THE IMPACT OF INFORMATION SYSTEMS ON THE DECISION-MAKING PROCESS OF FINANCIAL MANAGEMENT IN THE MINISTRY OF EDUCATION IN LIBYA

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Abdulati Saghair Issa ALI

Supervisor

Assoc.Prof.Dr. Serhan GÜRKAN

THE IMPACT OF INFORMATION SYSTEMS ON THE DECISION-MAKING PROCESS OF FINANCIAL MANAGEMENT IN THE MINISTRY OF EDUCATION IN LIBYA

Abdulati Saghair Issa ALI

T.C
Karabuk University
Institute of Graduate Programs
Department of Business Administration
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Assoc.Prof.Dr. Serhan GÜRKAN

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THESIS APPROVAL PAGE

I certify that in my opinion the thesis submitted by Abdulati Saghair Issa ALI titled "THE IMPACT OF INFORMATION SYSTEMS ON THE DECISION-MAKING PROCESS OF FINANCIAL MANAGEMENT IN THE MINISTRY OF EDUCATION IN LIBYA" is fully adequate in scope and in quality as a thesis for the degree of Master.

Assoc.Prof.Dr. Serhan GÜRKAN .....

Thesis Advisor, Entrepreneurship

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Examining Committee Members (Institutions)	Signature
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Without being bound by a particular time, I accept all moral and legal consequences of any detection contrary to the aforementioned statement.

Name Surname: Abdulati Saghair Issa ALI

Signature :

FOREWORD

Praise be to God who enabled me to accomplish this work, and I would like to thank all those who supported me in my study career, and in particular to mention my supervisor Assoc. Prof. Dr. Serhan GÜRKAN who was with me step by step and did not spare the advices and the guidance, and to my father and mother who were with me with their constant prayers, and my wife who supported me, and also I would like to thank all my teachers since the beginning of my academic studies.

ABSTRACT

Information systems are considered one of the most significant topics that researchers are interested in. The increasing need to collect, process, and use data and information effectively is an essential 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, internal auditors in the Ministry of Education in Libya. Following the study's goal, the obtained data have been analysed 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.

ÖZ

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.

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ABBREVIATIONS

AIS	:	Accounting Information Systems
AVE	:	Average Variance Extracted
DMQ	:	Decision-Making Quality
DSS	:	Decision Support Systems
EIS	:	Executive Information Systems
HTMT	:	Heterotrait-Monotrait
IPC	:	Information Processing Cycle
IQ	:	Information Quality
IS:	:	Information System
IS-AC	:	Information System Administrative Capability
IS-HRC	:	Information System Human Resource Capability
ISQ	:	Information System Quality
ISQ	:	Information System Quality
LVC	:	Latent Variable Correlations
MAIS	:	Management Accounting Information Systems
MIS	:	Management Information Systems
OLS	:	Ordinary Least Squares
PCA	:	Principal Components Analysis
PLS	:	Partial Least Squares
RAM	:	Reticular Action Modeling
SEM	:	Structural Equation Modeling
SRMR	:	Standardized Root Mean Square Residual.
TDQM	:	Total Data Quality Management
TMT	:	Top Management Team
TPS	:	Transaction Processing Systems
VIF	:	Variance Inflation Factor

SUBJECT OF THE RESEARCH

In business, financial management is handling 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 important role of managers is represented in making financial decisions and practicing 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 that, it can be said that information has an important role in 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 researches and studies have considered the mediating role of information quality. The current study aims to examine the relationship between information systems quality and the financial decision-making process, considering information quality's mediating role.

PURPOSE AND IMPORTANCE OF THE RESEARCH

The current study mainly focuses on the role of 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 some 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 the presence of 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 that, 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.

METHOD OF THE RESEARCH

Following the study's goal, the obtained data have been analysed by the use of the partial least squares regression (PLS) analysis method.

HYPOTHESIS OF THE RESEARCH / RESEARCH PROBLEM

The main research problem is "Does information system quality affects the financial decision-making quality in a non-profit organization?". In addition to the research problem, the mediating role of information quality in the relationship between information system quality and financial decision-making is also examined in this study. For this purpose, four different hypotheses were tested in the study.

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

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

POPULATION AND SAMPLE

The research data was obtained through a purpose-prepared questionnaire. The questionnaire form includes four parts. In the first part, there were questions about the demographic information of the participants. The second part includes four questions to measure the system quality at the organization taken from a study (Al-Mamary et al. 2013), the third part of the questionnaire, there were seven questions to measure the quality of information and were taken from a study (Al-Mamary et al. 2013), and the fourth part was Five questions to measure the quality of decision-making taken from a study (Caniëls and Bakens, 2011).

The questionnaire was distributed to the Ministry of Education employees, which is a non-profit organization in Libya. The population of this study consists of managers, heads of administrative and financial departments, accountants, internal auditors. The questionnaire form has been prepared electronically and 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 %.

SCOPE AND LIMITATIONS / DIFFICULTIES

The primary goal of this study is to investigate the effect of information system quality on the financial decision-making quality in a non-profit organization or not. Contacting employees was challenging because of the Covid 19 pandemic, and I only got data from one non-profit organization. The data gathered for analysis was limited, with 200 employees from the Ministry of Education in Libya. The results of this study must be evaluated under a limitation of the study. It means that the results of this study are valid for only 200 employees and the date of the survey. Similar studies on different groups may yield different results.

CHAPTER ONE: THEORETICAL BACKGROUND

1.1. THE ROLE AND IMPORTANCE OF THE INFORMATION

The information is necessary for operating and making the effective decisions. It determines and explains the different types of information by the internal complex communication links to the department of research and development. 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 behaviour, 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 use. Basically, any organization needs information about its internal operations to guarantee the effectivity, efficiency and environment to respond and adapt to the procedures, positions and decisions of external agencies including governments and social groups. Both of the information types should be collected together in organized way in order to match the procedures and organization decisions closely with its external circumstances (Kaye, 1995).

The previous researches focused around the role of accounting information to develop 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 are 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 the knowledge of individuals and ability on making better decisions. Nevertheless, focus on how to use accounting information by managers for making previously determined decisions is considered a good and restricted matter. It determines how to look in other ways which are more important to be used by managers (Sprinkle & Williamson, 2006). The role of accounting information which facilitate decision can be clarified as the provision of accounting information to facilitate the decisions and features of those information was found to enhance the knowledge of individuals and ability on making decisions (Hall et al., 2009).

As an important source of information about business performance, accounting may help directors in developing the knowledge in workplace environment by many approaches to make these activities invisible by daily activities of manager and provide a comprehensive quantitative viewpoint to their job. Accounting information can clarify

those invisible problems by the daily activities and provide independent examination for operations to help directors to know what is happening (Hall, 2010).

1.2. THE CONCEPT OF INFORMATION SYSTEMS AND THEIR FUNCTIONS

Information System (IS) is a set of persons, equipment, programs, communication networks, policies and procedures which store, retrieve, transform and distribute information in the organization (Hasan Al-Mamary et al., 2014). AIS is a sub-system specialized in the information systems. The goal of IS is represented in collecting, processing, and informing information associated with the financial sides of the organization (Hasan Al-Mamary et al., 2014). The accounting information system is a set of the element which collect the accounting information and process data for users (Abdelraheem et al., 2021). AIS is a set of actions, certificates and associated techniques which designed to collect and process data and inform about information for different internal groups and external decisions makers inside the organization (Napitupulu, 2015).

AIS is a system which depends on a computer and designed to transform the accounting data into information. AIS of the organization includes two main systems which are financial AIS and MAIS. Both of these sub-systems are characterized according to the goals, the nature of inputs, type of user operation to transform the inputs into outputs (Wisna, 2013). Financial AIS collects and process transaction data and then distribute the financial information for interested parties (Susanto, 2015). MAIS produces information to help managers, executive managers and operators on making decisions to manage organizations (Napitupulu & Dalimunthe, 2015).

The AIS concept is a system which offers the necessary quantitative and quantitative information (financial and non-financial) for all parties inside the financial organization and also other parties outside the financial organization that used as a tool to simplify the decision making process from these parties in terms of the rights and responsibilities towards the financial institution. AIS is defined as a set or integration of sub-systems elements which collaborate in harmony to process the financial data in accounting information (Syaifullah & Syaifullah, 2014). Technically, IS is a set of associated element which aims to collect, process, store and distribute information to support the decision making process and control the organization (Afiah & Indahwati, 2015). Moreover, IS integrates physical and unphysical associative sub-systems and work

collaboratively in harmony to accomplish the goal of data processing into a useful information (Napitupulu & Dalimunthe, 2015). Information users inside the organization include the internal and external users. The internal users of IS use the information as a base to promote the decision making. It can be concluded that the core of AIS is many elements which collect, register, store and process data to create information for decision makers (Susanto, 2015).

1.2.1. Components of an Accounting Information System

AIS is an integrated system which collect information or data to provide reports for decision makers after transforming to financial data. The three terms which constitute the AIS will be placed separately to understand "the AIS" term better. Firstly, the literature showed that it is possible to determine three components: IS, business language and financial information source. Secondly, information is an important data processing provide the base to make decisions, procedures and legal commitments, finally, the system is associated entity focuses on a set of goals (Soudani, 2012). AIS includes six main parts including people, procedures and instructions, data, software, information technology infrastructure and internal controls. At the following steps, we will take a look on each one of them in detail:

- **People**: they are just users in AIS. People include professionals who may need to use AIS of the organization and they may consist of accountants, consultants, business analysists, mangers, financial senior officials and reviewers. AIS helps different departments inside the organization on working together. By the use of well-designed AIS, any person inside the organization is authorized to access the same system and obtain the same information. AIS must be designed to fulfil the needs of persons who use it. Moreover, the system must be used and enhanced easily and does not hinder the efficiency.
- **Procedures and Instructions**: these include AIS are the method used to collect, store, retrieve and process data. These methods may be automatic or manual. Data may come from internal sources (including employees). These procedures and instructions will be coded by authentication and training. Instructions and procedures should be followed continuously to be efficiently. In order to store information, AIS should include on database structure to store information.

- **Data**: Data included in AIS is all financial information associate with the practices of organization business. Any work data effect the internal affairs of the organization must include in AIS. The data comprised in AIS will depend on the work nature. Then, these data can be used to prepare data and accounting reports, analysis, auditing and decision making. In order to make the data useful, it should be completed, correct and relevant.
- **Software**: the software components in AIS is a computer program used in order to store, retrieve, process and analyse the financial data of the organization. Before the existence of computer devices, the AIS systems were paper manual systems but currently most organizations use computer programs as a base for AIS system. Quality, reliability and safety are considered basic elements for efficient AIS programs. Directors depend on produced information to make the institutional decisions and they need to high quality information to make well decisions.
- **Information Technology Infrastructure**: The information technology infrastructure is just fancy name for devices used to run the AIS. Most of the devices elements are things needed by the organization where they include personal computers, servers, printers, control devices, orienting devices, storing media and may be backup power supplies. In addition to cost, factors which must be taken into consideration when selecting the devices are speed, storing ability and whether the specified devices of AIS are compatible with the intended program. Optimally, it will be organized only but it will be optimal. The supported system will be less beneficial than the quick system. Good AIS must include on a plan to maintain the system components, replace, promote and a way to override the old and broken devices without corrupting the sensitive data.
- **Internal Controls**: The internal controls of AIS are the included security measures to protect the sensitive data. These may be simple passwords such as passwords or complex such as identifying the vital measurements. AIS must include internal controls to be protected from unpermitted access to the computer and restrict access to authorized users including some in the organization. Moreover, it is necessary to prevent unauthorized access to files by authorized users to access into specific elements of the system. In addition, AIS need to internal controls to protect from computer virus, hacker and other internal and external threats. Also, it should be

protected from the power surges and natural disasters which may cause the loss of data (Cleary, 2017).

1.2.2. Functions of Information Systems

There are different functions for information systems such as input data, store, process and production of output data. Also, functions control the flow of information in addition to feedback. Systems can be open or close. Inform ion system functions can be summarized as follows:

- **Input:** IS includes two types of inputs. Outputs are created by detailed data which can be stored and processed. User must determine the specification to the type of analysis which is performed (Sean, 2015).
- **Storage:** data must be stored by highest possible level of detail. Organized backup must be completed and different abstracts to avoid the loss of any important data because of mistakes. In addition, it is necessary to store the backup in different geographical location to avoid any large disasters including floods, fires and etc. that may effect on storing the original and backup data (Sean, 2015).
- **Processing:** it is a function which transform data into information. The most complicated operations are functions which lead to accounting information and put assumptions about the lost data to create information from the available data (Sean, 2015).
- **Feedback/control loops:** it happens for the outputs when they are processed and produced. The system continuously repeats the same operations based on the outputs of last loop that may effect on entering the follow data in the loop (Sean, 2015).
- **Output:** this context includes two types of outputs including graphical and textual. The graphical output is always used to look into the information wider which can be provided later on the form of graphs and diagrams, charts and images. The textual output is information on smaller scale which can be displayed on the form of numbers, texts or charts (Sean, 2015).
- **Open and closed systems:** IS is defined as open or closed systems based on how they interact with the environment. The open system will interact completely with the environment and can deal with any unpredicted event because it monitors the surrounding environment that means it can adopt with outputs according to the circumstances. The closed system is separated and isolated from the environment

that means they do not interact too much. The closed system interacts only with the environment when it is planned and expected previously or a part of automated operation. It works when it is operated and works only in accordance with the events. The closed systems have not any influence the external environment (Sean, 2015).

1.3. TYPES OF INFORMATION SYSTEMS

O'Brien & Marakas (2006) mentioned that the applications of information systems applied in business world currently can be divided by many methods. For instance, many types of information systems can be divided as whether operations (support the commercial operations) or (support the administrative decision making). Support the commercial operations including TPS, process control system and Enterprise collaboration system (office automation system). Support the administrative decision making including MIS, DSS and EIS. Patterson (2005) stated that there are many types of IS including DPS, MIS, DSS and EIS (Patterson, 2005). The summary on each types of these systems can be summarized as follows:

- **Transaction Processing Systems (TPS):** TPS are the basic business systems which work in the operation level of the organization. TPS is computed system which implement and register the daily routine transactions that essential to facilitate the business transactions (Laudon & Laudon, 2006).
- **Process Control Systems:** They monitor and control the pshycal and industrial oeprations such as petroluem refinery, power geenration and steel production systems. For instance, the petroluem refinery uses electronic sensors assocaite with computer devices to control the chemcial oeprations continously and make immediate modifications that control the refinery processes (O'brien & Marakas, 2006).
- **Office Automation Systems:** these types of systems are mostly used systems and help directors to control the information flow in the organization (Heidarkhani et al., 2013). Also, they operate on promoting the team communication, work group and productivity (O'brien & Marakas, 2006).
- **Management Information Systems (MIS):** it is a type of computer information systems which can be used to collect and process information from various sources in decision making process on the management level (Heidarkhani et al., 2013).

- **Decision Support Systems:** they are systems which are based on specialized computer to be used by particular director or always a set of directors on any organizational level in making decision and solve semi-organized decision (O'brien & Marakas, 2006).
- **Executive Information Systems:** these types of systems were developed to offer quick access to the internal and external information and they can approximate more comprehensive basic data if necessary (Al-Mamary, Shamsuddin, & Aziati, 2014).
- **Expert Systems:** these types of systems are a category of articifical intellegince which were used suvcessfully to create commerical appliaiton (Al-Mamary, Shamsuddin, & Aziati, 2014). According to O'Brien & Marakas (O'brien & Marakas, 2006) expert systems are systems depend on knowledge, offer consultancy for experts and work as expert consultants for users.
- **Knowledge Management Systems:** they are comprehensive systems promote the growth of the organization knowledge (Salisbury, 2003).
- **Strategic Information Systems:** they are considered a special type of organizational IS which are used to safe or preserve the competitive benefit in the markets (Al-Mamary, Shamsuddin, & Aziati, 2014).
- **Functional Business Systems (Information Systems from Functional Perspective):** information systems can be classified based on the organizational functions of selling, marketing, manufacturing, accounting, financing, producing and human resource (Khanore, Patil & Dand, 2011).
- **Sales and Marketing Information Systems:** Sales and marketing functions are responsible to sale products or services of the organization. Marketing is interested by determination of agents for the company product or service, determine their need or want, planning and developing the products and services to fulfill the necessary needs and advertise and promote those products or services. Sales associate with communicating with agents and sale the products and services, receive the requests and follows sales. These types of systems support these activities (Laudon & Laudon, 2006).
- **Manufacturing and Production Information Systems:** the functions of manufacturing and production are liable on the real production of the company product and service. The manufacturing and production systems deal with the planning, developing and maintaining of the production abilities, determine the

production goals, gaining, store and supplies the production materials, scheduling the equipment, facilities, materials and workforce necessary to design the final products. These types of activities are supported by the manufacturing and production IS (Laudon & Laudon, 2006).

- **Finance and Accounting Information Systems:** the financial function is responsible to manage the financial assets of the organization including cash, bonds, stocks and other investments. The accounting function is responsible to preserve and manage the financial records of the organization including bills, consumptions and payroll (Khanore, Patil & Dand, 2011).
- **Human Resource Information Systems:** they are the process to produce, coordinate, store and distribute the workforce information to help the organization directors on different levels in order to make the suitable decisions. Currently, most of the successful organizations use human resource information systems in order to support the regular processes of human resources (Khanore, Patil & Dand, 2011).

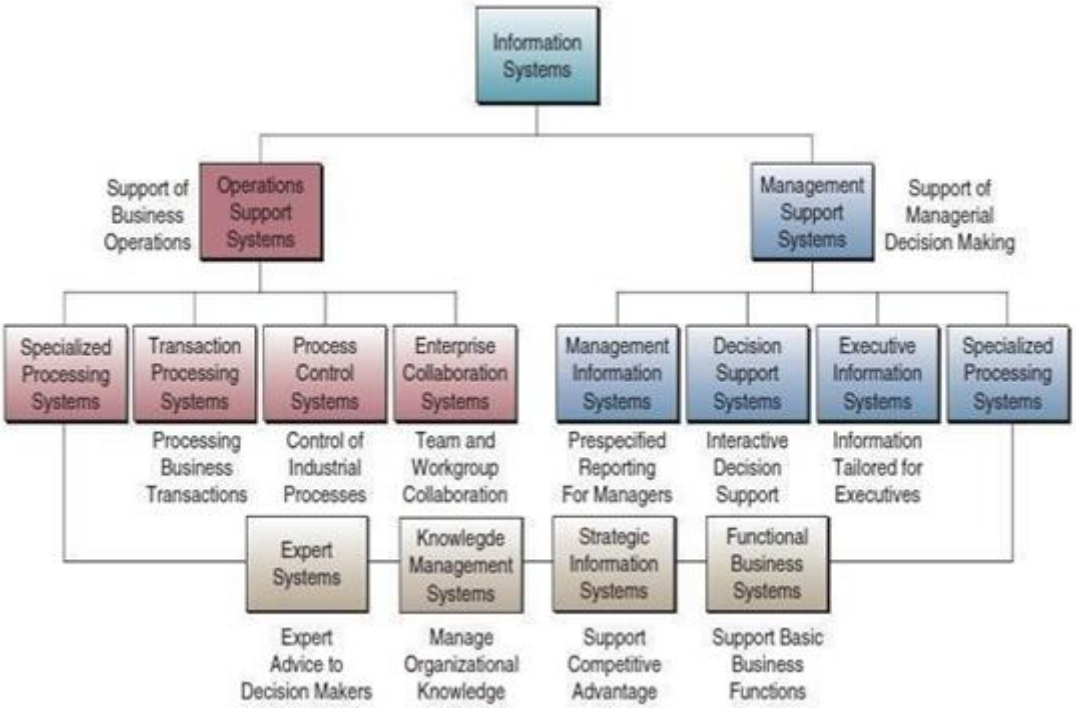

Figure 1: Operations and Management Classifications of Information Systems (O'Brien & Marakas, 2014).

1.4. QUALITY COMPONENTS OF SYSTEM AND INFORMATION

1.4.1. System Quality

The system quality describes the quality of IS in terms of the operational features. The quality of system is a measurement to the information processing itself which include the contents of programs and data and measurement of the technical safety of the system. The quality of system was equal to the technical level of the communication (Petter & McLean, 2009). According to Seddon (1997), the system quality interests whether there are mistakes in the system, consistency of the user interface, ease of use, quality of authentication, quality program code and capability of maintenance "(Gorla, Somers & Wong, 2010). The quality of system is the performance of IS in terms of reliability, comfort, ease of use, functions and other information systems. Simultaneously, DeLone and McLean (2003) measured the system quality in terms of reliability, ease to use, functions, flexibility, information quality and the probability to transfer, integration and importance (DeLone & McLean, 2003).

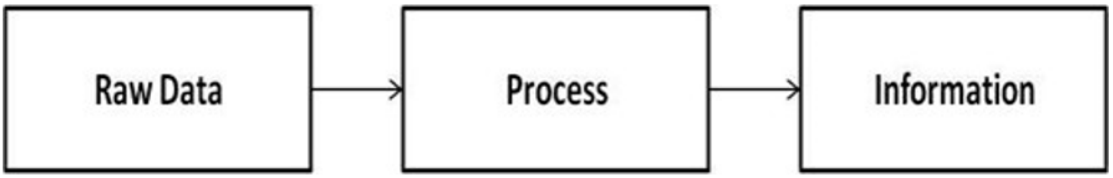

Figure 2: Transforming Data into Information

1.4.2. Information Quality

Information quality is a feature of outputs provided by information systems including the accuracy, reliability, completeness and timeline (Petter & McLean, 2009). Information quality represents as background for all the communication process in modern organizations (Michnik & Lo, 2009). Information quality can be measured based on accuracy, completeness, timeline, reliability, consistency and relevance (DeLone & McLean, 2003). At the same time, Michnick (2009) examined the information quality by dividing the information quality to four assessment sides. These sides are accessibility, representational, contextual and intrinsic of information quality (Gorla, Somers & Wong, 2010).

1.4.3. Characteristics of Information Quality

The information quality includes many characteristics and these characteristics can be summarized and described as follows:

- **Accuracy:** It means the accuracy of information or the amount of mistake which included at the information. Thus, information must be accurate in order to be used correctly (Hasan Al-Mamary et al., 2014). MIS must be accurate and avoid any mistakes in approximations or probable costs. Accuracy of information is associated with specific, specialized, correctly computed or free of mistakes value. The accuracy plays a main role in most information quality models as a core characteristic to the information itself. Nevertheless, determination of the accuracy in many cases represent a challenge if not impossible and what is suitable or desired. The accurate information needs also to the judge of users. In general, the accuracy can be defined as the accuracy in assigning the stored information suitably in real world represented by the information. The concept of accuracy represented by the idea that the information is accurate with subjectivity, meaning and can be believed. The main element in this refinement is the idea that there is very significant perceptual element. The information should not be only correct but it must also be accurate (Lee et al., 2002). The accurate information reflects the basic real. Information quality must be clear. Particularly, the used information for many purposes require many levels of accuracy. Inaccuracy in information and associated problems occur in many information systems. information systems specialists fix many issues starting from the systems design to the implementation until maintenance. What is not really understood is that information can be accurate if the accuracy degree exceeds the ability of the agent process. This increases the costs of information systems and burden the reliability of the systems and even from the confusion it caused, it leads to misuse of information (Tejay et al., 2005).
- **Relevance:** relevant information must be as required and suitable. What is suitable for manager may not be suitable for others. The suitability measure in this valuable information to our job, this information is associated to our job, this information is suitable to our job and this information can be applied in our job (Hafiez et al., 2014). In this case, it must be relevant based on our specific standards by the user to the field of interest and time in specific field. In general, standards determined by users

depend on the field and purpose in consideration. Relevance has many associated standards with the field and purpose but it is not relevance if the information is old (Lee et al., 2002). Relevance is a critical point and relevant information increases the awareness and decrease misunderstanding about the problem. There are always irrelevant parts in reports and messages and cause problems. The extra load of information is caused by incorrect management decisions. The accurate information is not derived from the stored information in unnecessary way which seem that it gives general feeling towards the problem (Aiken, 1971).

- **Completeness:** this measure means that this information consists of all the important values which means this information is comprehensive. This information is adequately enough to our job. This information covers the needs of our tasks. This information has sufficient depth and breadth to our missions. Completeness is the scope where this information is not being lost and the scope of breadth and depth of searched mission (Lee et al., 2002). Failure of providing information may lead to confuse consumers and complete information for specific person is uncompleted. Similarly, information which its accuracy exceeds the ability of the process, the information may be very completed. Risk in commercial business is the ISs which produce more information which cannot be processed by agents in real time (Tejay et al., 2005).
- **Timeliness:** information must be in time for specific purpose. When it's too late information, it will not be relevant. Data must be available to be used in a reasonable period of time. Timeliness is the extent of information update adequately for specific task (Lee et al., 2002). The timeliness includes two elements: age and volatility of information. Age is the extent of information age based on the registered period with the equality of all other things. Whenever new information is collected, the relevant probability will be increased (Tejay et al., 2005).
- **Conciseness:** the shortcut representation is the extent to express the information compactly (Kahn et al., 2002). Information must be shortly enough to allow to be checked and used. Information must not be strange (Hafiez et al., 2014). The expression of shortcut representation is that information must be organized compactly and provided concisely and compactly (Lee et al., 2002).
- **Consistency:** the representation measures must be provided continuously in the same form. This information is delivered in organized way continuously (Lee et al.,

2002). Consistent representation of information requires that multiple recording of values for an entity attribute must be consistent with time or space (Min et al., 2006). Consistency is the extent of providing data in the same coordination and compatible with the previous data (Lee et al., 2002).

- **Understand ability:** under stability measures is that this information is easy to be understood and the meaning of this information is understandable (Lee et al., 2002). Understanding means what transform the data into information. If the information is not understandable, it cannot be used. Therefore, it cannot add value. Many factors interfere in understanding the information: firstly, the preferences of users where some persons prefer information exist in graphics or charts while others prefer the descriptive description. Some prefer the presentation than the statistics and numbers but others do not understand it. Researches showed that some people understand specific details while others evaluate the general image without looking to the accurate points. In fact, these differences means that it is possible to interpret this message in different ways. Secondly, the previous knowledge, understand ability is a result of memory associate with received message. Thirdly, the environmental factors, groups pressures, available time, trust in information technology effects the understand ability. Finally, information and language are codified in signs or messages (Aiken, 1971).

CHAPTER TWO: THE IMPACT OF INFORMATION SYSTEMS IN SUPPORTING THE DECISION–MAKING PROCESS

IS plays a significant role in the organization and affects the performance, productivity and functions of the organization. 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 goals of function. The operational managers are informed by the development, success and shortcomings in business and goals. Manager is kept alert by providing specific information refers to the probable directions in many job sides and this helps to predict and planning for long-term. Manager interests in expected circumstance and leads him to behave or make decision in this regard. A disciplined information creates database to the structure and knowledge base for all of the organization members. Information is available to be used immediately by mixing and analysing which safe time for managers. The IS creates additional effect on the understand of the organization for the same job. information systems start in defining the data and its entities and characteristics. It uses the dictionary of data, entities and characteristics to generate information in the organization. Since all information systems use the dictionary, the common understanding to the terms and meanings clarify the communication and compared understanding to the event (Mishra & Pradhan, 2019). It is though that the use of information systems change the way of organizations work and enhance the decision making process. The use of information systems by organization is expanded with years (Brien & Marakas, 2014).

Currently, IS technology plays a significant role in management which implement in universal environment and cannot be served without information and traditional systems which support the daily management. IS provides support for decision makers. Many studies revealed and informed that information systems play increasing role in organizations of all types. In addition, most of the authors agree that information systems support decision on all levels of the organization. Organizations can enhance the decision making process on all levels of the organization. Organizations may enhance the decision making process, quality of service, increase efficiency by the information systems and associate techniques. In both cases, the effective use of information systems aims to make change in the organization. Organization may use more and better information and make better decisions to enhance the value of service. These features show that information systems technology can be a tool to develop the

organizations. It is common that Is is a tool to help directors to use the available information and facilitate the decision making. Directors who understand what is information systems and what can be performed by IS are in best situation to help their institutions on success and make better decisions (Berisha-namani & Qehaja, 2012).

Information systems provide the ability to be on communication inside the organizations, provide group participation in decision making process, increase the speed of decision making process, fasten in determining the problems, decrease the pyramid sequence of the organization, promote the contribution and skills of persons inside the organization (Hasan et al., 2017). The importance of information systems has been confirmed before many decades because of the development of management and modern organization cannot manage its business without IS (Lipaj & Davidavičienė, 2013).

The importance of IS in decision making process has been studied by many authors. In 1966, Kostetsky was of the first authors who studied the relationship between the three concepts of information systems, system analysts and decision making. IS provides the management by knowledge in relative situation of the organization and workforce in the job. It gives the suitable information in decision making process and help organization to control effectively in planning and imputation of functions. The indecision support system helped the senior management on making long-term decisions. These types of systems dealt with unorganized or semi-organized decisions. The decision is considered unorganized if there is no clear procedure to make decisions. If it is not like this, it is easy to determine all factors which must be taken into account in the decision previously. DSS is not repeated. Some of them repeated is in unrepeated way or happens one time only. DSS must be very visible. Also, user must be able to provide specialized decisions by providing specific data and coordination. The types and classifications of information systems are determined by different point of views (Ghaffarzadeh, 2015).

The creative use of information systems is considered a significant issue to the survive and growth of many organizations in the current organizational environment. Information systems of organizations provide additional opportunities to enhance the management operations and their practices with facilitation of organizational change (Dedrick et al., 2003). The operational flexibility and organizational efficiency,

planning, and internal and external analysis were identified as relevant information systems. Moreover, abilities of information systems include three associative features including business, knowledge of information systems, information technology infrastructure, effective use of operations, resources and efficiencies associate with abilities of information systems. Resources constitute a stock of preserved or controlled available efficiencies (Aydiner et al., 2019). So, resources of tangible information systems refer to the infrastructure of information technology owned and controlled by the organization. The efficiency represents the multi-function ability of the organization to coordinate and facilitate these resources. The efficiency of information systems includes six features: strategic formula, determine the ability of information technology, determine the contribution of information systems, provide solutions, exploitation and supplies. The abilities of these scopes are described by each of the resources and efficiency (Sudmant et al., 2015). Then, the ability of IS is built on the resources of the information systems and their efficiency and become a competitive model to provide the knowledge for organizations to generate superior performance (Aydiner et al., 2019).

2.1. INFORMATION SYSTEM CAPABILITIES

Capabilities of information systems are the main indicators to the ability of the organization to implement and use the information technology systems effectively. The capabilities of information systems include the strategically compatible planning of operations and support. Similarly, the abilities of information systems can be considered a mean to classify and provide access to the gained knowledge and applied successfully. The capabilities of information systems may provide value in the organization by quick response to changes in business environment (Aydiner et al., 2019). The capabilities of information systems include the infrastructure, human and administrative capabilities (Barney, 1991). Each of these terms can be summarized as follows:

- **IS Infrastructure Capability:** infrastructure is basically referred by information technology. Therefore, information technology and information systems are the terms used together in the field of technology. As one of the basic resources in the organization, the infrastructure of information technology is a set of common technology necessary to establish all the business applications. It is considered an integral part of the organization. It creates the basic technical system and the necessary service resources to respond quickly to the needs of organization and its

change. Moreover, the infrastructure of information technology includes resources and tools that contribute to obtain, process, store, distribute and use information. Infrastructure of information technology provides quick and easy access to the required information and enable to transfer the knowledge. The strong infrastructure increases the influence of information systems capabilities on organizational performance by unifying and automating specific operations (Pérez- López & Alegre, 2012). The flexible infrastructure of information technology positively supports the information systems capabilities by providing basic system which can access to the suitable data and create communication network with other systems. All the institution units adopt with information technology infrastructure and integrate with it to change the direction of work and its needs. So, the infrastructure becomes an integral part of information systems abilities to reach into each point and cover the scope of organization (Mithas et al., 2011).

- **IS Human Resource Capability** (IS- HRC)**:** the technical operations need a set of skills to achieve specific activities with specific performance levels (Tippins & Sohi, 2003). The capability of human resources was designed to spread the technical capabilities and confirm that this capability works effectively and efficiently. So, IS-HRC provides an important contribution to develop the capabilities of information systems. IS- HRC has two types of special features: skills and privacy. While skills refer to the capability of individual in information systems and technical and commercial skills; the privacy determines the level to understand the culture of information systems employees and their routine. The technical skills of IS- HRC includes also the programming, system analysis, design and efficiencies in emerged technology (Pérez-López & Alegre, 2012). The features of IS- HRC allow the quick communication and easy to merge the knowledge with those associate with business employees by providing the error exploration and fix quickly when problems occur. The human capabilities depend on understanding the basic of information technology. So, information systems employees can work inside broad groups of systems environments depending on their knowledge by different programing capabilities (Feeny & Willcocks, 1998). Strong IS- HRC can merge information systems and administrative operations together in more effective way by developing more reliable applications, integrity and communication with managements,

business units in more effective way to create future and creative works and new technological infrastructure for business (Bharadwaj, 2000).

- **IS Administrative Capability (IS-AC):** the IS-AC is the main engine to determine and develop the capabilities of information systems and they are more associated with needs and values of the organization (Feeny & Willcocks, 1998). The idea of management inside information systems provides the factors which explain the quality of information systems practices and capability to develop the suitable operations to sense, collect, organize and distribute information and install the expected behaviours in employees. The administrative curriculum is basically associated with information management, performance management, human resource management, planning, assets management and resources allocations (Mithas et al., 2011). In order to accomplish these administrative tasks, the leadership of management is important for these activities. IS-AC determines how to implement the job in information systems. The IS-AC includes many parts including policies, rules and strategic perspective (Feeny & Willcocks, 1998). Information systems planning is the main directional path to the management activities which guarantee that goals and initiatives of information systems keep pace with work strategies and plans. This convergence allows the implementation of decisions strategically and enhance the value of the organization (Ravichandran & Lertwongsatien, 2005). The effective IS-AC guarantees the consistency in the policies of information systems in all parts of the organization and decrease the duplicity and repetition in system and organization (Bharadwaj, 2000). This capability creates a perspective for the organizational engineering and work as a planning and experimental tool that interpret the strategies into programs and projects (Land et al., 2009).
- **IS Capabilities and Decision-Making Performance:** The capability of information systems plays a critical role in decision making process. Managers and executive managers face high degree organizational tasks and they must make decisions despite the high degree of ambiguity (Islei et al., 1991). Nevertheless, some scientists claim that the capability of information systems have important effect on decision making process. However, the positive impacts of the information systems capabilities were supported by other scientists. They mentioned that technology reduces the amount of time spend in reviewing the information. Without suitable

information systems capabilities, organizations loss their competitive capacity comparing with their competitors by supporting the necessary decisions in suitable time by the use of technological infrastructure and relevant systems. Time and efforts necessary to make decisions may be decreased. Therefore, the capabilities of information systems increase the effectivity of managers in making decision to achieve the organizational goals (Huber, 1984). Moreover, high and various group of people may participate in the decision making processes. The capability of information systems decreases the hierarchical sequence in the organization during the decision making process and lead to determine the problems or opportunities quickly and accurately. The accurate expectations, transparency and capability on making decisions allow managers to focus on more important factors (Islei et al., 1991).

2.2. IMPROVING QUALITY OF DECISION

Quality of decision making refers to the capability of organization on making accurate, correct and vital decisions. The process of decision making in the organization is knowledge intensive activity and the knowledge is considered its raw material (Ghasemaghaei, 2019). The decision making process is implemented when the policy, goals, and plans of organization are interpreted into main procedures. The main goal of decision making process with additional planning is providing the future directions and goals by orientating all the human behaviours. The decision making process plays a critical and important role in business administration, financing and other business functions (Hasan et al., 2017). Decision making process is complex operations includes many variables which cannot be understood completely in many cases. Nevertheless, the literature refers that there are many sides of decision making process and the decisions occur on each administrational levels in the organization. In decision making process literature, decision making means the identification of problems, create alternative solutions, select between alternatives and implement the selected alternatives. It is universally agreed that decision making process is administrative decision and basic function and may be the main activity which always determine the fate of organizations. The decision making process is critical administrative function. Managers need into information to measure the problem and make decisions and perform different administrational goals. This matter may be difficult and information systems play basic role in providing the required information. The interest of managers

is increased quickly from one case to another. When the problem occurs, there is always no time for decision maker to participate deeply in wide set of issues. Therefore, information which is processed by information systems is always demanded when the organization grows and specialized persons perform administrative functions to make decisions. Currently, decision making is an important issue for the sustainability of the organization on the long-term. It is not enough to make correct decisions; it is necessary to be made quickly by the organization. Increasing the risks of innovations may lead to loss the business if the or failed to respond into the dynamic environment of network economy and deal with suitably. Good decisions are always made by the information systems that provide facts, information and answers on queries to decision maker. Without such supporting decisions, bad information and hunches will be found (Berisha-namani & Qehaja, 2012).

In order to understand the relationship between information systems and decision making process, we must look into many studies by famous researchers and authors about information systems who found that decision making process is complex operation and information systems which can be used to enhance the decision making process. Similarly, Lucey confirms the concentration of decision in his definition to the information systems. He pointed out that information systems are a system lead to transform the data from internal and external resources into information and make these information reaches suitably by managers on all levels in all circumstances to make efficient decisions for planning and monitoring activities that they bear. Moreover, information systems play a significant role in supporting all types of decisions including organized, semi-structured and unstructured decisions (Laudon & Laudon, 2007).

2.2.1. Relation Between System Quality and Decision Quality Improvement

System quality refers the quality of information systems process itself including the components of programs and data. It is a measure to the extent of systems safety from the technical side. The quality of systems is associated whether there are errors in the system, user interface consistency, ease of use, documentation quality and in more cases the quality of program code and possibility of maintenance. The quality of system can be measured by many features including ease of use, functions, reliability, quality of data, integration and flexibility (Delone & Mclean, 2003). A comprehensive tool is developed to the quality of system and check its validity that lead to many features

including system features, ease of learning, accuracy of the system, user requirements, development, integration, ease of use, specialization and flexibility (Sedera & Gable, 2004).

Features of system quality is classified into two classes: systems feature from the system designer point of view (named the flexibility of system) and systems features from the point of view of 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 make the necessary modification on programs easily. The complexity of system dimension refers to easily used system, well authenticated, characterize by quick time, uses modern technique which allow to use the system easily. The well designed and developed system is considered a basic condition to derive the organizational advantages. The obtained features enhance the efficiency of the process (Gorla et al., 2010). In contrast, the system which is designed and constructed carefully will face probable crashes which will be harmful in the organizational processes. Moreover, easily maintained system enjoys by longer age and lead to spread the costs of programs on longer period which lead to decrease costs incurred by the organization (Swanson, 1997). The quality of system is positively related with organizational influence on the operational level inside the organizations by enhancing the decision making (Bradley et al., 2006).

2.2.2. Relation Between Information Quality and Decision Quality Improvement

Information quality is considered a main issue to high number of organizations. Many organizations focus on the provision of related information more than ever before. In order to ensure that information fulfil the highest standards, each organization faces problems associate with monitoring the quality of production. Therefore, management of information quality becomes an in integral part of the management process in any organization (Price & Shanks, 2011). Information quality is described as a field of information systems. IS is always described as accounting database systems comprise data collection, data processing, distribution and use of data by other operations or human in the context of information systems (Ballou et al., 1998). The TDQM cycle has been proposed to include a high quality of information and control the quality of information. It is included of four phases as follows (Hafiez et al., 2014):

- **The definition stage**: this stage identifies the information characteristics, how information systems generate information and the requirement of information quality. Moreover, this stage identifies the used evaluation approach used to identify the information quality.
- **The measurement stage:** this stage identifies the qualitative or quantitative values of information quality in specific context. This stage includes different computing techniques to evaluate the information quality according to the evaluation outputs (Ge & Helfert, 2014).
- **The analysis stage:** this stage detects the main reason for information quality problems and the strategy of effective plan to enhance the information quality. The enhancement stage is associated with the implementation of suggested enhancement on the information quality of planned use. The organization must apply TDQM cycle regularly and inform the management by the concepts of information quality. The measured stage is considered an important issue because if the organization wants to manage the information quality, it must measure officially and explicitly. In order to approximate the quality of information, it is important to determine the dimensions of information quality (Kluitmans, 2013).

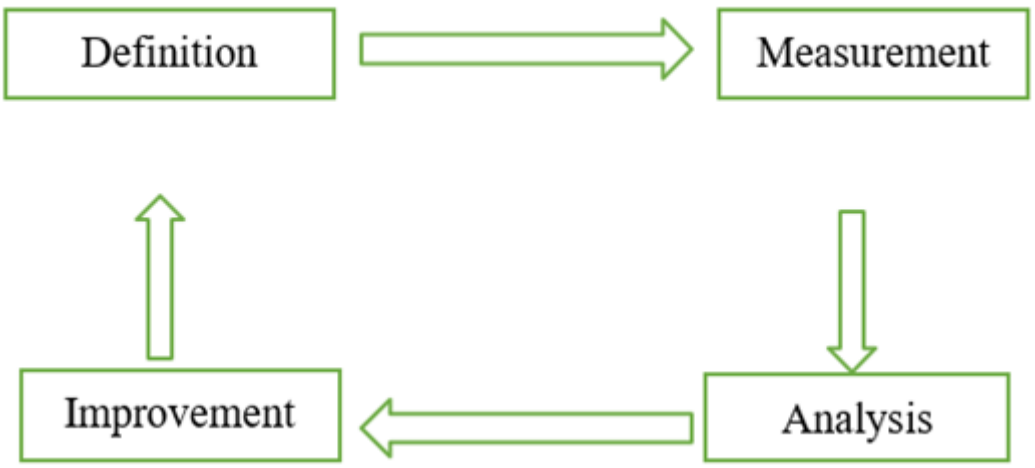

Figure 3:TDQM cycle

There are four groups of quality in management of information quality including intrinsic quality, accessibility quality, contextual quality, and representative quality. These groups can be summarized as follows:

- **Intrinsic quality:** this type of information includes the accuracy of data, authenticity of data and reputation of data. Intrinsic quality is a data which enjoy by quality itself (Henseler et al., 2016).
- **Accessibility quality:** it is associated with access to information and security. This tintype of quality highlights the importance of data and system role and describes how to reach to the data and information and how to understand the information online.
- **Contextual quality:** it is the relevance, added value, timelines, completion and the quality of data. The completion allows users to use data for many other purposes and also, it is important to update the data and information periodically.
- **Representational quality:** this type of information quality is interpretable information, easy to understand by receiver, shortcut representation of delivery and consistent representation. In data coordination, the data is entered uniformly and allow to retrieve information with less complexity than database. The quality of representational information includes the coordination of data and the meaning of data. These features may include the continuous representation and simplicity of understanding (Lee & Levy, 2014).

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 analyse the influence of information quality on decision making. The experimental assessment approach must be applied by just promoting the relationships between the dimensions of information quality. Most of the information quality evaluations are based on personal or subjective curriculum, Basically, the personal curriculum uses the interviews or questionnaire to evaluate the quality of information by the information agents. Nevertheless, the subjective curriculum is always used programs to assess the quality of information automatically by applying the quality concepts. The self-curriculum is assessing the information quality by examining a wide set of dimensions. In other hand, the feature of subjective curriculum is represented in computing process for a wide 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 not suitable for subjective curriculum (for instance, the reputation and authenticity). Then, the organization needs into comprehensive system to evaluate

the quality of information and take into account each of the self and subjective approaches (Mouzhi & Markus, 2008).

2.2.3. Relation Between System Quality and Information Quality

The quality of program is always used to mean the quality of system. In general, decreasing the quality of programs lead to increase the costs because program does not serve the intended purpose and it has not designed as specified, expose to errors, less conditions of safety and not strong (Törn, 1990). Therefore, low cost programs lead to low quality of information (in terms of the information content) because of unsuitable and inaccurate information. In addition, the flexible system can be modified easily and quickly and therefore fulfil 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 enhance the quality of decision. System which use modern technologies (such as user interface) may transfer the data easily and effectively. The integrated system provides complete and accurate information where the outputs of information is useful to the daily functions of users and associate with enhancing the decision making (Gorla et al., 2010). Information systems process is similar to the production process in manufacturing organizations. Let's suppose that the product (information) has not provided in specific time (timeline) and that the product (information) does not fulfil the requirements of agents (users). In this case the agents (users) will be unsatisfied and the organization will lose its business (Clikeman, 1999).

Information produced by information system which is not compatible with the needs of users will be subject to high maintenance and disrupt the operations in the organization. This will lead to increase the costs (Swanson, 1997). The high content of information will lead to improve the effectivity of decision making. The quality of bad information has negative impacts on organizations on the operational, tactical and strategic levels. The agents will be not satisfied on the operational level and employees will lack to the functional satisfaction because of inaccurate or inadequate information. So, the selection and implementation of well job strategy will be difficult due to the imprecise or late information. In other hand, the high quality of information in terms of content may lead to high organizational effect in terms of internal organizational efficiency (Redman, 1998).

2.3. REDUCING TIME OF DECISION MAKING

Decision making is a response to the problem where the problems comprise selections between a set of substitutes. Some reasons which make the decision making process falls short of the ideal is that information is incomplete. The experimental of the results is incomplete and there is limited time to explore all the alternatives (Price & Shanks, 2011). It is known from a long time that the effectivity of decision making process is effected by many factors including the available time before making the decision, decision maker experience and the type of necessary information to make decisions (Wang & Madnick, 1990). It is necessary to distinguish between the constraint of time and pressure of time. The constraint of time is specified allocating of time to make a decision while the pressure of time is personal reaction to the amount of allocated time. The pressure of time is tested when the available time to implement specific task is considered shorter than the required (Svenson & Edland, 1987). The pressure of time effects the decision making process (Price & Shanks, 2011). The effect of time decision making process has some mixed results. Some say that the pressure of time decreases the accuracy of decisions (Zakay & Wooler, 1984). At the same time, others say that increasing the pressure of time will lead to enhance the quality in software development projects (Austin, 2001). The time constraints may affect the decision making process at novices more than the sophisticated decision makers (Dukerich & Nichols, 1991). The time is considerably effective in the suitable decision making processes.

There would be restricted time to evaluate and apply some decisions. In similar cases with limited time, it is possible to create higher limit by the use of available resources and therefore, it is possible to scarify by some strategies (modes). This time is short resource for managers and it is important to structuring the difficulty of decision making process for the optimal and effective use to their time. In order to perform that, managers need to know the changes which may occur in decision time or opportunities which delayed or give up may cause of losing some more valuable opportunities. From this point of view, the correct thing for managers is to make the suitable decision in suitable time (Bostan, 2017). The term of time in decision making process is considered necessary to guarantee the competitiveness and survival (Serkan et al., 2016).

Decision makers who work under time pressure comparing with decision makers who do not subject to time pressure use features but with more importance and less

complex decision rules, balance the negative sides greater and take less risks are less satisfied on their decisions. The pressure time leads to decrease the search about information, its process and decrease the number of alternatives which have been looked. The time in decision making was a subject for many studies in different fields. The quality of making decisions is largely depended on time and time is considered a part of the daily life. In decision making process, the time is narrowed by allowing individuals by incomplete time to consulting in finding the solution for specific issue or effective decision. The demands of individuals to make decisions within limited timeline may lead to increase the psychological pressure. When the stress is very high, the individual can make decisions without creating all the available alternatives. The accuracy of human judgment is decreased under pressure (Ahituv et al., 1998).

If the time is normally distributed, this will enforce persons to perform tasks quicker than normal. Nevertheless, placing time constraints is not adequate to guarantee the feeling of persons by more time pressure. There are time constraints when there is a deadline even if the persons are able to complete the tasks with less time. The time pressure refers to the stress caused from the time constraints and create a need to deal with limited time. So, it is likely to have timelines but without time pressure (Benson & Ordonez, 1997). It is not possible to implement more activities which supposed to support the judgment and selection without adequate time. Some researches refer that time pressure is a corporate feature to circumstances of making the personal and professional decision and that compliances associate with lack of time are more repetitive by all (Chamberlain & Zika, 1990).

There is an overall supposition that the time pressure decreases the decision making quality. Managers and other professionals judge the time pressure as basic constraint on the quality of making decision (Maule & Edland, 2013). The trust in decision making process is decreased with time. Also, there are evidences refer that this decrease in trust is caused for two reasons: firstly, because of the exceeded use of strategies to make the simplest decision and second, there is increased probability that there will not be adequate time to execute the depended cognitive strategy (it is probable that the reactions are interpreted as they reflect the decision making process is not enough) (Smith et al., 1982). Some researches and studies refer that time pressure may decrease the actual decision making process quality and the trust of individual in the quality of this activity. This happens when individuals have earlier learned the best

strategy. Nevertheless, some studies showed that there is a lack of effects or even reverse effect. Evidences refer that the effect of time pressure on quality is basically referred on applied strategy which refer to the possibility in the future, we may be able to help decision makers by advise them in the strategy which must be followed to decrease the harmful effects of time pressure (John Maule & Edland, 2013). The literature refers to a set of adoptions with time pressure. Ben Zur and Breznitz (1981) adopted the ideas of Miller's (1960) about the extra load of information which refer into three different responses to increase the time pressure. Firstly, which is called acceleration and it includes the use of same strategy and information but an attempt to process faster. Secondly, which is called filtration and simply refers that the decision makers may look only to a sub-group of information thirdly, individual can move into different strategy when facing the time pressure (Johnson et al., 1993).

2.4. MANAGING THE BUDGET FOR ACTIVITIES

Due to the importance of budget, it is important for those with financial responsibilities to understand how to perform their budget issue. Nevertheless, there are many types of budget systems which are used by non-profit organizations where these systems can perform their financial tasks in different ways. Some organizations financed by the government must follow the budget procedures and their types financed by their legitimate authorities. On the other hand, there are few number of private organizations have restrictions on used budget system. In this case, there are many probable effects on the type of system which are selected including the type used by the organization previously, procedures used by the president, institution message and organization culture. By looking to these types of systems, it is important to take into consideration the note of John Green and David Monica’s, it is probable that there are different methods to allocate resources in higher educational institutions such as the managers of these institutions while it is difficult to classify some of them, many of them can be classified (Green & Monica, 1985).

Management understands the functions performed by manager such as planning, decision making, direction and control. All of these functions have an effect on the budget process. For instance, the control is aimed to ensure the public work in suitable time that events are compatible with plans. Plans should be based on good decision and good decision making evaluations. Budget is that plan mentioned in terms of finance.

Planning and budget are together. It is not possible to have budget without plan and each plan if it is applied and will be applied must include budget. So, the budget is each of the following: 1) determined plan from the financial side; 2) real evaluation of the necessary resources to execute the plan; 2) allocate the resources to achieve the planned goals; 4) a tool to register programs in term of required adoptions to be implemented. 5) management tool designed to guarantee the implementation of programs as planned (Sennewald & Baillie, 2021).

A budget is a method to implement the different administrative tasks. The budget is not only a mean of planning for different flows of incomes. Nevertheless, it is a control machine for specific management to prevent spending too much, it is procedure to control its units and a process to organize the different activities performed by the organization. Also, it is a technique to identify the priorities of the organization by allocating the resources of those activities which are considered by mangers as the most important and rationing to those fields which are considered less important. Following the priorities determined in the organization is considered a main part to determine the direction of the organization and its success or failure in the future. Therefore, the organization must be based on official plan. Even during the good financial situations, create and follow the budget priorities are considered important issue while recession in financial situations make this matter more difficult and more important. So, budget is considered a main part to determine the direction of organization and its success or failure in the future (Linn, 2007).

The budget term refers to expected income spending plans where all the necessary needs are fulfilled from all the important expenditures in specific period of time. The concept is significant for the government as for individual. Nevertheless, the process of placing the budget for specific person is critical task. The governmental resources must be distributed to fulfil different income concepts. The government must be effective to manage its resources in a way which increase the public expenses on basic duties such as health, education and other activities to preserve the sustainable growth (Arora & Talwar, 2020). The budget and control are considered the central concept of planning, control and accountability in the public sector organizations. This is applied despite of the public criticize to control the budget in the accounting literature (Johansson & Siverbo, 2014).

The goal behind the preparation of budget is to effect on the administrative behaviour- how managers plan, organize and control the organization activities. Most of budget and accounting preparation references describe the budget process in terms of specific group of modes and procedures. Moreover, many organizations describe their use of top budget in terms of modes and procedures in budget references, functions descriptions, flow diagrams, memoranda and etc. Behaviorally, the budget can also be described in terms of procedures and interactions between employees of organization management which can be motivated by the use of organization budget. In fact, the use of budget by the organization can be seen as superimposing rhetoric, set of rules and labels on the positions of the organization management. All the management accountants worry about the changes on organizational performance and the effectivity of structural characteristics of budget preparation systems such as tights or loose standards and participate in standard setting. For example, organizational differ in the amount and type of participation and the effect of operations managers effect in budget setting process (Swieringa & Weick, 1981).

The budget gives the direction of plan and its evidence. Manager needs to deal with plan in three dimensions: 1) the operation or project must be declared as planned if the budget has been followed accurately; 2) the operation or project will be implemented during the planning because budgets will be implemented on stages which means that the plans must be implemented in uncoordinated method with the provision of moneys in the budget; 3) the project or process will not exceed the planned costs if the management has been implemented correctly. The three variables must be managed-the actual running of the project, timeline or the time of that project or process and costs-within the budget standards. The budget provides those standards where it gives the guidelines and directions. So, we have budget which reflect the characteristic of good management. The annual budgets can be created and finished before more than one year in advance. The annual budgets are always created and finished in the middle of period or three months before the period of new budget (Sennewald & Baillie, 2021).

There are many methods to set the budget from “bottom-up and top-down” and “top-down and bottom-up”. The last curriculum is the best because the senior management starts the operation by setting acceptable directional concepts for spending before the detailed plans of the operating or middle management. The general directional concept of the next financial year is that the middle management must continue cost

effectivity efforts in all operations. After the detailed planning of managers, the senior management will approximate and then determine the level of final budget based on the financial expectations of the budget period. The entire budget setting process follows structural or logical sequence lead to interaction between the senior and middle management. The classification is as follows: 1) planning (identify the goals and derivatives. 2) Based on the budget and its development (evaluation of current activities, identify the new activities, develop the alternatives and evaluation costs). 3) evaluate and review the recommendations (comparison with the original directional concepts or alternatives). 4) create the budget (allocate moneys). The costs of budget are divided into one from three classes: 1) salary expenditures, 2) various expenditures. 3) capital expenditures. In general, the capital expenditure is allocated for financial enhancement or physical additions or the main expenditures of devices. The capital expenditures are considered expenditures for one time while the salary and sundry are considered repeated expenditures (Sennewald & Baillie, 2021).

2.5. ALLOCATING RESOURCES

The resource allocation process is used to allocate resources in an organization. The process eventually controls which strategic actions are taken within an organization. Therefore, the resource allocation process is considered to be the process defining the actual strategy. Managing the resources has organizational and societal relevance as resource allocation results in innovations being executed. The executed initiatives contribute to organizational continuity but also provide solutions for real-world problems (Maritan & Lee, 2017). All of the organizations face the tasks of allocating resources between managements. Most of the organization managers agree that decisions associate with budgets, expenditures, level of salaries and the process of allocating other resources occupy large position in the participations activities of the organization which effect the contextual variables of the organization. Variables including the size of organization, technology, goals, nature of environment or even the quantity of available resources which impose on decision makers' restrictions that effect on material allocation decisions. Resource allocation decisions supposed to be as a result of complex set of organizational effects. Each of the subjective factors and the strength relationships have determined role in addition to the organizational structure and environment (Daft, 1978). There are contextual variables associate with materials allocation and these variables can be described as follows:

- **Organization Size:** the literatures show that large organizations differ than small organizations even with similar goals and techniques. The large organizations are bureaucracy and highly use the rules and procedures than the small organizations
- **Organization Revenues:** there are evidences that non-profit organizations work in the highlight of wide set of financial positions. Non-profit organizations are always providing more and better services for public. One of the theories say that the first stages of development organizations can be implemented by allocate highest possible number of resources to the performance of basic activities and satisfy the organization agents.
- **Employee Education:** when the educational level of employees in the organization is high, it is possible to expect that percentage of allocated resources for this department is high. Employees with high qualifications obtain higher salary.

Educated employees incline to be professional that means they tend to be independent, mobile and characterize by internal performance standards. These employees can be pushed to get additional resources and the organization may have to accept or risk to loss. Managements which include educated employees may provide bid resources far from the other managements in the organization. When there is educational difference between sections in the organization, the resources allocation and relative effect may be reflected to each department. The technical core is the largest individual function in most non-profit organizations. The employees education level in technical core will evaluate the share of allocated resources of technical management (Daft, 1978).

Research on senior management members inside the multi-business organizations are always realized the central role of senior management team in allocating the scarce resources (Myers & Chandler, 1962). In fact, the allocation of available resources is considered one of the most significant tasks for senior management team because it directly contributes in how the organization creates the value (Chandler, 1991). The issue of resource allocation is a central for economy. Also, it is central for strategic management of the organization. Despite of the large research conducted by management scientists who describe the operation in organizations conducted for the first time in sixties and continued since then, the theory of management to the operation is still associated with financial model of capital budget and does not fit well with the model of business units. However, during time, change

happens in capital markets and in the flow of technology and the modes of global competition (Bower, 2017).

One essential decision made within virtually all organizations is the allocation of resources to organizational subunits. Because of the pervasiveness of large organizations in contemporary society, resource allocation decisions in organizations are essential to understanding how resources are distributed to different activities within the larger society.

Various allocations activities occur inside the organization and not between and because the allocation of resources is a task faced by most organizations, it represents the base of compared evaluation to the importance of different types of variables in decision making process. The organizational decision making particularly in terms of decisions that allocate resources inside the organization is political in its nature. In order to understand the allocation of resources inside the organizations, it is necessary to take the relative power of sub-units and bureaucratic standards into consideration (Pfeffer & Salancik, 1974). The resource allocation to implement strategy is considered necessary for strategic management and includes many activities performed by managers from different levels, functions, organizational units and effect by the political, social and economic factors. It is not surprising that the strategy scientists extract from many theoretical perspectives visions about different sides and visions to this complicated phenomenon (Maritan & Lee, 2017).

2.6. MONITORING ACTIVITIES

Monitoring is the process of continuous systematic collection and analysis of information about the achieved progress in development. The monitoring is performed to guarantee that all persons who need to know the development are correctly aware and then it is possible to make better decision immediately. Internal employees and not external perform the monitoring process and it is continuous process and not periodic and highly focus on activities and outputs more than focusing on results and impacts. Moreover, the monitoring is always relied on system which is implemented in specific point of time (Jackson, 2017). The monitoring is considered a vital element when operating the activities to ensure and confirm that it is on correct path to achieve the expected results or note and understand the contradictions, difficulties or even the new

opportunities. So, monitoring helps to determine the necessary modifications to enhance the decisions taken (Lauriac, 2016).

Monitoring is a general and continues activity to follow the progress of job in terms of planned activities. It provides repetitive access to the information by the interaction between administrative employees in the organization. Monitoring is a critical function of management in any developmental activity in the organization. Particularly, the administrative activities which aim to process the main economic problems by a set of total and partial interfere require multi-level comprehensive monitoring system to guarantee the effective execution and provide services efficiently with better results. This may not occur without systematic monitoring of inputs\outputs, operations, periodic evaluations of results and effect on different levels. At the same time, efforts must be spent to document the experiment and make the periodic researches and develop the conceptual base of interfere to create new knowledge about issues. Monitoring is considered important process to the organizational basic support system which may offer important information about the continuous organizational operations and associated issues for management especially the officials of program development to make good decisions in suitable time. Generally, managers and programs employees perform some monitoring activities as a part of their job and evaluate their operations from time to another. Such reports constitute the base for more reviews and researches in specific fields by the monitoring department. By collect and monitor the information, it is expected that the monitoring department may reach to analysis and conclusion to be used in planning and good decision making by the organization. The good and sustainable monitoring system have the ability to lead the organization towards fulfilling its responsibilities and achieve the goals when facing the crises. It works as a warning system in addition to protect against the weakness of the organization. The monitoring system looks in the operational and strategic goals of the organization and its special goals which can be monitored and achieved regularly. It can be applied comprehensively or partially based on the size, nature, work and priorities of the organization (Khan, 2003). Monitoring is applied on all the components of the organization which contribute in making decisions. From the operational side, the physical, human, financial and organizational resources, activities and its direct results (outputs). Strategically, the organizational goals, the intermediate and final results which may affect positively or negatively on results (Lauriac, 2016).

Monitoring has many proposes according to the type and context of monitoring system. However, the main purpose is to collect organized information about the progress to be used to make continuous modifications to support the management. This includes to guarantee the following of plans, budgets and others if necessary. It is always difficult to differentiate between the good monitoring and good management. In different situations, monitoring may serve different purposes. The most common are as follows: 1) provide managers, employees and stakeholders by information about the achieved progress towards the announced goals to prove the accountability in front of different stakeholders, 2) provide the information which allow to change the curriculum and strategies as a response to the developed situations, 3) determine whether there is a need to change the goals, plans or budgets with time, 4) identify the need for more information or researches, 5) provide information which promote the continuous education (Jackson, 2017).

In the stage where the monitoring function is included in business management and work across all managements by different focus and intensity, the machine of support must be developed to increase the promotion of the system. It is important to make revision for all monitoring, evaluation and research activities to identify the roles and responsibilities of managers in terms of monitoring and information process which implemented in the organization to be used. There are gaps in communication in terms of knowledge exchange and experience between different functional and administrative levels that may lead to unstudied decisions with difficulties to implement in the subsequent levels. The coordination and monitoring machine can be transformed into self-operating department to perform the monitoring activities in all fields and support the development of programs. The monitoring department is employed and educated with focus to create monitoring culture in the organization. Instead of applying unified monitoring on everything which cannot be implemented, the stage passed by the organization must be defined and then design the transformation process from one stage to another and take into consideration the size and scope of the operation and available resources in that stage. A separate monitoring department is advised in case if the organization is large enough to be included and financed. Otherwise, it is beneficial to develop a machine to support the current functions and avoid overburdening the organization by additional operating costs which may affect later on the costs and quality of services (Khan, 2003).

2.7. REVIEW OF LITERATURE

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 completely related to our topic to know the results of these studies.

Khanum Nuri Kaka Hama Attar (2019), A study 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 questionnaire was used, and 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 main role in any of the financial decisions taken by the company, especially financing decisions; influence on financial decisions.

Yaser Mayeli and Bahareh Bakhoda (2016), Study entitled 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 centred 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 deems appropriate and related to his research. The study concluded the importance of financial information in guiding management in making decisions about activities in the present and maintain the effectivity and stability in the future in business by offering fair and convincing information about the financial aspects of the organization; Decisions about various investments, financing, and profits are made after analyzing and evaluating the financial information available to companies.

Adnan Rahim Obaid Al-Kinani (2008), the study entitled the effect of modern information systems on the process of making financial management decisions, the

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.

Bakens (2010) mentioned that the use of project management information systems is useful for project managers and that there is not any negative effect to the project and extra load of information on the quality of information. Many enhancements were noticed in the effect on decision making by the quality of information from PMIS in terms of enhancing the quality of decisions, decrease the time to make decisions, allocate the resources better and monitor the activities. The study showed that there is moderate relationship between the information quality and the project manager approval about PMIS, the information use and effect the decision makers.

Yaser Sokkar (1999) provide a study about the use of MIS in decision making process in business sector. The researcher applied his study on two organizations one of them in petrol industry and the other in the field of information in Egypt. The study showed that the application of MIS directly affects the productivity of organizations and help to achieve profit by enhancing the information process, knowledge on administrative level, enhance to understand the importance of information in lower levels of the organization. Nevertheless, it is considered a type of administrative expenditures 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 organizational knew the features of MIS, they will plan differently and transform the attention to these systems. The study encourages organizations to pay special attention to apply MIS in technical and administrative level and implement the organization plan. MIS adds value to the organization and not only to the department where it is created for. According to the study, it is necessary to create a MIS unit that is supervised by the government to publish the adequate knowledge and training for specific authorities,

create units for MIS inside ministries to decrease the administrative expenditures which overburden the governmental budgets.

Winterman, Smith, and Abell (1998) studied the impact of information on decision making in governmental departments. It is found that the respondents realize and evaluate the positive effect of information in decision making. It is confirmed on the internal and local information network during the study and the information service centres are seen as with positive impact on decision making process. The results showed increase in trust of decision making better than associated information. Also, the study confirmed on the value of information as continuous and accurate. Decision made by the governmental administrations are highly depended on mix of requirements complexity and the diversity of information resources reflect this complexity. The study recommended by more studies about this subject.

3. CHAPTER THREE: AN EMPIRICAL ANALYSIS IN MINISTRY OF EDUCATION IN LIBYA

3.1. METHODOLOGY

3.1.1. Hypotheses and Research Model

Figure 4 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).

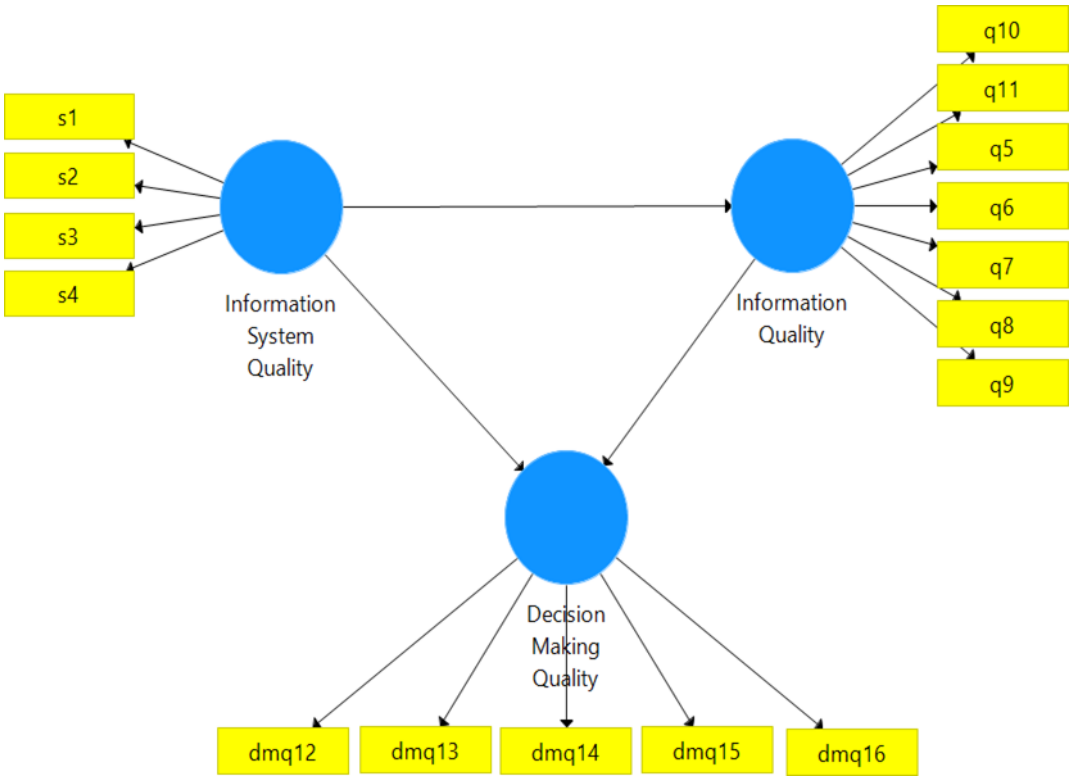

Figure 4: The Research Model.

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 in Chapter 2, 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 the provision of high quality information in the information systems are necessary to help users to make correct decisions and thus enhance the work performance of employees. In contrast, IS which deliver users by unpredictable and inaccurate information have negative impact on its advantage. Therefore, IS quality is added as the first input, which affects the decision quality. According to Saeed & Abdinnour- Helm (2008), the 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 that there a strong statistical correlation between the availability, topicality, and validity of information 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, which affects decision quality. Based on extant literature, we expect that quality of information is positively related with 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 effects the 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.

3.1.2. 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 has been 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 Steven K.Thompson equation to calculate the sample size (Thompson, 2012).

3.1.3. Data Collection Method

The research data was obtained through a purpose-prepared questionnaire. The questionnaire form involves of four parts. In the first part, there were questions about the demographic information of the participants. The second part includes of four questions (s1 – s4) to measure the system's quality at 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, 2011). A 5-point Likert scale is used to rate all scales (5 = very strong, 4 = strong, 3 = medium, 2 = weak, 1 = very weak).

3.1.4. Data Analysis Method - Partial Least Squares Regression

Wright introduced the path analysis and modelling in the twentieth of last century and at the late of sixtieth has been developed by Herman. Partial least square regression has been developed to be used in the field of econometric but it has adopted in the field of chemistry to be used in the analytical, physical and clinical chemistry studies. Wold

created and generated the least square to address the weak data and weak theory (Pirouz, 2012). PLS path modelling can be comprehended as a full-fledged SEM approach which may deal with both factor models and composite models for measurement of construct, assess the recursive and non-recursive structural models, and perform model fit tests (Henseler et al., 2016). The partial least-squares analysis is a multivariate statistical method which help to compare between several responses and explanatory variables. Partial least squares are covariance-based statistical approaches usually referred 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 in both real data and imitations (Pirouz, 2012).

The PLS path model is determined by two sets of linear equations: the measurement model (outer model) and the structural model (inner model). 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).

PLS were created to deal with problems in multicollinearity, missing values, small datasets and data precisely. While the OLS regression yields unsteady findings when the size of the data sample is small, missing values and multicollinearity among predictor in OLS regression increases the standard error of their expected factors. High multicollinearity increases the risk of the theoretical sound forecaster being rejected from the regression model as a non-significant variable. Although analogous to PCA regression and recognized analysis and alternating least squares is considered a better substitute of multiple linear regression and PCA regression approaches because it supplies more reliable model constraints which do not change with new calibration samples from the population. Moreover, PLS is an enhancement on PCA because the solution originating from partial least squares is affected by the part of the covariance matrix that is directly associated with the experimental manipulation. PLS are usually named soft modelling as OLS regression creates hard expectations as to no multicollinearity in the independent variable, soft modelling indicates to softening of the mentioned assumptions. PLS is a linear technique that desired as an extrapolative method and not as an interpretive method except for the exploratory analysis before using the interpretive methods including multiple linear regression or SEM. PLS optimal linear relations are computer among latent variables and it is interpreted as the best set

of expectations available for a study which give all the limitations. Soft modelling is a path to evaluate the probability of given event information about other issues (Pirouz, 2012).

Critical Definitions in Partial Least Squares are listed as follows. 1. Partial Least Squares Factors: These are the underlying variables removed as linear arrangements of the manifest IVs. Generally, 3-7 factors will account for 99% of the computed variations. 2. Partial Least Squares Responses: Latent variables are mined as linear mixtures of obvious response variables. In general, 3-7 factors will account for 99% of the variation. 3. Cross Validation: Partial least squares model has been developed for all cases excluding 1, then examined on the holdout. They are repeated N times with each used case as in turn a validation case.

Advantages of Partial Least Squares are 1. Capable of modelling multiple dependent in addition to multiple independence variables. 2. may deal with multicollinearity in IVs. 3. Reliable in spite of 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. 8. Cope with a wide set of variables: continuous, ordinal and nominal.

Nomo graphic Representations in Partial Least Squares. Partial least squares have the added advantage to provide a graphical sign of the relationships between the variables. Four characteristics of nomograms:

1. Ordering the theoretical constructs.
2. Identifying of arrows.
3. Identifying of the internal model.
4. Blocking the obvious and theoretical variables and establishing their directions.

Overall, PLS is an adequate approach selection for datasets which do not suit the conventional prospects required by the ordinary regression. When the datasets are missing values, small, suffer from multicollinearity, or where the distribution is unknown, PLS permits the user to decrease the adverse effects of these circumstances. Furthermore, PLS has the extra advantage to offer a Nomo graphic representation of the relations among variables that may provide extra vision to the research questions. Given

the frequently unique nature of marketing and data management, PLS are an underutilized but a well adequate statistical approach of analysis that researchers may consider using (Pirouz, 2012).

3.2. 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.

3.2.1. Demographic Statistics

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

(A) Gender:

The following table shows the percentages and the number of participants according to their genders.

Table 1: Distribution of Participants' Gender

Gender	Frequency	Percent
Male	142	71,0
Female	58	29,0
Total	**200**	**100,0**

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.

(B) Age:

The following table shows the percentages and the number of participants according to their ages.

Table 2: Distribution of Participants' Age

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**

According to table 2, 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%). The participants in the age groups (50 and over) years (51) samples with a percentage of (25.5%).

(C) The level of education:

The following table shows the percentages and the number of participants according to their level of education. The participants of the questionnaire were classified into five groups according to their educational level. The groups are Secondary Certificate level, Diploma level, Bachelor 's Degree level, Masters Level, and Ph.D. level. According to table 3: (50) participants had Diploma level at a rate of (25%), (88) participants had bachelor's degree level by (44%), and (53) participants had Masters Level by (26.5%), (9) participants had Ph.D. level by (4.5%).

Table 3: Distribution of Participants' Education Level

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

(D) Specialization:

The following table shows the percentages and the number of participants according to their specialization.

Table 4: Distribution of Participants' Specialization

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

The participants of the questionnaire were classified into five groups according to their Specialization; the groups are Accountant, Internal auditor, Director, External auditor, and Financial controller. According to table 4: (70) participants were Accountant by (35%), (33) participants were Internal auditors by (16.5%), (19) participants were Director by (9.5%), (71) participants were External auditors by (35.5%) and (7) participants were Financial controllers by (3.5%).

(F) Experience

The following table shows the percentages and the number of participants according to their experience.

Table 5: Distribution of Participants' Experiences

Experience	Frequency	Percent
5 year 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

We find that the level of expertise enhances awareness of the significance of information systems and their effect to improve the decisions quality, as the access rate according to the questionnaire reached (14) a sample of participants with experience (5

years and less) at a rate of (7%), (39) samples of participants with experience (6-10) years was, with a participation rate of (19.5%). (54) samples of participants with experience (11-15) years, at a rate of (27%), and (93) samples of participants with experience (16 years and above) at a rate of (46.5%).

3.2.2. Descriptive Statistics

Descriptive statistics, which include a preliminary analysis, should be given before hypothesis tests. Table 6 clarifies the Mean, Median, Minimum, Maximum, Standard Deviation, Excess Kurtosis, and Skewness. In the questionnaire form, 1 represents “very weak,” and 5 represents “very strong." The measure with the highest mean regarding system quality is (Please evaluate system quality in terms of reliability measure as you see it in the IS where you work?) Mean=3.230, and the lowest mean regarding system quality is (Please evaluate system quality in terms of response time measure as you see it in the IS where you work?) Mean = 3.050.

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.

Table 6: 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 the quality of decision-making is (Does the information system as you see it at the organization where you work help you to the time of 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.

Note: Questions can be seen from the questionnaire form written in appendices.

3.2.3. Reliability and Validity

Reliability: It is known as the repeatability or regularity of test findings. Other descriptors used to refer to reliability are precision, repeatability, consistency, dependability, and objectivity. Accuracy is the reliability function. Increasing the reliability will increase the accuracy of the results. Contrariwise, poor reliability leads to more inaccurate results, which increases the opportunity to make an incorrect decision. Moreover, accuracy is effected by the specificity and sensitivity of the test.

Reliability focuses on the consistency or repeatability of the data. In order to understand the theoretical concepts of reliability, it is important to understand the perception of the experimental score.

Validity: it can be defined by the degree where the outcomes are correct. This relies on the significance and reliability of the test. The valid test can be defined as the test that measure reliably intend to be measured. Validity can be classified as logical or statistical in its nature. The logical validity needs inference and understand to the subject which is measured. The statistical validity is used the statistical methods to compare the intended test by specific standard or known measure (Eldridge, 2017).

(A) Outer Model Measurement Loadings

The outer model consists of the indicators and paths which associate the special factors with each other. 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 that, we focused on outer model loadings. Outer model loadings can be considered a type of reliable coefficients for reflective models. Whenever the loads close from 1.0, the statistics variable is more reliable. According to the convention, in terms of good reflective model, the path loadings must be higher than 70 (Sarstedt et al., 2014).

Table 7: 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

Note: * < 0.01

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. More than 0.50 of the Cronbach Alfa coefficients, the scale's internal consistency can be said to be 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 by the use of widely acceptable approach "average variance extracted" (AVE). AVE value refers that on average, each construct may explain more than a half of variance of the special value and must be more than 0.50. AVE is considered more suitable for reflective measurement models (Hanafiah, 2020).

Table 8: 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 0.893, AVE coefficient was calculated 0.627, R2 value was calculated 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 0.908, AVE coefficient was calculated 0.623, R2 value was calculated 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 0.864; AVE coefficient was calculated 0.613. As shown in Table 8, there is no problem with the reliability and validity of the variables which 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 9: Outer VIF Values

	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 10: 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 10 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 11: Heterotrait-Monotrait Ratio

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

As shown in Table 11, all Heterotrait-monotrait values for variables were calculated less than 0.85, so it can be said that discriminant validity was achieved.

3.2.4. Model Assessment and Hypothesis Tests

The general suitability of the model must be the starting point to evaluate the model. If the model does not fit with data, the data includes information more than what the model transfers. Approximations which 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 in responding about the extent of importance of discrepancy between the implied model and the empirical correlation matrix. This question is very important if the discrepancy is high. Now, the only approximate model which suit the criteria conducted for PLS path modelling 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 12: 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 12. T value of path coefficient 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 hypothesis 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 gain a better understanding of the role of ISQ in our model, its potential mediating effect on the linkage between IQ and DMQ. This is performed by following the Preacher and Hayes (2008) procedure, that include 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 is consisted in the model.

Table 13: 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

T value of path coefficient 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 quality was 0.564, calculated as 0.252 + 0.311. Figure 5 clarifies the results of evaluating the research model.

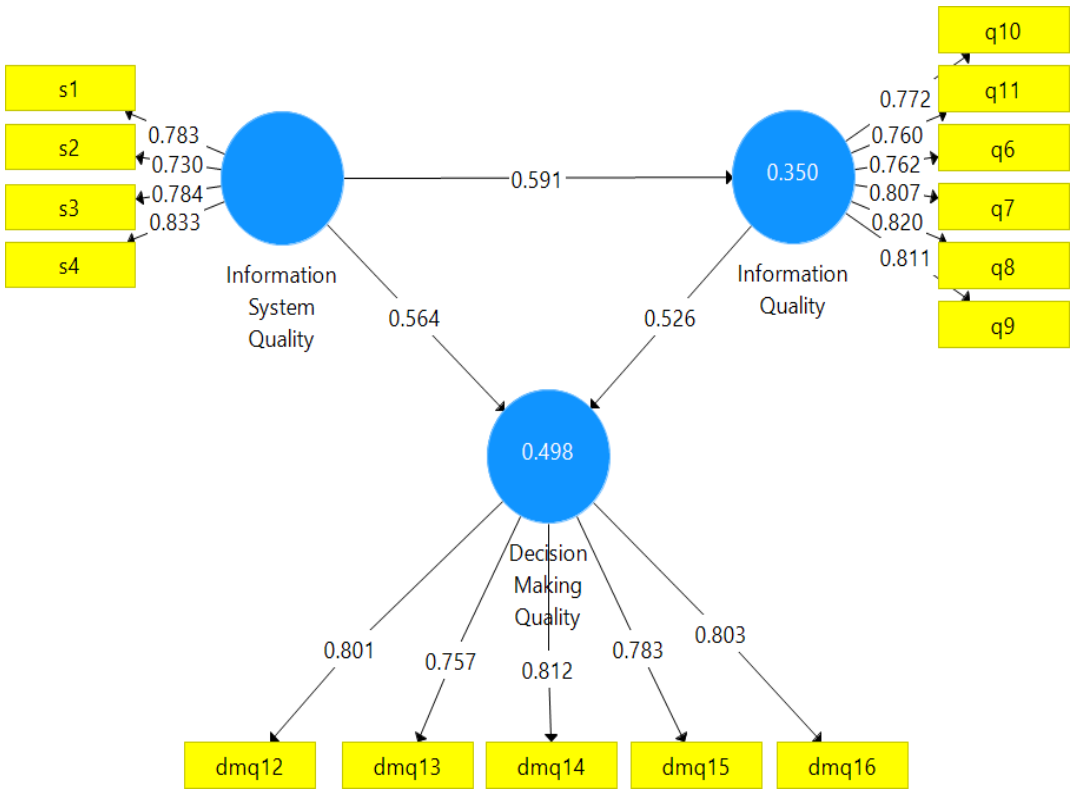

Figure 5: Research Model Paths

Table 14: Results of Hypothesis

Hypothesis	Result
Information system quality (ISQ) significantly influences firm decision-making quality (DMQ).	Confirmed
Information quality (IQ) significantly influences firm decision-making quality (DMQ).	Confirmed
Information system quality (ISQ) significantly influences information quality (IQ).	Confirmed
Information system quality (ISQ) significantly mediates the relationship between Information quality (IQ) and decision-making quality (DMQ).	Confirmed

CONCLUSION

All organizations depend on information systems for their management and operation. Moreover, advanced information systems improve performance, which is reflected in improving the quality of decisions. There is no doubt that information is essential in making decisions in institutions. Several researchers consider that individuals and departments are systems to collect and process information. Given the current challenges in this century, the information systems concept has received increasing and remarkable attention in many fields of modern human life, whether at the individual, institutional or collective level. No two dispute the importance of information for the decision-making process, and this is not new, and it is also not new to use this information within the framework of a system. What is considered new is that the decision-maker requests information of a high degree of quality, accuracy, modernity, and appropriateness to make his decision purposeful and distinctive and invents advanced computer-based systems to facilitate access to it. The decision-making element is affected by the internal and external environment variables in which the institution is located, so it is an important element in management. In addition, it is a complex process that requires the institution to prepare an effective AIS, which links the institution with its external environment and works to collect the largest amount of data. These inputs are expressed in a financial form of actual value to the institution, and this system enters data, analyses, and processes it in order to access information that is characterized by accuracy, relevance, consistency, timeliness, that is, it is of quality, and this information is relied on extracted in making the right decisions which benefit the institution. The financial decision is one of the most important decisions for the institution. Whenever the decision is excellent and provides the required resources, the institution will reach a successful decision. Organizations seek to obtain sufficient information to make decisions to compare between alternatives and choose the best option.

This research focused on the role of information quality in the financial decision-making process. This research used a questionnaire to analyse the role of information systems (in terms of system quality and information quality) and their impact on the quality of decision-making at the institution (Ministry of Education in Libya). This research was in three parts. The first and second parts are theoretical. They included the scientific methodology of the research and the theoretical framework, in which the

importance, purpose, and problem of the research were clarified. The third part included applications dealing with the data of the studied problem, including evaluation of the questionnaire form, analysis of results, conclusions, and recommendations.

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 at the financial management in terms of measuring the quality of information and the quality of the system. The research was conducted in the Ministry of Education - Libya; The questionnaire was distributed to a group of employees in the financial and administrative administration, including managers, heads of administrative and financial departments, accountants, internal auditors, and the Office of the Controller. Data were collected and then analysed by (partial least squares regression). The research hypotheses were tested.

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 employees of the Ministry of Education - Libya that the newly used information systems have an effective role in the decision-making process in the organization.

Most of the employees in the Ministry of Education - Libya 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 in improving 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 that get from different groups can give dissimilar 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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Questionnaire Form

T.C.

KARABUK UNIVERSITY

Dear Mr./Miss/Mrs.

This questionnaire is a part of master Thesis titled: The Impact of Information Systems On the Decision-Making Process of Financial Management in The Ministry of Education in Libya

I am looking forward to receive your answers to questions listed in the attached questionnaire. The data/ information you are going to provide here will be treated and processed confidentially and will be used only for scientific Research.

Thank you very much for your time and co-operation

The Researcher: Abdulati Saghair Issa Ali

THE QUESTIONNAIRE

Gender:

□ Male

□ Female

Age:

□ 30 years and less.

□ 31- 40 years.

□ 41- 50 years.

□ 51 years and above.

Education level:

□ Secondary Certificate level.

□ Diploma level.

□ Bachelor ‘s Degree level.

□ Masters Level.

□ PhD.

Specialization:

□ Accountant.

□ Internal auditor.

□ Director.

□ External auditor.

□ Financial controller.

Years of experience:

□ 5 years and less.

□ 6 - 10 years.

□ 11 - 15 years.

□ 16 years and above.

System Quality Measures, SQ (Al-Mamary et al 2013)

Please evaluate these System Quality Measures as you see them in the information system where you work. Choose points from 1 to 5 for your evaluation where 1 is very weak and 5 is very strong.

NO	Statement	**1**	**2**	**3**	**4**	**5**
1	Ease of use					
2	Reliability					
3	Response time					
4	Flexibility					

Information Quality Measures, SQ (Al-Mamary et al 2013)

Please evaluate these Information Quality Measures as you see them in the information system where you work. Choose only one answer from 1 to 5 for your evaluation where 1 is very weak and 5 is very strong.

N O	Statement	**1**	**2**	**3**	**4**	**5**
5	Completeness					
6	Relevancy					
7	Accuracy					
8	Understandability					
9	Consistency					
10	Conciseness					
11	Timeliness					

Quality of Decision Making, DM (Caniëls and Bakens, 2011, Modified)

Please evaluate these Quality of Decision-Making Measures as you see them at the organization where you work. These evaluations should come at least one year after an introduction of an Information System where you work. Choose only one answer from 1 to 5 for your evaluation where 1 is very weak and 5 is very strong.

NO	Statement	**1**	**2**	**3**	**4**	**5**
12	The quality of decision at your organization.					
13	Time of decision making at your organization.					
14	Management of the budget for activities at your organization.					
15	Allocation of resources at your organization.					
16	Monitoring of activities at your organization.					

Thank you for your participation

CURRICULUM VITAE

ABDULATI SAGHAIR ISSA ALI was graduated from elementary and basic education in Tripoli - Libya. He completed his secondary education at Hai Damask High School. after which he completed bachelor's program in the Department of Business Administration in National Institute of Management 2009. after which he worked in The Ministry of Education of Libya. Then in 2019 a postgraduate student was accepted at Karabük University in Turkey.