. The decision-making process plays a critical and important role in business administration, financing, and other business functions (Hasan et al., 2017).

1.2. Relation Between System Quality and Decision Quality Improvement

System quality refers to the quality of information systems process, including the components of programs and data. It measures the extent of systems safety from the technical side. The quality of systems is associated with errors in the system, user interface consistency, ease of use, documentation quality, the quality of program code, and the possibility of maintenance. The system's quality can be measured by many features, including ease of use, functions, reliability, data quality, integration, and flexibility (Delone & Mclean, 2003). A comprehensive tool is developed to the system's quality and checks its validity leads to many features, including system features, ease of learning, system accuracy, user requirements, development, integration, ease of use, specialization, and flexibility (Sedera & Gable, 2004).

Features of system quality are classified into two classes: systems feature from the system designer's point of view (named the flexibility of system) and systems features from the point of view of the final user (named the system developer). The dimension of system flexibility reflects that the system has been designed with beneficial features (without unnecessary features) and that the system designer can easily make the necessary modification to programs. The complexity of system dimension refers to the easily used system, well authenticated, characterized by quick time, and uses a modern technique that allows the system to be easily manipulated. A well-designed and developed system is considered a primary condition to derive organizational advantages. The obtained features enhance the efficiency of the process (Gorla et al., 2010).

In contrast, the system designed and constructed carefully will face probable crashes that will be harmful to the organizational processes. Moreover, an easily maintained system enjoyed by longer age leads to spreading the costs of programs over a more extended period, leading to decreased costs incurred by the organization (Swanson, 1997). The system's quality is positively related to organizational influence on the operational level inside the organization by enhancing the decision-making (Bradley et al., 2006).

1.3. Relation Between Information Quality and Decision Quality Improvement

Information quality is considered the main issue in a high number of organizations. Many organizations focus on the provision of related information more than ever before. In order to ensure

that information fulfills the highest standards, each organization faces problems associated with monitoring the quality of production. Therefore, information quality management becomes an integral part of any organization's management process (Price & Shanks, 2011). Information quality is described as a field of information systems. IS is always described as accounting database systems comprising data collection, processing, distribution, and use of data by other operations or humans in the context of information systems (Ballou et al., 1998).

It is necessary to measure and control the levels of information quality. A supporting analysis is required to confirm the dependency between the dimensions of information quality to analyze the influence of information quality on decision-making. The experimental assessment approach must be applied by promoting the relationships between information quality dimensions. Most of the information quality evaluations are based on personal or subjective curricula. The unique curriculum uses interviews or questionnaires to evaluate the quality of information by the information agents.

Nevertheless, the personal curriculum is always used programs to automatically assess the quality of information by applying the quality concepts. The self-curriculum assesses the information quality by examining a comprehensive set of dimensions. On the other hand, the subjective curriculum feature is represented in the computing process for a comprehensive set of data to get unique outputs. Although the self-curriculum focuses on a sample of data and produces outputs from distinctive agents, some dimensions are unsuitable for subjective curriculum (reputation and authenticity). Then, the organization needs a comprehensive system to evaluate the quality of information and consider each of the self and subjective approaches (Mouzhi & Markus, 2008).

1.4. Relation Between System Quality and Information Quality

The program's quality is always used to mean the system's quality. In general, decreasing the quality of programs leads to increased costs because the program does not serve the intended purpose and is not designed as specified, is exposed to errors, has fewer safety conditions, and is not strong (Törn, 1990). Therefore, low-cost programs lead to low quality of information (in terms of the information content) because of inappropriate and inaccurate information. In addition, the flexible system can be modified easily and quickly and therefore fulfill the needs of users' information that change quickly and efficiently. This leads to the outputs of associated and modern information for users, which means information with high quality and then enhances the quality of the decision. Systems that use modern technologies (such as user interface) may transfer the data efficiently and effectively. The integrated system provides complete and accurate information where the outputs of information are helpful in the daily functions of users and associated with enhancing decision making (Gorla et al., 2010). The information systems process is similar to the production process in manufacturing organizations. Let us suppose that the product (information) has not been provided at a specific time (timeline) and that the product (information) does not fulfill the requirements of agents (users). In this case, the agents (users) will be unsatisfied, and the organization will lose its business (Rani & Kidane, 2012).

Information produced by an information system incompatible with users' needs will be subject to high maintenance and disrupt the organization's operations. This will lead to an increase the costs (Swanson, 1997). The high content of information will improve the effectiveness of decision-making. Bad information quality negatively impacts organizations on the operational, tactical, and strategic levels. The agents will not be satisfied on the operational level, and employees will lack functional satisfaction because of inaccurate or inadequate information. So, selecting and implementing a healthy job strategy will be difficult due to imprecise or late information. On the other hand, the high quality of the information in terms of the content may lead to increased organizational effectiveness in terms of internal organizational efficiency (Redman, 1998).

2. LITERATURE REVIEW

Given the importance of the studies carried out by the researchers who preceded us in this field on what is related to information systems and decision-making in the institution, we will present the previous studies that are entirely related to our topic to know the results of these studies.

Winterman, Smith, and Abell (1998) studied the impact of information on governmental departments' decision-making. It is found that the respondents realize and evaluate the positive effect of information in decision-making. It is confirmed in the study's internal and local information network, and the information service centers positively impact the decision-making process. The results showed an increase in trust in decision-making better than associated information. Also, the study confirmed the value of information as continuous and accurate. Decisions made by the governmental administrations are highly dependent on the mix of requirements complexity, and the diversity of information resources reflects this complexity—the study recommended by more studies about this subject.

Sokkar (1999) provides a study about using MIS in the decision-making process in the business sector. The researcher applied his study to two organizations, one in the petrol industry and the other in the information field in Egypt. The study showed that the application of MIS directly affects the productivity of organizations and helps to achieve profit by enhancing the information process and knowledge on an administrative level, enhancing understanding of the importance of information at lower levels of the organization. Nevertheless, it is considered a type of administrative expenditure, and in some cases, they are considered less important than the fixed assets and cannot be retrieved. The study suggested that this opinion is wrong. If the organization knew the features of MIS, they would plan differently and transform the attention to these systems. The study encourages organizations to pay special attention to applying MIS at the technical and administrative level and implementing the organization plan. MIS adds value to the organization and not only the department it is created for. According to the study, it is necessary to develop an MIS unit that the government supervises to publish adequate knowledge and training for specific authorities and create units for MIS inside ministries to decrease the administrative expenditures that overburden the governmental budgets.

Al-Kinani's (2008) study entitled the effect of modern information systems on the process of making financial management decisions purpose of the study was to establish the impact of recent

advances and trends in information systems, as well as the reality of key manager adoption in Arab and foreign banks, on the decision-making process of financial management, in addition to their impact on supporting that process. On the practical side, a questionnaire was delivered to seven Arab and foreign banks in Amman in 2008, resulting in a study sample of 125 individuals. The study concluded with a set of results that problems are facing the process of applying modern information systems concerning benefiting from the advantages of exploiting modern technological techniques in supporting the decision-making process of financial management; Arab and foreign banks focus on optimal uses of decision support systems and expert systems due to the lack of confidence in them.

Caniëls & Bakens (2012) mentioned that using project management information systems is helpful for project managers. There is no adverse effect on the project and an extra load of information on the quality. Many enhancements were noticed in effect on decision-making by the quality of information from PMIS in terms of enhancing the quality of decisions, decreasing the time to make decisions, allocating the resources better, and monitoring the activities. The study showed a moderate relationship between the information quality and the project manager's approval about PMIS, the information use, and the effect on the decision-makers.

Bakhoda & Mayeli (2016) focused on the role of financial information in decision-making. This theoretical study aimed to fully understand the role of financial information and its effect on the decision-making process in management, where the main problem was centered on how accounting and financial information affect the quality of decision-making in the institution, and the study also sought to analyze the current and future way of the impact of decisions with the available information, from the financial statements. In his analysis, the researcher relied on the survey process for a group of previous studies that he deemed appropriate and related to his research. The study concluded the importance of financial information in guiding management in decisions about current activities and maintaining the effectivity and stability in the future. In business, by offering fair and convincing information about the organization's financial aspects, Decisions about various investments, financing, and profits are made after analyzing and evaluating the financial information available to companies.

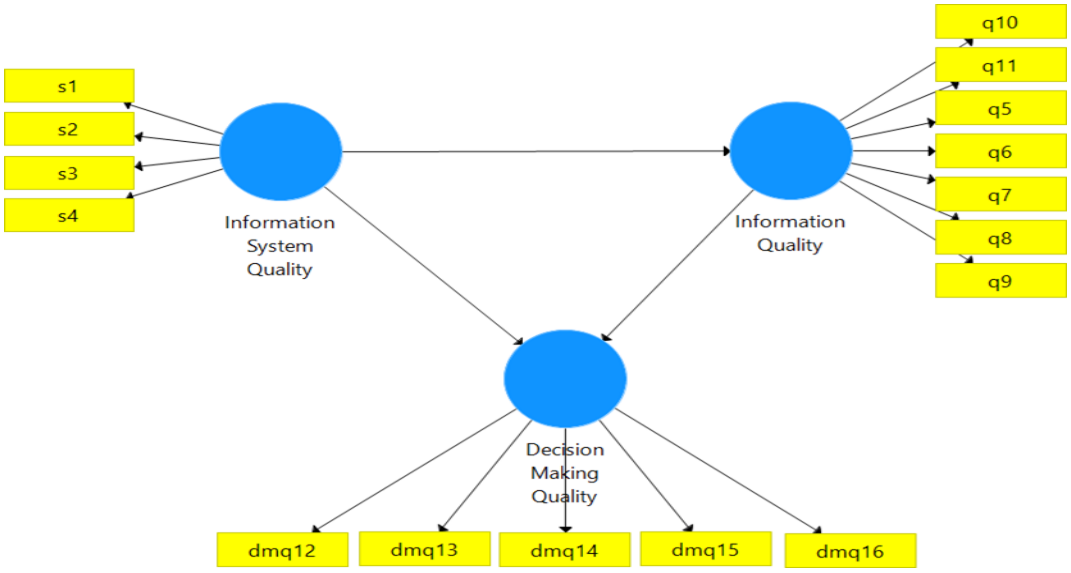
Attar's (2019) study is entitled financial information systems based on the data mining approach and its impact on the success of financial decisions. The study aimed to highlight the extent to which financial information systems contribute to financial decision-making in the organization, using the principle of data mining. Applied, the researcher used a case study method represented in Aseel Telecom Company. As for the data collection tool, the SPSS program for statistical analysis was used. The study sample consisted of 100 employees of Aseel Telecom Company. The study concluded with a set of results, including that financial information systems based on data mining have a primary role in any of the financial decisions taken by the company, especially financing decisions that influence financial decisions.

3. AN EMPIRICAL ANALYSIS IN MINISTRY OF EDUCATION IN LIBYA - METHODOLOGY

3.1. Hypotheses and Research Model

Figure 1 shows the proposed research model of this study. Three variables were added to the research model: IS quality, information quality, and decision-making quality. IS quality was measured with four questions (s1 – s4); information quality was measured with seven questions (q5 – q11), and decision-making quality was measured with five questions (dmq12 – dmq16).

Figure 1: The Research Model



Decision-making quality indicates the accuracy and the correctness of decisions. If the decision-maker has appropriate information on the problem factors, the quality of the decision will be improved. Nevertheless, if the decision-maker does not have sufficient knowledge about the relationship between the variables of the problem, the quality of the decision may decrease. As a result, the quality of the decisions is determined by the inputs. As mentioned above, information systems are used to meet the data needs of employees and save time for employees to make decisions. An employee can control the entire process by using information systems. So, the quality of the IS can directly affect the correctness and accuracy of decisions.

Saeed and Abdinnour-Helm (2008) clearly studied the IS. Specifically, they discovered the impacts of IS on their supposed advantage. They found that providing high-quality information in the information systems is necessary to help users make correct decisions and thus enhance employees' work performance. In contrast, IS that delivers unpredictable and inaccurate information has a negative impact on its advantage. Therefore, IS quality is added as the first input, affecting decision quality. According to Saeed & Abdinnour- Helm (2008), system quality is positively associated with decision making.

Hypothesis 1: Information system quality significantly influences firm decision-making quality.

Information quality indicates the correctness and timeliness of data that employees need. Employees need the information to make rational decisions. So, it can be said that the right decision can only be taken using the correct information. Another critical factor for rational decision-making is access to information on time (Martinsuo & Lehtonen, 2007:Raymond & Bergeron, 2008).

Dietrich and Lehtonen (2005) detected a strong statistical correlation between information availability, topicality, validity, and adequate decision-making. Dietrich and Lehtonen's (2005) finding specifies the significance of high-quality information enabling organizations to succeed. In light of this, information quality is added as the second input, affecting decision quality. Based on extant literature, we expect that information quality is positively related to decision-making (Dietrich & Lehtonen, 2005).

Hypothesis 2: Information quality significantly influences firm decision-making quality.

IS quality and information quality are strongly interrelated because information systems generate information. If the information systems cannot generate accurate information, decision-makers will make wrong decisions. Information systems make it easier for employees to make decisions. The use of information systems is critical to the timeliness of the information. If so, it can be thought that IS affects information quality.

Hypothesis 3: Information system quality significantly influences information quality.

Hypothesis 4: Information system quality significantly mediates the relationship between Information quality and decision-making quality.

3.2. Data Collection Method

The research data was obtained through a purpose-prepared questionnaire. The questionnaire form involves four parts. In the first part, there were questions about the participants' demographic information. The second part includes four questions (s1 – s4) to measure the system's quality in the organization, taken from a study (Al-Mamary et al., 2013). In the third part of the questionnaire, there were seven questions (q5 – q11) to measure the quality of information and were taken from a study (Al-Mamary et al. 2013), and the fourth part was Five questions (dmq12 – dmq16) to measure the quality of decision-making taken from a study (Caniëls and Bakens, 2012). A 5-point Likert scale is used to rate all scales (5 = very strong, 4 = strong, 3 = medium, 2 = weak, 1 = very weak).

3.3. Population and Sample

The questionnaire was distributed to employees of the Ministry of Education in Libya. The population of this study consists of managers, heads of administrative and financial departments, accountants, internal auditors, and the financial controller's office. The questionnaire form was prepared electronically in addition to being distributed directly to the employees; All participants completed the survey anonymously and voluntarily. 200 out of 412 employees participated in the research. The survey participation rate is around 49 %. We use the Steven K.Thompson equation to calculate the sample size (Thompson, 2012).

3.4. Data Analysis Method

The Partial Least Square Regression (PLS) model analyzes the gathered data. PLS path modeling can be comprehended as a full-fledged SEM approach that may deal with both factor models and composite models for measuring construct, assessing the recursive and non-recursive structural models, and performing model fit tests (Henseler et al., 2016). The partial least-squares analysis is a multivariate statistical method that helps to compare several responses and explanatory variables. Partial least squares are covariance-based statistical approaches usually referred to as SEM. It has been created to cope with many regressions when data has a small sample, missing values, or multicollinearity. PLS regression was proven to have inaccurate data and imitations (Pirouz, 2012). Two sets of linear equations determine the PLS path model: the outer and the structural models (the inner models). The structural model determines the relationship between the constructs, and the measurement model determines the relationship between a construct and its perceived indicators (manifest variables) (Henseler et al., 2016).

The PLS method was selected in this research due to the following advantages of PLS rather than the OLS regression model; 1. Capable of modeling multiple dependents in addition to multiple independence variables, 2. may deal with multicollinearity; 3. Reliable despite missing data; 4. Makes independent latent directly based on cross products including response variable(s) = stronger expectations; 5. Permit for reflective and formative latent; 6. Applied to the small sample; 7. Distributional free and 8. Cope with a wide set of variables: continuous, ordinal, and nominal.

4. RESULTS

The results in this section are presented in five parts; the findings relating to (I) Demographic Statistics, (II) Descriptive Statistics, (III) Reliability and Validity, (IV) Model Assessment, and (V) Hypothesis Tests.

4.1. Demographic Statistics

The study sample was 200 employees working in the Ministry of Education in Libya. Demographic results include gender, age groups, education level, specialization, and employees' years of experience.

According to Table 1, the number of male participants in the questionnaire reached (142), and the number of female participants (58) and the percentage of male participation reached (% 71) the percentage of females participation (% 29). This finding indicates that more (males) have predicted the impact of information systems on the decision-making process of financial management. Table 1 also shows that the number of samples participating in the questionnaire from (30 years old and over) was (12) samples with a percentage of (6 %). In contrast, the samples of participation in the age groups between (31-40) years amounted to (60) samples amounted to (30%), while the number of participation samples in the age groups between (41-50) years amounted to (77) samples amounted to (38.5%).

Table 1: Distribution of Participants' Demographic Statistics

Gender	Frequency	Percent
Male	142	71,0
Female	58	29,0
Total	200	100,0
Age	**Frequency**	**Percent**
up to 30	12	6,0
31 - 40	60	30,0
41 - 50	77	38,5
50 over	51	25,5
Total	200	100,0
Education	**Frequency**	**Percent**
Diploma	50	25,0
Bachelor's Degree	88	44,0
Masters	53	26,5
PhD	9	4,5
Total	200	100,0
Specialization	**Frequency**	**Percent**
Accountant	70	35,0
Internal auditor	33	16,5
Director	19	9,5
External auditor	71	35,5
Financial controller	7	3,5
Total	200	100,0
Experience	**Frequency**	**Percent**
5 years and less	14	7,0
6 - 10	39	19,5
11 - 15	54	27,0
16 and above	93	46,5
Total	200	100,0

The participants in the age groups (50 and over) years (51) samples with a percentage of (25.5%). This result shows that the participants are evenly distributed according to age. The questionnaire participants had mostly Bachelor's Degree level with % 44 and worked as an accountant (%34) and external auditor (%35,5). The %46,5 participants have 16 and above years of experience.

4.2. Descriptive Statistics

Descriptive statistics, which include a preliminary analysis, should be given before hypothesis tests.

Table 2: Descriptive Statistics

No.		Mean	Median	Min	Max	Standard Deviation	Excess Kurtosis	Skewness
1	s1	3.160	3.000	1.000	5.000	0.886	0.022	0.246
2	s2	3.230	3.000	1.000	5.000	0.859	0.290	-0.129
3	s3	3.050	3.000	1.000	5.000	0.870	-0.420	-0.006
4	s4	3.080	3.000	1.000	5.000	0.808	-0.068	-0.033
5	q5	3.020	3.000	1.000	5.000	0.911	0.030	0.400
6	q6	3.180	3.000	1.000	5.000	0.853	-0.336	0.132
7	q7	3.315	3.000	1.000	5.000	0.978	-0.563	-0.150
8	q8	3.475	4.000	1.000	5.000	0.922	-0.510	-0.196
9	q9	3.190	3.000	1.000	5.000	0.919	-0.318	0.003
10	q10	3.030	3.000	1.000	5.000	0.883	-0.166	0.381
11	q11	2.970	3.000	1.000	5.000	0.989	-0.598	0.466
12	dmq12	3.270	3.000	1.000	5.000	0.898	0.014	0.023
13	dmq13	3.310	3.000	1.000	5.000	0.972	-0.641	0.069
14	dmq14	3.280	3.000	1.000	5.000	1.006	-0.657	0.127
15	dmq15	3.145	3.000	1.000	5.000	1.007	-0.852	0.149
16	dmq16	3.225	3.000	1.000	5.000	1.065	-0.560	0.165

The measure with the highest mean regarding information quality is (Please evaluate information quality in terms of Understandability measure as you see it in the IS where you work?) Mean=3.475 and the lowest mean regarding information quality is (Please evaluate information quality in terms of Timeliness measure as you see it in the IS where you work?) Mean = 2.970. The measure with the highest mean regarding the quality of decision-making is (Does the information system as you see it at the organization where you work help you during decision-making?) Mean=3.310 and the lowest mean regarding the quality of decision-making is (Is the information system as you see it at the organization where you work help you better allocate resources?) Mean = 3.145.

4.3. Reliability and Validity

(A) Outer Model Measurement Loadings

The outer model consists of the indicators and paths associated with the particular factors. Load and weights are extracted for each of the formative and reflective models. Outer model loadings focus on reflective models, and outer model weights focus on formative models. Our research model is qualified as a reflective measurement model (Garson, 2016). So, we focused on outer model loadings. Outer model loadings can be considered a reliable coefficient for reflective models. Whenever the loads close from 1.0, the statistics variable is more reliable. According to the convention, in terms of a good reflective model, the path loadings must be higher than 70 (Sarstedt et al., 2014).

Table 3: Outer Model Loadings

Questions	**Decision Making Quality**			**Information Quality**			**Information System Quality**		
	Loading	Std.Dev.	T.Stats.	Loading	Std.Dev.	T Stats	Loading	Std.Dev.	T Stats.
dmq12	0.801*	0.028	28.963						
dmq13	0.757*	0.037	20.651						
dmq14	0.812*	0.027	30.239						
dmq15	0.783*	0.038	20.801						
dmq16	0.803*	0.034	23.601						
q10				0.775 (0.772)*	0.032	23.801			
q11				0.740 (0.760)*	0.032	23.409			
q5				**0.671**					
q6				0.765 (0.762)*	0.038	20.123			
q7				0.793 (0.807)*	0.030	26.752			
q8				0.803 (0.820)*	0.024	33.948			
q9				0.812 (0.811)*	0.025	32.014			
s1							0.783*	0.041	19.211
s2							0.732*	0.044	16.415
s3							0.782*	0.037	21.159
s4							0.833*	0.024	34.619

Regarding information "path loadings should be above .70", question 5 (q5) was removed from the model. The new outer model loadings and weights of information quality calculated after Q5 was removed are shown in parentheses (…).

(B) Reliability and Validity Tests

The reliability and validity of structural models are examined by testing discriminant validity, internal consistency reliability, and convergent validity. After checking indicator reliability by outer model loadings, the internal consistency of the measurement model was determined with the Cronbach Alpha. With more than 0.50 of the Cronbach Alfa coefficients, the scale's internal consistency is at a proper level. Rho_A is a calculated coefficient to see data consistency and should be over 0.70. Composite reliability is another coefficient that gives the model reliability and must be above 0.70. R2 value shows how much the variables explain each other, while its value is more than 0.26 was desired (Çakır, 2019). The convergent validity has been determined using a widely accepted approach, "average variance extracted" (AVE). AVE value refers to the that, on average, each construct may explain more than half of the special value variance and must be more than 0.50. AVE is considered more suitable for reflective measurement models (Hanafiah, 2020).

Table 4: Construct Reliability and Validity Test Results

	Cronbach's Alpha	rho_ A	Composite Reliability	Average Variance Extracted (AVE)	R^2
Decision Making Quality	0.851	0.855	0.893	0.627	0.498
Information Quality	0.878	0.879	0.908	0.623	0.350
System Quality	0.790	0.798	0.864	0.613	-

Decision-making quality's Cronbach alpha coefficient was calculated as 0.851; rho_A coefficient was calculated as 0.855, and A and composite reliability coefficients were calculated as 0.893, AVE coefficient was calculated as 0.627, R^2 value was calculated as 0.498. Information quality's Cronbach alpha coefficient was calculated as 0.878; rho_A coefficient was calculated as 0.879, and A and composite reliability coefficients were calculated as 0.908, AVE coefficient was calculated as 0.623, R2 value was calculated as 0.350. System quality's Cronbach alpha coefficient was calculated as 0.790; rho_A coefficient was calculated as 0.798; A and composite reliability coefficients were calculated as 0.864; AVE coefficient was calculated as 0.613. As shown in Table 8, there is no problem with the reliability and validity of the variables used in the research model. Cronbach's Alpha coefficients are above 0.50; rho_A and composite reliability coefficients are above 0.70, AVE coefficients are above 0.50, and R2 values are above 0.26 for whole variables. To assess if the variables are correlated highly, we measured the Variance Inflation Factor (VIF) as suggested by (Ghasemaghaei, 2019). The results refer that the VIF value for all the questions was < 3.3.

Table 5: Outer VIF Values

Questions	Outer VIF Values
dmq12	1.968
dmq13	1.806
dmq14	2.008
dmq15	2.087
dmq16	1.980
q10	2.185
q11	1.778
q6	1.997
q7	2.636
q8	2.490
q9	2.448
s1	1.638
s2	1.537
s3	1.714
s4	1.834

Fornell--Larcker criterion and Heterotrait-monotrait (HTMT) standards are generally accepted methods for discriminant validity assessment. The square root of the Average Variance Extracted of each latent variable must be more than the LVC to establish the discriminant validity.

Table 6: Fornell--Larcker Criterion

	Decision Making Quality	Information Quality	Information System Quality
Decision Making Quality	**0.792**		
Information Quality	0.676	**0.789**	
Information System Quality	0.564	0.591	**0.783**

Table 6 clearly clarifies that the validity of discriminant is encountered for this study because the square root of AVE for Decision Making Quality, Information Quality, and Information System Quality is much larger than the corresponding LVC. Discriminant validity assessment was also tested using Heterotrait-monotrait (HTMT) Criterion. If the value of the HTMT is higher than this threshold (0.85), one can conclude that there is a lack of discriminant validity. Therefore, the HTMT value should be less than 0.85.

Table 7: Heterotrait-Monotrait Ratio

	Decision Making Quality	Information Quality
Information Quality	0.774	
Information System Quality	0.677	0.708

As shown in Table 7, all Heterotrait-monotrait values for variables were calculated less than 0.85, so it can be said that discriminant validity was achieved.

4.4. Model Assessment and Hypothesis Tests

The general suitability of the model must be the starting point for evaluating the model. If the model does not fit with the data, the data includes information more than what the model transfers. Approximations that have been obtained without meaning and extracted conclusions may be doubtful. There is more than one way for model assessment. The suitability models help the approximation model respond to the extent of the discrepancy between the implied model and the empirical correlation matrix. This question is essential if the discrepancy is high. The only approximate model that suits the criteria conducted for PLS path modeling is the consistent root means square residual (SRMR) (Henseler et al., 2016). Hu & Bentler (1998) mentioned that a model has a good fitting when SRMR is less than 0.08.

The SRMR value of the research model was estimated as 0.074. Since the SRMR value of the research (0.074) was smaller than the threshold value (0.080), it was concluded that the model was fit. After determining that the model is fit, the hypotheses can be tested.

Hypothesis 1: Information system quality (ISQ) significantly influences firm decision-making quality (DMQ).

Hypothesis 2: Information quality (IQ) significantly influences firm decision-making quality (DMQ).

Hypothesis 3: Information system quality (ISQ) significantly influences information quality (IQ).

Hypothesis 4: Information system quality (ISQ) significantly mediates the relationship between Information quality (IQ) and decision-making quality (DMQ).

Table 8: Hypothesis Test Results

Hypothesis	Relations	Path Coefficients	Standard Deviation	T Statistics	P Values	Decision
H1	ISQ > DMQ	0.252	0.059	4.246	0.000	Confirm
H2	IQ > DMQ	0.526	0.057	9.183	0.000	Confirm
H3	ISQ > IQ	0.591	0.059	10.019	0.000	Confirm

Path results are given in Table 8. The path coefficient value for each hypothesis is greater than 1.96, which is the T table value of the 95% confidence level. In addition, the P-value values of the path coefficient for all hypotheses are less than 0.05. In line with these findings, it was concluded that hypotheses 1, hypothesis 2, and hypothesis 3 were confirmed. Specifics indirect effects show if there is a mediate effect or not. In the research model, we investigate if ISQ significantly mediates the relationship between IQ and decision-making quality or not. Table 12 shows the results of the mediate effect. The relationships among constructs in PLS-SEM can be complex and not always straightforward. To better understand the role of ISQ in our model and its potential mediating effect on the linkage between IQ and DMQ. This is performed by following the Preacher and Hayes (2008) procedure, which includes the use of bootstrap in a 2-step procedure: (i) the importance of direct impact is first checked by the use of bootstrap without the occurrence of the mediator ISQ in the model, and (ii) the importance of indirect impact and related T-Values are then checked by the use of the path coefficients when the mediator ISQ has consisted in the model.

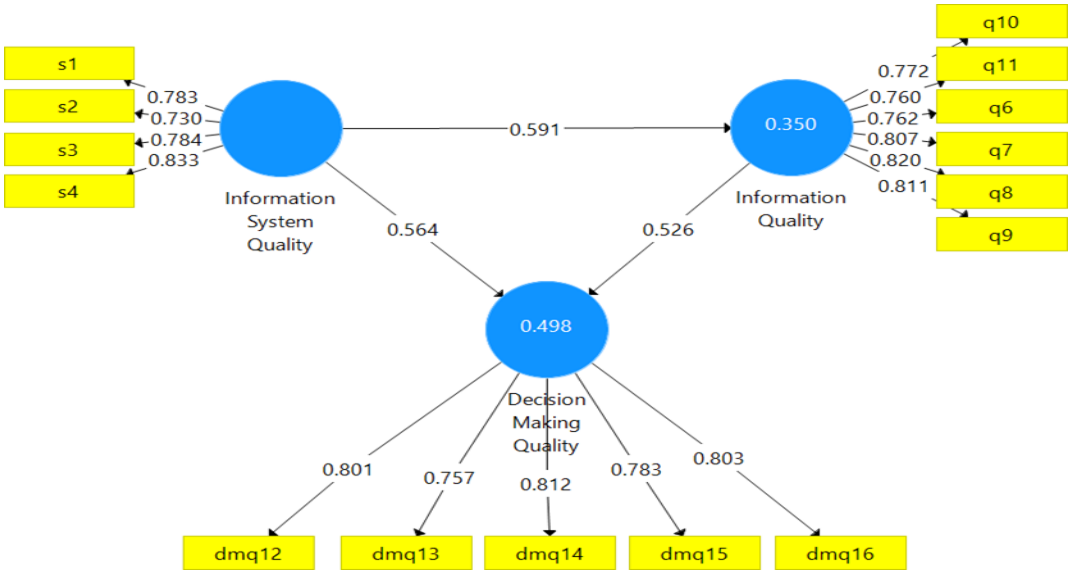
Table 9: Specifics Indirect Effects

Hypothesis	Relations	Path Coefficients	Standard Deviation	T Statistics	P Values	Decision
H4	ISQ > IQ > DMQ	0.311	0.044	7.080	0.000	Confirm

The path coefficient value for hypothesis 4 is greater than 1.96, which is the T table value of the 95% confidence level. In addition, the P-value values of the path coefficient for hypothesis 4 are less than 0.05. In line with these findings, it was concluded that hypothesis 4 was confirmed. This finding means that information system quality had a 0.311-unit indirect effect on decision-making quality. Thus,

the total effect of information system quality on decision-making was 0.564, calculated as 0.252 + 0.311. Figure 5 clarifies the results of evaluating the research model.

Figure 2: Research Model Paths



CONCLUSION AND RECOMMENDATIONS

All organizations depend on information systems for their management and operation. Moreover, advanced information systems improve performance, reflected in improving the quality of decisions. There is no doubt that information is essential in making decisions in institutions. It is clear from the previous literature that information systems within organizations affect the decision-making process. From this point of view, the research problem has been identified in examining the impact of information systems on the quality of decision-making in financial management regarding measuring the quality of information and the system.

The first hypothesis, which is "There is a significant effect of System Quality on Quality of Decision-making," was confirmed by the approved analysis. This finding shows that if the organization relies on information systems with a high-quality system in its financial and administrative departments, there will be a positive effect on the quality of decision-making. Similar to the first hypothesis, Hypothesis three, "Information system quality (ISQ) significantly influences information quality (IQ)," and Hypothesis four, "Information system quality (ISQ) significantly mediates the relationship between Information quality (IQ) and decision-making quality (DMQ)" were also confirmed. These results show that information system has a significant impact on organizations. In light of this finding, we recommend that the organization give attention to the development of the information system periodically and in a manner commensurate with all departments. The information systems are updating due to technological developments. For this reason, training should be given to employees at regular intervals. These could help the employees to develop themselves and adapt. Based on the findings of the impacts of information systems on decision-making, we recommend that access to international experiences and import and develop such experiences in information technology because the ability to use information systems can

also be improved by reading the experiences of other users. In addition, urging the establishment of a unique information system in each department, provided that its connection is with the director or head of the department, can be recommended.

The second hypothesis of the research, "There is a significant effect of Information Quality on Quality of Decision-making," has also been confirmed. This shows that if the organization relies on high-quality information in its financial and administrative departments, there will be a positive effect on the quality of decision-making. So that we firstly recommend that work to follow up the collection of data on time, provided that it is up-to-date on each topic or problem.

The research reached a set of results which are as follows:

There is a conviction among the Ministry of Education - Libya employees that the newly used information systems have an influential role in the decision-making process in the organization.

Most of the Ministry of Education - Libya employees admit that using modern computerized technologies for information systems and the speed of data entry into them leads to obtaining high-quality information, which helps improve the quality of decisions.

The information offered by information systems and the efficiency of decision-making in the institution has a significant impact on the advancement of the organization by achieving the desired development and accelerating the processes in which inputs are processed much more quickly than traditional methods.

The research revealed that using information systems to provide decision-makers with correct and valuable information for the organization at the right time helps in the decision-making process.

This study shows that information systems have significant effects on decision-making quality in non-profit organizations. However, these results are based only on data obtained from employees working in the Ministry of Education - Libya. So, the analysis using data from different groups can give different results. It is thought that similar studies to be conducted in the following years, and other groups will enrich the results of this study.

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