

**Attitudes of Jordan Commercial Banks Managers
Towards Dealing with Determinants of Geographic
Information System and Their Impact in Adopting**

اتجاهات مديري البنوك التجارية الأردنية نحو التعامل مع محددات
نظام المعلومات الجغرافية وأثرها في تبنيها

Prepared by:

Ramez Shaher Mubarak Khries

Supervised by:

Dr. Ahmad Sukkar

**Thesis Submitted in Partial Fulfilment of the Requirements
for Master's Degree in E-Business**

Business Administration Department

Business Faculty

Middle East University

February 2020

Authorization

I **Ramez Shaher Mubarak Khries**, hereby grant the Middle East University the authorization and the right to use and provide my thesis to the researchers in the library of university and use it to help the researchers in their research.

Name: Ramez Shaher Mubarak Khries

Date: 02 / 02 / 2020.

Signature:



Discussion Committee Decision

This dissertation titled: **Attitudes of Jordan Commercial Banks Managers towards Dealing with Determinants of Geographic Information System and their Impact in Adopting**, has been defended, accepted and approved on 25/01/2020.

Discussion Committee Members

University

Signature

Dr. Sameer-Aljabali

Chairman

MEU

Dr. Ahmad Sukkar

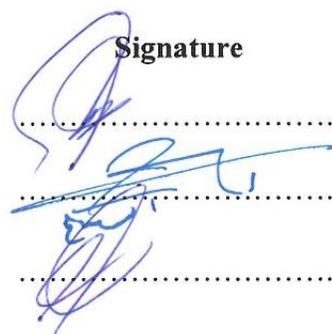
Supervisor

MEU

Prof. Dr. Mahmoud Migdadi

External
Member

PSUT

The image shows three handwritten signatures in blue ink, each written over a horizontal dotted line. The signatures are stylized and appear to be the names of the three committee members listed in the table: Dr. Sameer-Aljabali, Dr. Ahmad Sukkar, and Prof. Dr. Mahmoud Migdadi.

Acknowledgements

I sincerely thank the almighty Allah who has given me immeasurable grace to carry out my studies to this far.

I would like to express my special thanks of graduate to my supervisor Dr. Ahmad AL-Sukkar for his continuous support, motivation and generous guidance through this journey.

My sincere thanks also goes to my university (Middle East University) and its entire academic faculty, and all who contributed in one way or another in making this thesis possible.

My sincere thanks to Jordan Commercial Bank represented by all its employees who supported me in every possible way to reach this point.

Last but not least, I would like to thank my family and friends for their spiritual support throughout the entire process.

Ramez Shaher Mubarak Khries

Dedication

Dedicated to the memory of my mother, Suraya Alrobaiy, who always believed in my ability to be successful. You are gone but your belief in me has made this journey possible.

To my beloved father for his great role in my life and his numerous sacrifices for me and my siblings.

To my brother Ra'ed for his support and for being truly a brother when needed.

To my sister Shahera for being the sister with biggest heart in the world, and for her prayers and support.

Last but not least, I would like to dedicate this study to my Sister Ro'aa, the one who always stayed by my side and always believed that I'm distant to achieve great things, to the one I'm proud to call my second mother.

Ramez Shaher Mubarak Khries

Table of Contents

Subject	Page
Title	i
Authorization	ii
Discussion Committee Decision	iii
Acknowledgement	iv
Dedication	v
Table of Contents	vi
List of Tables	ix
List of Figures	x
Appendices	xi
Abstract in English	xii
Abstract in Arabic	xiii
Chapter One: Study Background and Significance	1
Introduction	2
Study Problem	3
Study Purpose and Objectives	5
Study Significance	5
Study Questions and Hypotheses	6
Study Model	7
Study Limitations	7
Study Delimitations	7
Study Terms and Operational Definitions	8
Chapter Two: Literature Review and Previous Studies	10
Overview	11
Geographic Information Systems	11
Intention and Adopting	21
Previous Studies	22
Study Contribution to Knowledge	29
Chapter Three: Study Methodology: Method and Procedures	31
Overview	32
Study Field	32
Study Methodology	32
Study Population	32
Study Sample	33
Study Tool and Data Collection	33
Statistical Methods	34

Personal and Occupational Characteristics	35
Validity and Reliability	37
Chapter Four: Results Presentation and Test Hypotheses	44
Overview	45
Results Presentation	45
Adequacy of the Data to Test Study Hypotheses	50
Study Hypotheses Tests	51
Chapter Five: Results Discussion and Recommendations	58
Overview	59
Results Discussion	59
Recommendations and Future Studies	60
References	62
Appendices	67

List of Tables

No.	Table Content	Page
3-1	Study Sample Personal and Occupational Characteristics	36
3-2	Exploratory Factor Analysis results for Geographic Information System factors	38
3-3	Exploratory Factor Analysis results for Intention to adopt items loading	39
3-4	Correlation coefficients between the dimensions of Geographic Information System	40
3-5	Model fit Indicators of scale of Geographic Information System dimensions	41
3-6	Reliability of Questionnaires Dimensions	43
4-1	Mean, Standard Deviations, dimension rank and important of Geographic Information System dimensions	45
4-2	Mean, Standard Deviations, items rank and important of Technology Competence	46
4-3	Mean, Standard Deviations, items rank and important of Competitive Pressure	47
4-4	Mean, Standard Deviations, items rank and important of Financial Concerns	48
4-5	Mean, Standard Deviations, items rank and important of Intention to Adopt	49
4-6	Results of Variance Inflation Factor, Tolerance and skewness coefficient	50
4-7	Multiple regression analysis to ensure the impact GIS determinants (Technology competence, Financial Concerns, and Competitive Pressure) on Intention to adopt	51
4-8	Sample regression analysis to ensure the impact Technology competence on Intention to adopt	53
4-9	Analysis of variance to ensure the impact Technology competence on Intention to adopt	53
4-10	Coefficients value to ensure the impact Technology competence on Intention to adopt	54
4-11	Sample regression analysis to ensure the impact Financial Concerns on Intention to adopt	55
4-12	Analysis of variance to ensure the impact Financial Concerns on Intention to adopt	55
4-13	Coefficients value to ensure the impact Financial Concerns on Intention to adopt	55

List of Tables

No.	Table Content	Page
4-14	Sample regression analysis to ensure the impact Competitive Pressure on Intention to adopt	56
4-15	Analysis of variance to ensure the impact Competitive Pressure on Intention to adopt	57
4-16	Coefficients value to ensure the impact Competitive Pressure on Intention to adopt	57

List of Figures

No.	Contents	Page
1 – 1	Study Model	7
2 – 1	System definitions	12
2 – 2	Information system elements	14
3 – 1	The output path diagram of three Geographic Information System dimension model	41
3 – 2	The output path diagram of Intention to adopt model	42

List Appendices

No.	Subject	Page
1	Names of arbitrators	68
2	Persons Interviewed Names	69
3	Interview Question	70
4	Questionnaire	71

Attitudes of Jordan Commercial Banks Managers towards Dealing with Determinants of Geographic Information System and their Impact in Adopting

Prepared by: Ramez Shaher Mubarak Khries

Supervised by: Dr. Ahmad Sukkar

Abstract

The study aimed to investigate the impact of Geographic information systems determinants on Intention to adopt Geographic information systems in Jordanian commercial banks. The study applied to 13 Jordanian commercial banks, and the population of this study was the managers from the three managerial levels working in these banks. The study sample consisted of (173) managers in the Jordanian commercial banks from the top-level management who were chosen in a purposive sampling manner. The questionnaire was used as a main tool for collecting data, (173) questionnaire were distributed, while the accepted questionnaire reached to (151) and constitute (87%) of the total distributed questionnaires.

To achieve study objectives, the researcher used descriptive analytical method through many statistical tools; most prominent are multiple and simple regression analysis, using the statistical programs (SPSS Ver.24 & Amos V.24).

In regards to the study, there has found a number of results, the most notable are; the positive impact of GIS determinants with its dimensions (Technology competence, Financial Concerns, and Competitive Pressure) on the Intention to adopt GIS in Jordanian commercial banks in Amman Governorate. In light of the findings of the study, the researcher has made several recommendations, including:

That the Jordanian commercial banks should make more use of geographic information systems as they work to minimize costs on one hand, on the other hand to help them make decisions through making alliances with institutions that use geographic information systems. And that Jordanian commercial banks should take advantage of their resources to use geographic information systems by working to balance between the availability of their resources and contemporary uses of this type of system to achieve their goals.

Keywords: Geographic Information Systems, Intention, Jordan Commercial Banks.

اتجاهات مديري البنوك التجارية الأردنية نحو التعامل مع محددات نظام المعلومات

الجغرافية وأثرها في تبنيه

إعداد: رامز شاهر مبارك خريس

إشراف: الدكتور أحمد السكر

الملخص

هدفت الدراسة إلى التعرف على أثر محددات نظم المعلومات الجغرافية على نية تبني نظم المعلومات الجغرافية في البنوك التجارية الأردنية. تم تطبيق الدراسة على 13 بنك تجاري أردني، وكان مجتمع الدراسة هو المديرين من المستويات الإدارية الثلاث العاملة في هذه البنوك. أما عينة الدراسة فكانت عينة قصدية، بلغ حجمها (173) مدير في البنوك التجارية الأردنية من الإدارة العليا. واستخدمت الاستبانة كأداة رئيسية لجمع البيانات، حيث تم توزيع (173) استبانة، وقد بلغ عدد الاستبانات الصالحة للتحليل (151) وتشكل (87%) من مجموع الاستبانات الموزعة.

لتحقيق أهداف الدراسة تم استخدام المنهج الوصفي التحليلي من خلال العديد من الأساليب الإحصائية أبرزها تحليل الانحدار المتعدد والبسيط، باستخدام البرامج الإحصائية (SPSS V.24 & Amos V.24). وقد توصلت الدراسة إلى العديد من النتائج أبرزها: وجود أثر إيجابي لمحددات نظم المعلومات الجغرافية (الجدارات التكنولوجية، الاهتمامات المالية والضغط التنافسي) على نية تبني نظم المعلومات الجغرافية في البنوك التجارية الأردنية لنظم المعلومات الجغرافية في محافظة عمان.

وفي ضوء النتائج التي توصلت إليها الدراسة، قدم الباحث عدداً من التوصيات ومنها: ضرورة أن تستفيد البنوك التجارية الأردنية أكثر من أنظمة المعلومات الجغرافية لأنها تعمل على تقليل التكاليف من ناحية ومساعدتها على اتخاذ القرارات من خلال إقامة تحالفات مع المؤسسات التي تستخدم نظم المعلومات الجغرافية من ناحية أخرى. وضرورة استفادة البنوك التجارية الأردنية من مواردها لاستخدام نظم المعلومات الجغرافية من خلال العمل لتحقيق التوازن بين توافر مواردها والاستخدامات المعاصرة لهذا النوع من النظام لتحقيق أهدافها.

الكلمات المفتاحية: نظم المعلومات الجغرافية، النية والبنوك التجارية الأردنية.

CHAPTER ONE

Study Background and Significance

Introduction

Study Problem

Study Purpose and Objectives

Study Significance

Study Questions and Hypothesis

Study Model

Study Limitations

Study Delimitations

Study Terms and Procedural Definitions

CHAPTER ONE

Study Background and significance

Introduction

Information technology is a fast-moving train with an only destination for advancement and development. "Information technology can change the way businesses compete" (Nikoloski, 2014). Information technology has a great impact on the financial institutions such as, saving time and effort, accuracy in results, high performance and better decision making due to the great amount of data (Alzighaibi, et al., 2016). Hence, it's necessary for financial institutions to grab opportunities and adopt new innovations in order to gain a competitive advantage and stay sustainable.

Organizations adopt new technologies to improve the effectiveness and efficiency of different work processes. Sadly, many technology-based items and services never reach their full potential, and some are simply rejected (Burton-Jones & Hubona, 2006). Failed investments in technology may not only cause financial losses, but also lead to dissatisfaction among employees (Venkatesh & Davis, 2000). Hence, explaining and predicting user adoption of new innovation is significant.

Commercial banks importance stands in its ability to supply the national economy with the funds needed for its development and sustainability, any deficiency in commercial banks might produce a problem in the economy and the well-being of the people. Of course, the role of banks becomes more important as the economy develops in the country. Subsequently, the banking sector play important role in the economic resource allocation of countries. The banking system is a major factor that affects the organization of social and economic life cycle in the economies of the world. It is considered as an indicator of economic and social development. Also, developed economic system should be

characterized by the existence of a modern and sophisticated banking system which contribute to achieving economic balance. (Al-Fayoumi & Abuzayed, 2009)

Based on their ability to support decision makers, geographic information system (GIS) is considered among the most powerful technologies today. In general, GIS is both a database, and a set of operations to process these data. With an emphasis on using spatial data (information about positions). GIS is "a computer system built to capture, store, manipulate, analyze, manage, and display the various kinds of spatial or geographical data." (Gordon, 2017). The main objectives of the GIS are to maximize the efficiency of decision making and planning, provide efficient means for data distribution and handling, eradication of the duplicated data, integration of information from many sources, analysis of queries involving geographical reference data for generation of new information, update data quickly and at the minimum cost (Pandey, Shukla, & Shukla, 2013).

Although it is important to adopt a new technology in the banking sector, especially one in its early stage of research. This research will examine the attitudes of Jordanian Commercial Banks managers towards dealing with GIS determinants and their impact on adoption.

Study Problem

Technology usage is considered as the most important trend in this decade, which is being highly used in Jordanian banks since it provides an easy access for employees to gather customers data since banks rely heavily on gathering and analyzing data, in addition it facilitates interaction between devices that save time and cost (Al Nahar, 2019).

Verschuren (2006) says that the recently rising GIS business part is in a region where scholarly research is in its earliest stages. Specifically, there has been insignificant examination into the reception, use and improvement of GIS.

Accordingly, Alzighaibi, et al., (2016) study showed that managerial support, IT expertise and exposure to GIS are factors that have the most significant impact on employees' perceptions of GIS. Vicente, et al, (2017) show that GIS allows the optimal control of market demand coverage through the collaborative strategies of the supplying retailers, in this case, car dealerships. Nelson et al. (2017) suggested the technology competence, security, and competitive pressure are critical drivers to disclose the aim to embrace Geographic information technology. Financial concerns, government approaches, benefactor and intention to adopt are critical drivers to explain the adoption of GIT. Ramadani et al. (2018) reveal that the influence of Geo-marketing on business development for a majority of companies is positive, as long as decision-making determinants have been taken into consideration and are reviewed during the process.

From the foregoing, it is clear that the many intellectual and research contributions emphasized the positive role of geographic information system in achieving organization goals, which motivated the researcher to conduct the current study. On the other hand, through the researcher conducting interviews with (4) decision maker in the Jordanian commercial banks and asking them about the reality of using the geographic information system in Jordanian commercial banks, as well as, the potential impact of GIS determinants on Intention to adopt GIS. It became clear to the researcher through interviews and from his practical experience in the banking sector for more than 5 years that Jordanian commercial banks seeking attention to geographic information system, as well as, the impact of the GIS determinants on Intention to adopt GIS needs research and study. Consistent with the above, the current study came with the aim of answering the following main question:

Do the GIS determinants (Technology competence, Financial Concerns, Competitive Pressure) affect on Intention to adopt GIS in Jordanian commercial banks?

Study Purpose and Objectives

The general purpose of the current study is to investigate the impact of GIS determinants on Intention to adopt GIS in Jordanian commercial banks, by achieving the following objectives:

1. Recognition the real usage of GIS determinants in Jordanian commercial banks.
2. Determine the Intention to adopt GIS in Jordanian commercial banks.
3. Identify the impact of GIS determinants on Intention to adopt GIS in Jordanian commercial banks.

Study Significance

As for the theoretical significance, this study is considered as an important reference for those interested in the fields of scientific research. Since there is a lack of Arab studies related to the adoption of Geographic information system to the knowledge of the researcher.

As for the practical significance, this study recognize and understand the determinants that lead banks to adopt Geographic information system, which could help managers to gain perceived benefits of adopting Geographic information system and make wise decisions for Jordanian commercial banks.

Study Questions and Hypothesis

The following questions were formulated:

1st Question: What is the reality usage of GIS determinants in Jordanian commercial banks?

2nd Question: What is the Intention to adopt GIS in Jordanian commercial banks?

3rd Question: Do the GIS determinants (Technology competence, Financial Concerns, Competitive Pressure) affect on Intention to adopt GIS in Jordanian commercial banks?

The following sub-questions are derived from it:

(3 – 1): Do the Technology competence affect on Intention to adopt GIS in Jordanian commercial banks?

(3 – 2): Do the Financial Concerns affect on Intention to adopt GIS in Jordanian commercial banks?

(3 – 3): Do the Competitive Pressure affect on Intention to adopt GIS in Jordanian commercial banks?

Accordingly, the following hypothesis has been formulated:

H₀: There is no impact of GIS determinants (Technology competence, Financial Concerns, and Competitive Pressure) on Intention to adopt GIS at the level ($\alpha \leq 0.05$).

The following sub-hypotheses are derived:

H₀₁: There is no impact of Technology competence on Intention to adopt GIS at the level ($\alpha \leq 0.05$).

H₀₂: There is no impact of Financial Concerns on Intention to adopt GIS at the level ($\alpha \leq 0.05$).

H₀₃: There is no impact of Competitive Pressure on Intention to adopt GIS at the level ($\alpha \leq 0.05$).

Study Model

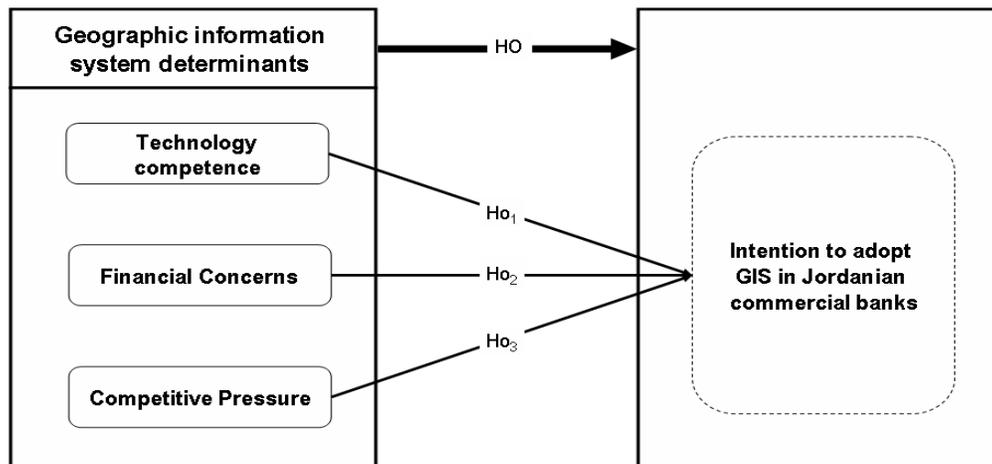


Figure (1-1)

Study Model

Source: Prepared by the researcher based on Nelson et al. (2017); Aboelmaged (2014).

Study Limitations

Place Limitation: Jordan Commercial Banks in Amman, Jordan.

Human Limitation: This study conducted on employees in the Jordanian commercial banks from the top-level management.

Time Limitation: This study conducted during second semester of 2019.

Study Delimitations

As with any research, it is not possible to generalize the results of this study to other commercial sectors, since this study was limited to the banking sector in Jordan.

Study Terms and Operational Definitions

Geographic Information System (GIS)

A computer system built to capture, store, manipulate, analyze, manage, and display the various kinds of spatial or geographical data. The “geographic” part of the acronym GIS refers to information about positions on the Earth’s surface, also known as spatial data, because it can be located in space and has a geographic reference. An example of spatial data, is one’s home address. While information systems, in general, are used to manipulate, summarize, query, edit, and visualize data, GIS does all of these things with spatial information (Gordon, 2017).

Operational define as a set of sub variables (technology competence, financial concerns and competitive pressure). Theses variables were measured by developing a questionnaire.

Technology Competence

Technology competence, also called technological readiness, refers to the available technological environment in a bank. It includes the specialized human resource, infrastructure, and all the working procedures. (Specialized HR are all the people that have skills, knowledge, and expertise to operate with the (GIS) (Nelson et al. 2017).

Operational define: All the elements related to the application of a technology in a bank.

Financial Concerns

The resources available in a bank to support or refuse the adoption of a technology. It refers to the financial state of a bank that facilitate or constraint the adoption of a new technology (Nelson et al. 2017).

Operational define: The financial ability of a bank to adopt a new technology.

Competitive Pressure

Recognized as a great driver in the adoption literature (Nelson et al. 2017).

Operational define: The degree of pressure a bank feels from competitors.

Intention to Adopt

Operational define: The degree of user's willingness to use Geographic information system and it's measured by items or questions included in the questionnaire measure adaption.

CHAPTER TWO

Literature Review and Previous Studies

Overview

Geographic Information System

Intention and Adopting

Previous Studies

Study Contribution to Knowledge

Overview

A review of the study variables through what is stated in the specialized literature, in order to formulate the theoretical framework of this study, and this chapter is divided into two parts:

The first part in the literature review for geographic information system (GIS) and Intention, while the second part is to review the contents of the previous studies and determine the Study Contribution to Knowledge.

Geographic Information Systems

Information System

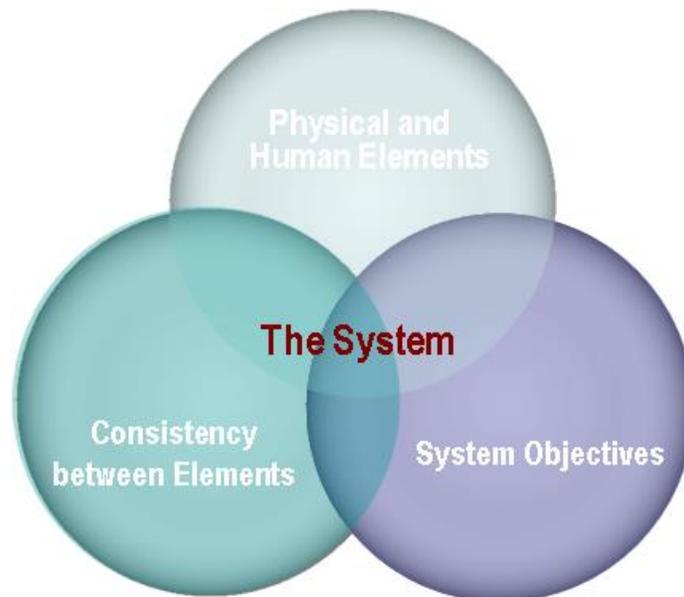
Today, the systems approach is increasingly being used to find solutions to administrative and organizational problems (Arvidsson et al. 2014). The term system is one of the common terms used in various economic, social and political fields ... etc. and it involves many meanings, it is called for every entity characterized by the interaction of its parts in what constitutes an integrated whole with it (Yoshikuni et al. 2018).

Therefore, the system is a set of different molecules, units, or parts with specific properties that interact with each other, affect each other, and fuse among themselves, forming an integrated whole or one homogeneous unit for achieving a specific goal (Adilson & Alberto, 2018). It is also known as a set of parts, elements, or components that work together in a coherent, coordinated and reciprocal manner to achieve specific goals (Ibrahim & Naem, 2019). The summarize system can be defined as follows (Bourdeau et al. 2018):

1. The set of parts and elements that can be material, human, or both, depending on the nature of the system.

2. The consistency and interdependence between parts, elements and components mutually in order to serve each other in one way or another according to a logical relationship.
3. Endeavoring to achieve a specific goal or a set of goals, as the goal of the system represents the main pillar upon which the parts are identified and their relationship with each other.

Figure (2 – 1) clarify the system definitions.



Prepared by the researcher based on Bourdeau et al. 2018

Figure (2 – 1)

System definitions

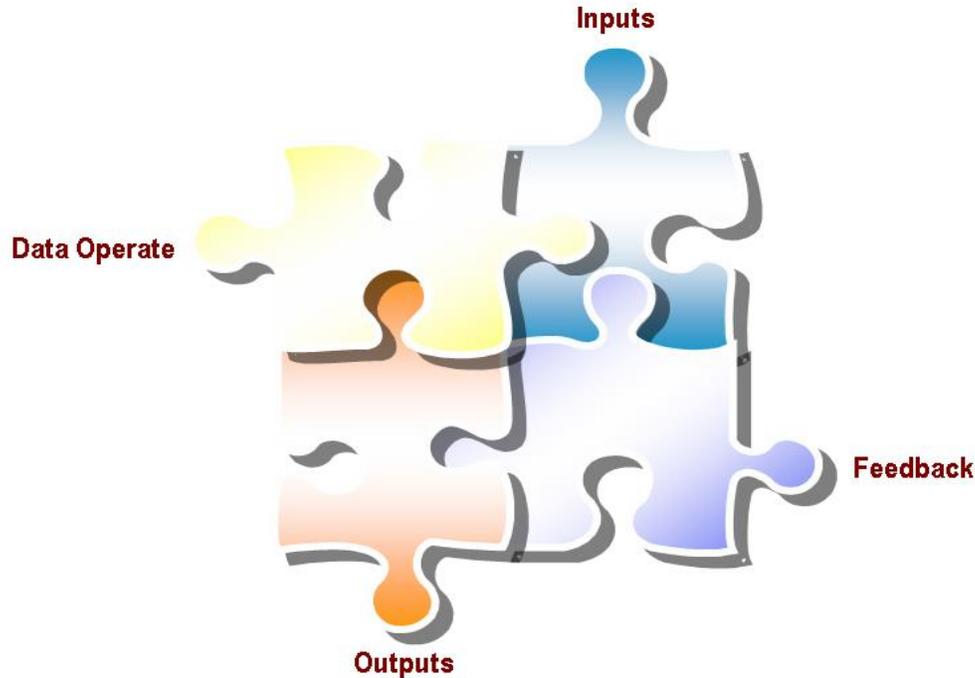
The information system can be studied depending on the general basis model of the system, as the elements of inputs, Data processing operations, outputs and feedback are the basis on which the information system is based. The following is an explanation of these information system elements (Yoshikuni et al. 2018):

1. **Inputs:** represented by a series of data flowing in the various communication channels from internal sources for all activities of the organization within which the information system operates, and from external sources about the external environment surrounding the system (market - competitors - government institutions) or from the system itself when it is approved part of its outputs as new inputs to feed the system with new data and changes in the situation.
2. **Data processing operations:** means data processing through a certain set of basic operations to convert it into information that has a meaningful for decision makers.
3. **Outputs:** the information that results from the system and is presented in the form and content needed by the administration at the appropriate time to make decisions.
4. **Feedback:** It is the relationship that links the system's outputs and inputs. The system works efficiently if it contains the element of feedback that is data on the performance of the system, and so it enables the performance of the monitoring function to determine the system's deviations from its tracks and then make the necessary adjustments to ensure accuracy in the outputs. It aims to provide an indicative tool for system activities and work to interpret results to improve system performance and reduce deviations to a minimum.

Figure (2 – 2) clarify the information system elements.

Geographic Information System: Concept and important

There have been so many definitions for Geographic information system. An earlier definition of GIS is "a special case of information systems where the database consists of observations on spatially distributed features, activities, or events, which are definable in space as points, lines or areas. A Geographic information system manipulates data about these points, lines, and areas to retrieve data in particular for queries and analyses." (Manda et al., 2014)



Prepared by the researcher based on Yoshikuni et al., 2018

Figure (2 – 2)

Information system elements

Geographic information system in general is an information system that processes geographic data. Geographic information system is a computer system for (capturing, storing, integrating, manipulating, analyzing, and displaying) geographically referenced data. Geographic information system is system for standardizing and storing the data, then offering analysis and modeling tools for the data to create new output, and displaying the output in map or report form. Results of Geographic information system are always output in different kinds of visual and tabular displays. Geographic information system is a system that comprises structured data containing information about geographic features as well as the hardware, software, and people used to analyze those features in an organizational environment. (FU, 2007)

Star and Estes (1990) define Geographic information system as "an information system designed to work with data (Manda et al., 2014). A Geographic information system

is database with specific capabilities for spatially referenced, data as well as a set of operations to work with the data". (Alzighaibi et al. 2016)

Geographic information system is a set of interrelated elements that work together to collect, process, store, and distribute information on a topic systematically to support decision making, Organizing, control and analysis in the organization to build a clear current and future perception of the subject (Ramadani et al. 2018)

In the decision making of business and communities, the link of location with information is a widely favorable process. Choosing sites, targeting audience, allocating resources, focusing on market segments, scheduling distribution networks and / or responding to emergencies and similar involved questions about geography (AL-Zyood, 2018).

Marketers, retailers, managers, real estate professionals, asset managers, health organizations, insurers, urban consulting agencies, travel agencies and much more are seeking to understand markets better. Geographic information system supports the above mentioned stakeholders in many ways such as: business decisions, marketing, analysis and research. Besides, Geographic information system assist firms to determine which products and promotions match the lifestyles and buying-patterns of their clients in a geographic perspective, identifying retail sites, making spatial competition analysis; planning trade areas, sales predicting, designing sales segments, planning and advertising (Ramadani, et al. 2018).

The pursuit of Geographic information system is becoming much easier and widely spread, due to the rise of location, awareness of hardware and software by companies, advertising professionals and marketing agencies (Gordon, 2017).

Geographic Information System: Benefits and Advantages

Rodríguez et al. (2017) identify the benefits of Geographic information system, as follows:

1. Expansion of Customer base and managing its database
2. Improving the service quality using Geographic information system.
3. Increasing Consumer Satisfaction.
4. Consistent Business / financial Growth and expansion.
5. Increase Profitability.

As well as, Geographic information system also can help banking sectors in various functional areas; by providing support in decision-making and strategic planning of the business and consumer (Upadhyay, 2019)

Geographic information system advantages are listed as follows (Makki, 2012):

- Collaboration: Geographic information system working condition offers a serious situation of participation and coordinated effort and supports collaboration where each user can have an effective role in the business life cycle.
- Improved planning and decision qualities: Geographic information system can be viewed as a DSS. Accordingly, Geographic information system improves planning and decision making since its analysis is put together not just with tabular and raw data unthinkable and crude information, yet notwithstanding geospatial information, information identified with area what makes a greater and more clear picture for decision makers.
- Automated business cycle: rather than receiving the demised desk work condition, Geographic information system improves work cycle by changing over each bit of everyday activities, planning and decision making completely computerized what brings about reducing costs, time and exertion with better outcomes.

- State of the art analysis capabilities and simulation: with a wide scope of accessible choices to be connected, all things considered, from a business perspective, Geographic information system can recreate and offer pre situation investigation models to emulate these proposed choices regardless how basic or complex choices.
- Scalability and flexibility systems: Geographic information system bolsters they might be a wide scope of technologies in regards to operating systems, database engines and data formats, also the ability to work with tremendous amounts of data and large areas.

Geographic Information Systems: Components and Dimensions

Geographical Information Systems consists of a set of elements that are composed and interconnected so that they give a specific system of work in order to achieve a specific goal or goals, despite the multiplicity and imbalance of geographic information systems, they all consist of a set of elements that are divided into four basic elements as follows (Ramadani et al. 2018):

1. Physical entity: Those devices used in the set of operations that take place in the system.
2. Programmatic entity: it refers to the set of programs used in the computer to carry out specific tasks and operations, which are programs specialized in working on geographic information systems, as well as, the program group varies widely.
3. Geographical data and information: it means those original geographic data and information, which are available for use immediately upon request for the purpose of supporting decision-making.
4. User: That person who does the work inside the system to perform certain specific tasks, and this person is required to have experience, know-how and knowledge, so that he can master what he is doing, and what he accomplishes with accurate and least expensive way.

In the current study the researcher relied on Nelson et al. (2017) and Aboelmaged (2014) proposed about geographic information system dimensions, as follows:

Technology Competence (TC)

The concept competence is widely used in different areas of research, including education, management, psychology, information system and human resources. And it needless to say that it is used in a variety of ways, sometimes as a skill or personality traits, other times as a synonym for performance (Bassellier, Reich, & Benbasat, 2001). The technology context refers to the internal and external technology relevant to the organization, and the technologies that are available for possible adoption. (Nelson et al., 2017).

Alkhaffaf et al. (2018) emphasized that the concept of technology competencies includes the ability to discover and confront new technological situations in a flexible way of analyzing, selecting, evaluating data and information, and exploiting technological capabilities to represent and solve problems, as well as build joint and collaborative knowledge with enhancing awareness of personal responsibilities and mutual obligations.

Technology competencies are defined as competencies that involve technological capabilities that are best used in work for the purpose of assessing, storing and exchanging information (Kashirin et al. 2016).

Chursin et al. (2017) clarified that technology competencies reflect the organization's use of technologies to manage its information effectively.

Finally, Chursin, et al. (2019) defined technology competencies as the extent to which an organization is aware of the effectiveness of using IT to manage its information.

Financial Concerns (FC)

The organization context refers to the descriptive characteristics of the firm (i.e., organizational structure, firm size, managerial structure, degree of centralization),

resources (human and slack resources), and process of communication (formal and informal) among employees. (Nelson et al. 2017).

Competitive Pressure (CP)

The competitive pressure is sign of losing competitive advantage for an institution, so that it forces firms to find a competitive edge by adopting new technologies (innovations), environmental context comprises market elements, competitors, and regulatory environment (Nelson et al. 2017)

Da Cruz, et al. (2012) notes that strategists believe that competitive pressure depends on the Porter five force competition, Buyer Power, Supplier Power, Barriers to Entry, Threats posed. by substitute products and Intraindustry Rivalry, and whatever the influencing factors in measuring competitive pressure and its diversity, it does not cover all types of competitive pressure.

Vives (2008) asserts that managers of organizations do not possess objective measurements of competitive pressure patterns expressed in four basic patterns (D'Aveni, 2001)

Managed Containment

This pattern of competitive pressure relies on surrounding the competitive arena and identifying it with the least possible space, as it reduces the intensity and scope of competitive pressure in new markets. This pattern of competitive pressure may be implemented by many organizations that target the same industry, but the surrounding of the competitive arena may take a long time because it is not possible to decisive victory. This type of competitive pressure is less costly than other competitive pressure patterns, especially if the briefing policy was developed early enough to stabilize the competitive environment in a particular industry.

Gradual Constriction

This pattern of competitive pressure begins by surrounding the organization with the competitive field of another competing organization, and then gradually encroaching on its market share, i.e. surrounding a specific geographical area, product or market by tightening the screws and grip gradually through a series of directions and maneuvers. For this kind of competitive pressure to succeed, the competing organization must have a group of strong alliances.

Sequential Stripping

It is the successive dismantling of the competitor's influence area in contrast to the gradual contraction, which leads to suffocating the competitor's main markets, stripping him of the focus on the competitor and his vital environment and destroying the competitor's control over his scope and competitive capabilities, and if the competitor survives, he usually is able to adhere to his scope of influence only in an unstable manner, as this pattern of competitive pressure can be activated in coordination with a number of other organizations that seek to limit the superiority of new market leaders.

Toppling

This type of competitive pressure is used to move to the center of the competitor's sphere of influence, where the organization takes an offensive position and bastion and gathers the skills necessary to enter a more dynamic competitive area. By using its forward positions, strengths and capabilities to enter the competitor's buffer zone and then move to the vital interests area, then attacking the main competitor's sphere of influence. It is possible for the organization to implement this pattern of competitive pressure through contact with a group of organizations allied with it, which exchange among themselves a set of competencies, as each exchange enables to drop a specific axis within the geographical area, product or target market.

Intention and Adopting

Intention was portrayed as the event immediately preceding the initiation of actual work (Vasiljevic et al. 2016).

Many scholars intend to affirm that intentions are the basis of intentional or deliberate human behavior and both psychologists and philosophers define the intention as the perceived state that proceeds temporarily or directly the behavior (Cristea and Gheorghiu, 2016).

Kabra et al. (2017) defined it as the state of mind that directs the attention of an individual and then his experience, behavior or behavior towards a specific goal or path in order to achieve a goal.

Therefore, intention can be viewed as a state of knowledge or awareness that directly precedes the decision to act or undertake work and scientific experiments indicate that intentions are consistently and the only and best indicator of subsequent behavior (Garza, 2018).

Kabra et al. (2017) define Adoption as individual's decision to become a regular and periodic user of a product

Previous Studies

Oliveira & Martins (2011) study titled “**Literature Review of Information Technology Adoption Models at Firm Level**”

This paper reviews theories for adoption models at the firm level used in information systems literature and discuss two prominent models: digital object identifier theory, and the technology organization environment framework. The digital object identifier found that singular characteristics: (internal characteristics of organizational structure, and external characteristics of the organization) are vital forerunners to organizational innovativeness. The technology organization environment framework identifies three aspects of an enterprise's context that influence the process by which it adopts and implements a technological innovation: technological context, organizational context, and environmental context. The researcher made a thorough analysis of the technology organization environment framework, analyzing the studies that used only this theory and the studies that combine the technology organization environment framework with other theories such as digital object identifier, institutional theory, and the Iacovou, Benbasat, and Dexter model. The institutional theory helps us to understand the factors that influence the adoption of interorganizational systems (IOSs); it postulates that mimetic, coercive, and normative institutional pressures existing in an institutionalized environment may influence the organization's predisposition toward an IT-based interorganizational system. The Iacovou, Benbasat, and Dexter model, analyses IOSs characteristics that influence firms to adopt IT innovations. It is based on three contexts: perceived benefits, organizational readiness, and external pressure. The analysis of these models takes into account the empirical literature, and the difference between independent and dependent variables.

AL-Kodmany (2012) study titled **“Utilizing GIS in Nonprofit Organizations for Urban Planning Applications: Experiences from the Field”**

This paper examines the utilization of GIS in charitable associations. The researcher talked with organizers and GIS specialists in key not-for-profit associations in the City of Chicago to appreciate their genuine uses of GIS, confronted difficulties, and gathered encounters. Associations provided details regarding many undertakings where GIS was utilized for useful urban arranging applications. Discoveries show that not-for-profit associations offer amazingly valuable exercises on utilizing GIS for tasks at the neighborhood, territorial, and national dimensions. They give broad encounters on GIS specialized issues and arrangements, systems, and information issues. Their undertakings regularly bolster altruistic endeavors and react to the requirements of low-salary networks. Nonetheless, the associations' assets are lessening.

Aboelmaged (2014) study titled **“Predicting e-readiness at firm-level: An analysis of technological, organizational and environmental (TOE) effects on e-maintenance readiness in manufacturing firms”**

This paper examines and predicts the effect of technological, organizational and environmental (TOE) determinants on e-maintenance technology readiness in assembling firms. Survey responses of 308 chiefs from a wide range of assembling firms have been approved and broke down by means of structural equation modelling. The results demonstrate that elements of e-maintenance technology readiness in assembling firms are impacted by technological and organizational determinants involving technological infrastructure and competence, expected advantages and difficulties of e-maintenance, and firm size and proprietorship. shockingly, there is no critical impact of competitive pressures on e-maintenance readiness. This study offers administrators and sellers an edge of reference to analyze firm's circumstance before initiating new innovations. If there should arise an

occurrence of e-maintenance technology, adoption strategies ought to be worked around fostering level of employees' technological knowledge and skills, technology infrastructure as well as continuing potential advantages and experiencing potential difficulties related with e-maintenance technology.

Thomas & Espadanal (2014) study titled “**Assessing the determinants of cloud computing adoption: An analysis of the manufacturing and services sectors**”

This Paper planned to expand a large number of elements impact the selection of cloud computing. To evaluate the determinants affecting the adoption of cloud computing, the researchers build up an examination model dependent on the innovation qualities from the (DOI) theory, and the (TOE) framework. Information were gathered from 369 firms in Portugal and used to test the related speculations. The examination additionally explores the determinants of cloud computing adoption in the assembling and administrations segment.

Noorsazwan et al., (2016) study titled “**Determination of New Bank Branch Location Using GIS Approach**”

This paper has summarized the method to carry out the research to determine the best location to place a new branch for Bank X, particularly in Shah Alam, Selangor. The process can be divided into three stages; planning, implementation, and decision stage. The planning stage was focused on the data methods and analysis to be used in this research. For the implementation stage, geospatial database was created and all required data for decision stage were prepared. In the decision stage, the location of new branch of Bank X was investigated based on the suggested criteria from the bank itself and location of other banks. Spatial modeling and Euclidean distance methods were used to obtain the desired decision. The results showed four suitable locations for new bank branch of Bank X; location near Stadium Shah Alam, location at Pusat Perniagaan Worldwide, location

opposite Sek. Keb. Seksyen 7, and location behind SRJK Tamil Seksyen 7. Ranking technique was used in order to get the most suitable location from those four locations and the most recommended location was the location opposite to Sek. Keb. Seksyen 7. For the conclusion, GIS technology is a useful and powerful tool in planning and decision-making purpose.

Alzighaibi et al., (2016) study titled “**Factors Affecting the Adoption of GIS Systems in the Public Sector in Saudi Arabia and Their Impact on Organizational Performance**”

This paper aimed to investigate the adoption of GIS in Saudi Arabia. A total of 221 questionnaires were collected from Ministry of Water and Electricity, the results show that managerial support, IT expertise and exposure to GIS are factors having the most significant impact on employees’ Perceptions of GIS, and it also shows that GIS training and incentives have no significant impact on employees’ perceptions. The study states that attitudes to GIS has an impact on and a relationship with the actual usage of GIS.

AL-Adwan (2016) study titled “**Management Information Systems & Their Impact on Improving the Quality of Service at the Commercial Bank Customers**”

The aims of this study is to identify MIS and their impact on improving the quality of service at the commercial bank customers, consisted of 50 customers a random sample at the commercial bank in Saudi Arabia was made, the finding were that there are an impact on MIS of improving the quality of service, the study also recommended to improve policies designed to activate the MIS.

Cavallone, et al. (2017) study titled “**Improving service quality in healthcare organizations through Geomarketing statistical tools**”

The aim of this study is to show how can Geomarketing statistical tools support healthcare organizations by improving the quality of the services they provide, concerning performance of nuclear magnetic data resonance a Geomarketing tools were applied to the analysis of the data, 91,478 observations. Results show that Geomarketing models can enhance and support planning of service provision of healthcare organizations.

Vicente et al., (2017) study titled “**Application of geographical information systems for the optimal location of a commercial network**”

The aim of this study is the optimization of the geographical location of a network of points of sale, so that each retailer can have access to a potential geographic market. In addition, the authors study the importance of the distance variable in the commercial viability of a point of sale and a network of points of sale, analyzing if the best location for each point (local optimum) is always the best location for the whole (global optimum). The study used Location-allocation models which were applied using p-median algorithms and spatial competition maximization to analyze the actual journeys of 64,740 car buyers in 1240 postal codes using a geographic information system and geomarketing techniques. The models showed that the pursuit of individual objectives by each concessionaire over the collective provides poorer results for the whole network of points of sale when compared to the coordinated competition. The solutions provided by the models considering geographic and marketing criteria permit a reduction in the length of journeys made by the buyers. A GIS allows the optimal control of market demand coverage through the collaborative strategies of the supplying retailers, in this case, car dealerships.

Nelson et al., (2017) study titled “**Determinants of Geographic Information Technologies Intention and Adoption and Mozambique Institutions’ Perspectives**”

The aim of this study is to explore the drivers behind the adoption of GIT at two stages (intention and adoption) connected to Mozambique settings. Information were gathered from 110 establishments having a place with Mozambique foundations. The information were examined by employing partial least square (PLS) and relevant-hypotheses were inferred and tested. The research model was evaluated using smart PLS 2.0 M3 software. The results suggested that technology competence, security, and competitive pressure are critical drivers to disclose the aim to embrace GIT. Financial concerns, government approaches, benefactor and intention to adopt are critical drivers to explain the adoption of GIT.

Schwertner (2017) study titled “**Analysis and Visualization of Marketing, Statistical and Macroeconomic Data With GIS**”

This paper presents opportunities of modern Geographical Information System (GIS) for analysis of marketing, statistical, and macroeconomic data. The researcher thinks about existing tools and models and their applications in different fields. The preferred standpoint is that the statistical data could be combined with geographic views, maps and furthermore additional data derived from the GIS. As a result, a programming system is developed, utilizing GIS for analysis of marketing, statistical, macroeconomic data, and risk assessment in real time and prevention. The system has been effectively executed as web-based software application designed for use with an assortment of hardware platforms (mobile devices, laptops, and desktop computers). The software is mainly written in the programming language Python, which offers a superior structure and supports for the advancement of vast applications. Optimization of the analysis, visualization of macroeconomic, and statistical data by area for various business research are

accomplished. The system is designed with GIS for settlements in their individual nations and locales. Information system integration with external software bundles for statistical calculations and analysis is executed so as to share data analyzing, processing, and forecasting. Technologies and processes for loading data from various sources and tools for data analysis are created. The successfully developed system allows implementation of qualitative data analysis.

Ramadani et al., (2018) study titled “**Impact of geomarketing and location determinants on business development and decision making**”

The aim of this study is to study and compare variables such as, industry, socio-demographics, location and business factors of varied companies in western Macedonia. The research method is based on primary data collected through questionnaires as well as secondary data from the state statistical office. The results reveal that the influence of Geomarketing on business development for a majority of companies is positive, as long as decision-making determinants have been taken into consideration and are reviewed during the process.

AL-Zyood (2018) study titled “**The Impact of using GIS on the Selection of ATM Sites and Their Effect on Profitability**”

The aim of this study is to focus on the factors that influence the location of automated teller machines (ATMs) and their impact on profitability using geographic information system, an analysis of results of many studies using the use of Geographic information system in the banking sector pertaining to the optimal location of ATMs helped to reach the conclusion that there is a universal consensus among empirical studies that banks can benefit great commercial advantages from the use of modern information system such as

Geographic information system, allowing them to improve quality of services provided to customers as well as improving their competitive position.

Nelson et al., (2018) study titled “**Geographic information technology usage in developing countries – A case study in Mozambique**”

The aim of this study is to distinguish the fundamental drivers and employments of GIT in associations and to give an outline of GIT utilizes in developing countries with an emphasis on a contextual investigation produced for Mozambique by breaking down the aftereffects of an overview of 123 Mozambican associations that are momentum GIT users. The outcomes demonstrate that the principle drivers behind are (compatibility, complexity, competitive pressure, donor pressure, government policy, intention to adopt, innovation, relative advantage, security, and technology competence). Associations of the public and private sectors use GIT for (customer/resource/risk management, decision support, education, research, monitoring, prediction, simulation, suitability analysis, sustainability, use and access).

Study Contribution to Knowledge

- The previous studies were conducted in different countries of different societies, size and nature, while the current study is conducted Jordanian Commercial Banks in Jordan.
- The study may increase awareness about geographic information system and its role in the banking sector in Jordan.
- Purpose: most of the previous studies investigate geographic information system after adoption. While this study demonstrates the attitudes of the commercial banks managers' towards determinants of geographic information system and their impact on adoption.

- Environment: Most of the previous studies were executed in foreign countries while this study will be executed in Middle Eastern country, specifically Jordan.
- Sample: Most previous studies targeted customers and / or employees, while this study targets top management.
- Comparison: The study results will be compared to the previous studies results mentioned earlier to highlight the differences and similarities.
- Methodology: Many researches depend on reports while this study depends on perceptions.

CHAPTER THREE

Study Methodology

Method and Procedures

Overview

Study Field

Study Methodology

Study Population

Study Sample

Study Tool and Data Collection

Statistical Methods

Personal and Occupational Characteristics

Validity and Reliability

Overview

The current study sought to demonstrate the attitudes of Jordanian Commercial Banks Managers towards Determinants of Geographic Information System and their Impact in Adopting GIS. To achieve this, the study method and procedures consist of the study field, methodology, study population, study sample, study tool and data collection, statistical treatments, personal and occupational characteristics, as well as the validity and reliability of the study tool.

Study Field

The study field consists of (13) Jordanian commercial banks located in the Amman Governorate which are Arab Bank, Arab Banking Corporation, Bank of Jordan, Cairo Amman Bank, Capital Bank of Jordan, Jordan Commercial Bank, Jordan Kuwait Bank, Jordan Ahli Bank, Housing Bank for Trade & Finance, Arab Jordan Investment Bank, Invest bank, Societe Generale de Banque /Jordanie and Bank al Etihad.

Study Methodology

The researcher relied on the descriptive analytical method to testing the current study hypotheses, by studying the relationships between the main and sub-variables through the collection of relevant data, in addition, a questionnaire was used that was prepared based on the measurements developed by researchers to suit the Jordanian commercial banks environment.

Study Population

Study population consists of all managers in the Jordanian commercial banks from the three managerial levels.

Study Sample

Study sample consists of (173) managers in the Jordanian commercial banks from the top-level management who were chosen in a Purposive Sampling manner.

Study Tool and Data Collection

To achieve the study objectives, the researcher developed a questionnaire to answer the study questions. The study questionnaire was developed based on relevant literature review. Two main sources were used to gather information:

Secondary Sources: where the researcher addressed in the study literature review to the secondary data sources that represent in Arabic and foreign books, periodicals, articles, reports, researches and previous cognitive efforts that dealt with the study subject, as well as, research and reading in various Internet sites.

Primary Sources: To address the analytical aspects of the current study, primary data collection through the questionnaire was used as the main tool of the study that included number of statements to answer the questions of the current study.

Questionnaire instrumental sections are as follows:

Section One: Personal and Occupational Characteristics. The Personal and Occupational Characteristics information was collected with closed-ended questions, through five Characteristics (Gender, Age, Qualification, Years of Experience and Job Position).

Section Two: Geographic Information System. This section measured the Geographic Information System through three dimensions (Technology Competence, Financial Concerns, and Competitive Pressure) and (13) items as follows:

1. **Technology Competence dimension:** measured through (5) items (1 – 5).
2. **Financial Concerns dimension:** measured through (4) items (6 – 9).
3. **Competitive Pressure dimension:** measured through (4) items (10 – 13).

Section Three: Intention to Adopt. This section measured the Intention to Adopt through (7) items arrangement from 14 – 20.

All items of the questionnaire were measured on five Likert scale which range from (1) as strongly disagree to (5) as strongly agree.

Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
5	4	3	2	1

Statistical Methods

To answer the study questions and test their hypotheses, the researcher used the following statistical methods through Statistical Package for Social Sciences “SPSS Ver.24” & “Amos V.24”:

- Percentages and Frequencies to describe the Personal and Occupational Characteristics of the study sample.
- Exploratory and confirmatory factor analysis to verify the construct validity of the study tool (questionnaire).
- Cronbach Alpha reliability (α) to measure strength of the correlation and coherence between questionnaire items.
- Means and standard deviations to determine the relative importance of the study variables and paragraphs.

Relative importance, assigned due to:

The Low degree from 1- less than 2.33

The Medium degree from 2.33 – 3.66

The High degree from 3.67 and above.

$$\text{Class Interval} = \frac{\text{Maximum Class} - \text{Minimum Class}}{\text{Number of Level}}$$

$$\text{Class Interval} = \frac{5 - 1}{3} = \frac{4}{3} = 1.33$$

- Variance inflation factor and tolerance to make sure that there are no Multicollinearity between independent variables.
- Multiple regression analysis to measure the effect of independent variables on dependent variable.

Personal and Occupational Characteristics

After distributing (173) questionnaires on sample study. A total of (165) from (173) answered questionnaires were retrieved, of which (14) were invalid, Therefore, (151) answered questionnaires from study sample of analysis were valid for study. Table (3-1) shows the personal and occupational characteristics of the study sample.

Table (3-1) shows that 70.86% of the study sample were male and 29.14% of the study sample was female. This reflects that the study population is a tendency male society and decision-making, and the representation of female leaders is very limited. Also, table (3-1) shows that 4.64% of the study sample age was Less than 31 Years, 7.28% of the study sample age ranged between 31 to 35 years, 70.20% of the study sample age ranged between 36 to 40 years, finally, 17.88% of the study sample age was 41 Years and above. This indicates the high concentration of Jordanian commercial banks on the youth component. In addition, table (3-1) shows that 62.91% of the study sample hold a bachelor's degree, 24.50% of the study sample hold a master's degree. Finally, the percentage of PhD hold was 12.59%. This is evidence of the high educational levels experienced by sample study in Jordanian commercial banks. As for the years of experience, the results shown in Table (3-1) that 8.61% of the study sample had 5 years or less, 25.88% of the study sample had years of experience ranged from 6 to 10 years, 51.60% of the study sample had years of experience ranged from 11 to 15 years. Finally, it was found that the total percentage of

respondents with 16 years and more experience was 13.91%. This reflects the accurate nature of the work of the Jordanian commercial banks, which need high levels of expertise. Finally, in regard to the job position, it was found that 4.64% of the study sample is Chief Executive Officer, 7.28% are Deputy Manager, 13.91% are Asst. General Manager, 27.81% are Division Manager. Finally, it was found that 46.36% of the study sample is Department Manager. This indicates good experience in Jordanian commercial banks

Table (3-1)

Study sample personal and occupational characteristics

Variable	Categorization	Frequency	Percentage
Gender	Male	107	%70.86
	Female	44	%29.14
Age	Less than 31 Years	7	%4.64
	From 31 – 35 Years	11	%7.28
	From 36 – 40 Years	106	%70.20
	41 Years and above	27	%17.88
Qualification	Bachelors	95	%62.91
	Master	37	%24.50
	Doctorate	19	%12.59
Years of Experience	5 Years or less	13	%8.61
	From 6 – 10 Years	39	%25.88
	From 11 – 15 Years	78	%51.60
	16 Years and above	21	%13.91
Job Position	Chief Executive Officer	7	%4.64
	Deputy Manager	11	%7.28
	Asst. General Manager	21	%13.91
	Division Manager	42	%27.81
	Department Manager	70	%46.36
Total		151	100

Validity and Reliability

Face Validity

The study tool shall be valid if its appearance indicates that it measures what has been set to measure it. The face validity of the study tool was verified by presenting it to (8) arbitrators (professors) who were selected with the experience, knowledge and competence in the fields of business administration, marketing and statistics. Their observations were taken and the questionnaire items were modified accordingly. Appendix (1) shows the names of the arbitrators.

Construct Validity

To verify the construct validity of the study tool the researcher employed factor analysis technique through using exploratory factor analysis in the first stage and confirmatory factor analysis in the second stage.

Exploratory Factor Analysis

To perform exploratory factor analysis, four main considerations are assumed (Hair et al., 2010):

- The value of Kaiser-Meyer-Olkin should be greater than (0.50).
- The minimum Eigen Value for each factor is assumed to be equal (1).
- The factor loading of each item must be not less than (0.50).
- Use of Rotate Factors in Varimax Method.

When conducting the exploratory factor analysis of the study variables, it was found that the independent variable Geographic Information System consists of three dimensions (Technology Competence, Financial Concerns, Competitive Pressure), it was found that the value of the KMO test was (0.950) and according to the Kaiser (1974) rule which states The minimum acceptable value of the KMO test is (0.50). It is clear that the extracted value of the KMO test coefficient is greater than the specified value, so the sample size is

sufficient and appropriate for the study. The minimum Eigen value for each factor was higher than the value (1), and all items had loadings greater than (0.5). Fulfilling the aforementioned assumptions, a three-factor model of Geographic Information System emerged explaining (78.413%) of the total variance. The Technology Competence factor explaining (69.663%) of the total variance, while the Financial Concerns factor explaining (4.620%) of the total variance. Finally, the Competitive Pressure factor explaining (4.130%) of the total variance. Table (3-2) shows the results of exploratory factor analysis for the Geographic Information System dimensions (Technology Competence, Financial Concerns, Competitive Pressure).

Table (3-2)

Exploratory Factor Analysis results for Geographic Information System factors

Questions		Factor 1 Technology Competence	Factor 2 Financial Concerns	Factor 3 Competitive Pressure
1	The Bank's infrastructure supports GIS	0.827		
2	The Bank's has high Competence for IT planning	0.670		
3	Bank staffs have a good knowledge of GIS	0.845		
4	The Bank provides a GIS training program	0.730		
5	Bank staffs have the necessary skills to implement GIS	0.604		
6	The Bank invests in GIS		0.693	
7	The Bank allocates a budget for the operation of GIS		0.649	
8	The Bank seeks to maximize the benefits of adopting GIS		0.781	
9	The Bank seeks to reduce GIS maintenance costs		0.832	
10	GIS contributes in revitalizing the bank's competitive level			0.706
11	GIS contributes to reducing the pressure of competitors			0.723
12	Our competitors use GIS			0.687
13	The Bank's GIS gives preference to competitors			0.664

It also showed the results of the exploratory factor analysis of the Intention to Adopt the value of the KMO test was (0.953) and according to the Kaiser (1974) rule which states the minimum acceptable value of the KMO test is (0.50). It is clear that the extracted value of the KMO test coefficient is greater than the specified value, so the sample size is

sufficient and appropriate for the study. The minimum Eigen value was higher than the value (1), and all items had loadings greater than (0.5). Fulfilling the total variance of Intention to Adopt emerged explaining (73.612%). Table (3-3) shows the results of exploratory factor analysis for the Intention to adopt items loading.

Table (3-3)

Exploratory Factor Analysis results for Intention to adopt items loading

	items	loading
14	The Bank intends to use GIS	0.749
15	The Bank collects information on GIS for use	0.704
16	The Bank conducts experimental GIS assessment tests	0.697
17	The Bank expects that it will use GIS	0.737
18	The Bank interested in alliances with other financial institutions using GIS	0.728
19	The Bank's management received various offers for the operation of GIS	0.706
20	The Bank seeks to use GIS in the future	0.717

Confirmatory Factor Analysis

To perform confirmatory factor analysis, four main considerations are assumed (Kline, 2011):

- Determine the structural model, includes non-measured variables and measured variables.
- Verify the default model goodness of fit to judge the Validity of its statements based on the following criteria:

GFI	Goodness of Fit Index
AGFI	Adjusted Goodness of Fit Index
NFI	Normed Fit Index
TLI	Tucker-Lewis Index
CFI	Comparative Fit Index
RMSEA	Root Mean Square Error of Approximation

➤ Acceptance of standard regression weights, known as loading coefficients of not less than (0.50).

When conducting the confirmatory factor analysis of the Geographic Information System dimensions, the value of chi-square (χ^2) = 203.411; DF = 92. χ^2/df ratio with a value of (2.211) indicated an ideal fit, as the ratio of approximately five or less 'as beginning to be reasonable according to Ahmad et al. (2016). Table (3 - 4) demonstrates the correlation coefficients between the dimensions of Geographic Information System.

Table (3-4)

Correlation coefficients between the dimensions of Geographic Information System

Correlation			Correlation coefficients value
Technology Competence	↔	Financial Concerns	0.862
Technology Competence	↔	Competitive Pressure	0.861
Financial Concerns	↔	Competitive Pressure	0.847

The goodness of fit indexes “GFI” and “AGFI” were (0.910) and (0.967) respectively. “NFI”, “TLI” and “CFI” were (0.989), (0.923), and (0.941) respectively. These values were close to (1.0) where the value of (1.0) signifies an ideal fit according to Ahmad et al. (2016). Subsequently the “RMSEA” statistics value (0.069), Ahmad et al. (2016) emphasized that RMSEA value must be less than (0.08) in order to indicate an ideal fit. Table (3 - 5) demonstrates the model fit Indicators of scale of Geographic Information System dimensions.

Table (3-5)

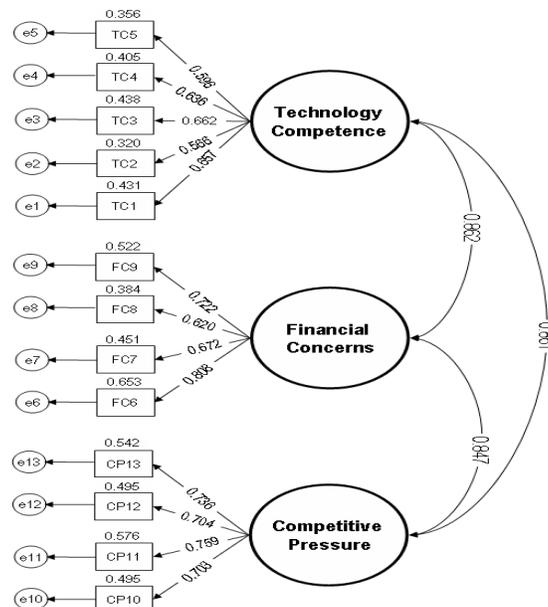
Model fit Indicators of scale of Geographic Information System dimensions

Indicators	Model		
	Default model	Saturated model	Independence model
RMSEA	0.069	-	0.248
χ^2	203.411	0.000	2004.404
DF	92	0	120
χ^2/DF	2.211	-	16.703
GFI	0.910	1.000	0.272
AGFI	0.967	-	0.175
NFI	0.989	1.000	0.000
TLI	0.923	-	0.000
CFI	0.941	1.000	0.000

With respect to factor loadings, the values were between (0.512) and (0.916). All values were within the statistical acceptable level of (0.001). Results demonstrated the suitability of these three constructs to measure Geographic Information System as shown in Figure (3 – 1).

Figure (3-1)

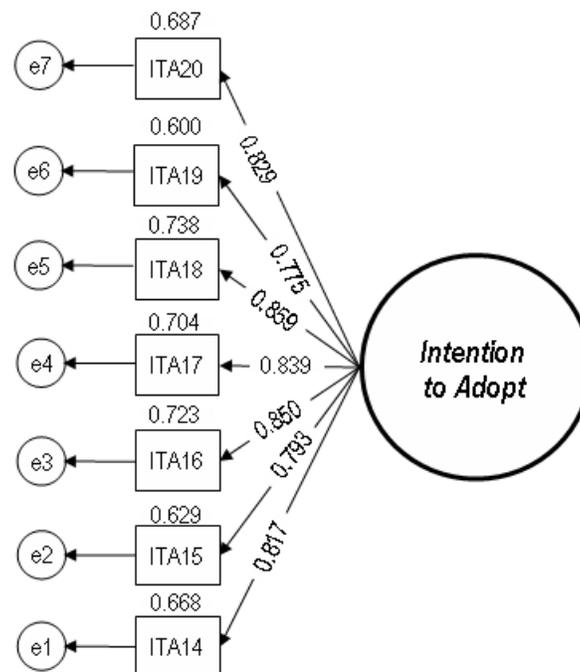
The output path diagram of three Geographic Information System dimension model



Based on results of confirmatory factor analysis shown in figure (3 – 2), Intention to Adopt GIS construct signified an excellent fit with chi-square value (χ^2) = 4.148, DF = 2 and $p = 0.126$. χ^2/df ratio with a value of (2.074) indicated an ideal fit, as the ratio of approximately five or less 'as beginning to be reasonable according to Ahmad et al. (2016). The goodness of fit indexes “GFI” and “AGFI” were (0.992) and (0.941) respectively. “NFI”, “TLI” and “CFI” were (0.993), (0.982), and (0.995) respectively. These values were close to (1.0) where the value of (1.0) signifies an ideal fit according to Ahmad et al. (2016). Subsequently the “RMSEA” statistics value (0.072), Ahmad et al. (2016) emphasized that RMSEA value must be less than (0.08) in order to indicate an ideal fit. With respect to factor loadings, the values were between (0.575) and (0.851). All values were within the statistical acceptable level of (0.001). Squared Multiple Correlation values were (0.687, 0.600, 0.738, 0.704, 0.723, 0.629 and 0.668 respectively).

Figure (3-2)

The output path diagram of Intention to adopt model



Reliability

The researcher used the Cronbach Alpha internal consistency test to measure the consistency of the respondents' answers to all the questions in the scale. Alpha ≥ 0.70 is acceptable in the humanities science (Hair, et al., 2010). Table (3-6) shows the results of the reliability of the current study tool.

Table (3-6) shows the reliability values of the main study variables, which amounted to (0.892) for Geographic Information System and (0.797) for Intention to adopt. The Cronbach Alpha indicators above indicate that the study instrument generally has a good reliability and its ability to achieve the study objectives (Hair, et al., 2010).

Table (3-6)
Reliability of Questionnaires Dimensions

No.	Variable	Dimensions	No of items	Cronbach's alpha Value
1	Geographic Information System		13	0.892
	(1-1)	Technology Competence	5	0.777
	(1-2)	Financial Concerns	4	0.721
	(1-3)	Competitive Pressure	4	0.739
2	Intention to adopt		7	0.797

CHAPTER FOUR

Results Presentation and Test Hypotheses

Overview

Results Presentation

Adequacy of the Data to Test Study Hypotheses

Study Hypotheses Test

Overview

This chapter describes the results of the statistical analysis for the data collected according to the research questions and research hypotheses.

Results Presentation

Descriptive Analysis Results for Geographic Information System

Table (4-1) shows Geographic Information System at Jordanian commercial banks in Amman Governorate, means and standard deviations, dimension rank and importance.

Table (4 - 1)

Mean, Standard Deviations, dimension rank and importance of Geographic Information System dimensions

No.	Geographic Information System	Mean	Standard Deviation	Rank	Importance
1	Technology Competence	3.758	0.440	1	High
2	Financial Concerns	3.644	0.488	3	Moderate
3	Competitive Pressure	3.700	0.564	2	High
General Mean and Standard Deviations		3.705	-	-	High

Table (4 - 1) Clarifies the level of interest in geographic information systems by Jordanian commercial banks in Amman Governorate was high. Where the mean for geographic information systems dimension ranges between (3.644 - 3.758) compared with general mean of (3.705). Where the "Technology Competence" came in the first rank with mean (3.758) and Standard deviation (0.440). In the second rank "Competitive Pressure" with mean (3.700) and Standard deviation (0.564). Finally, last third rank "Financial Concerns" with means (3.644) and Standard deviation (0.488).

(1) Technology Competence

To describe the Technology Competence at Jordanian commercial banks in Amman Governorate, means and standard deviations, item rank and important. As shown in Tables (4 - 2).

Table (4 - 2)

Mean, Standard Deviations, items rank and important of Technology Competence

No.	Technology Competence	Mean	Standard Deviation	Rank	Important
1	The Bank's infrastructure supports GIS	3.721	0.590	5	High
2	The Bank's has high Competence for IT planning	3.768	0.582	2	High
3	Bank staffs have good knowledge of GIS	3.768	0.559	2	High
4	The Bank provides GIS training program	3.761	0.573	4	High
5	Bank staffs have the necessary skills to implement GIS	3.774	0.579	1	High
General Mean and Standard Deviations		3.758	-	-	High

Table (4 - 2) shows the technology competence is considered to the important by Jordanian commercial banks in Amman Governorate since its items have high values. Where the mean for Technology Competence items ranges between (3.721 - 3.774) compared with general mean of (3.658). Where the highest mean for the item "Bank staffs have the necessary skills to implement GIS" came first rank with mean (3.774) and Standard deviation (0.579). The lowest mean was for the item "The Bank's infrastructure supports GIS" with mean (3.721) and Standard deviation (0.590). In general, it appears that the interest level of Technology Competence by Jordanian commercial banks in Amman Governorate from the study sample viewpoint was high.

(2) Competitive Pressure

To describe the Competitive Pressure at Jordanian commercial banks in Amman Governorate, means and standard deviations, item rank and important. As shown in Tables (4 - 3).

Table (4 - 3)

Mean, Standard Deviations, items rank and important of Competitive Pressure

No.	Competitive Pressure	Mean	Standard Deviation	Rank	Important
10	GIS contributes in revitalizing the bank's competitive level	3.781	0.540	1	High
11	GIS contributes to reducing the pressure of competitors	3.635	0.743	4	Moderate
12	Our competitors use GIS	3.649	0.722	3	Moderate
13	The Bank's GIS gives preference to competitors	3.735	0.629	2	High
General Mean and Standard Deviations		3.700	-	-	High

Table (4 - 3) shows the competitive pressure is considered to the important by Jordanian commercial banks in Amman Governorate since its items have high values. Where the mean for Competitive Pressure items ranges between (3.635 - 3.781) compared with general mean of (3.700). Where the highest mean for the item "GIS contributes in revitalizing the bank's competitive level" came first rank with mean (3.781) and Standard deviation (0.540). The lowest mean was for the item "GIS contributes to reducing the pressure of competitors" with mean (3.635) and Standard deviation (0.743). In general, it appears that the interest level of Competitive Pressure by Jordanian commercial banks in Amman Governorate from the study sample viewpoint was high.

(3) Financial Concerns

To describe the Financial Concerns at Jordanian commercial banks in Amman Governorate, means and standard deviations, item rank and important. As shown in Tables (4 - 4).

Table (4 - 4)

Mean, Standard Deviations, items rank and important of Financial Concerns

No.	Financial Concerns	Mean	Standard Deviation	Rank	Important
6	The Bank invests in GIS	3.695	0.599	2	High
7	The Bank allocates a budget for the operation of GIS	3.768	0.522	1	High
8	The Bank seeks to maximize the benefits of adopting GIS	3.496	0.681	4	Moderate
9	The Bank seeks to reduce GIS maintenance costs	3.615	0.691	3	Moderate
General Mean and Standard Deviations		3.644	-	-	Moderate

Table (4 - 4) shows the Financial Concerns is considered to the important by Jordanian commercial banks in Amman Governorate since its items have moderate values. Where the mean for Financial Concerns items ranges between (3.496 - 3.768) compared with general mean of (3.644). Where the highest mean for the item "The Bank allocates a budget for the operation of GIS" came first rank with mean (3.768) and Standard deviation (0.522). The lowest mean was for the item "The Bank seeks to maximize the benefits of adopting GIS" with mean (3.496) and Standard deviation (0.681). In general, it appears that the interest level of Financial Concerns by Jordanian commercial banks in Amman Governorate from the study sample viewpoint was moderate.

Descriptive Analysis Results for Intention to Adopt

To describe the Intention to Adopt GIS at Jordanian commercial banks in Amman Governorate, means and standard deviations, item rank and important. As shown in Tables (4 - 5).

Table (4 - 5)

Mean, Standard Deviations, items rank and important of Intention to Adopt GIS

No.	Intention to Adopt	Mean	Standard Deviation	Rank	Important
14	The Bank intends to use GIS	3.715	0.667	1	High
15	The Bank collects information on GIS for use	3.708	0.617	2	High
16	The Bank conducts experimental GIS assessment tests	3.357	0.666	6	Moderate
17	The Bank expects that it will use GIS	3.337	0.710	7	Moderate
18	The Bank interested in alliances with other financial institutions using GIS	3.370	0.606	4	Moderate
19	The Bank's management received various offers for the operation of GIS	3.370	0.606	4	Moderate
20	The Bank seeks to use GIS in the future	3.397	0.600	3	Moderate
General Mean and Standard Deviations		3.465	-	-	Moderate

Table (4 - 5) shows the Intention to Adopt GIS is considered to the important by Jordanian commercial banks in Amman Governorate since its items have moderate values. Where the mean for Intention to Adopt items ranges between (3.337 - 3.715) compared with general mean of (3.465). Where the highest mean for the item "The Bank intends to use GIS" came first rank with mean (3.715) and Standard deviation (0.667). The lowest mean was for the item "The Bank expects that it will use GIS" With mean (3.337) and Standard deviation (0.710). In general, it appears that the interest level of Intention to Adopt by Jordanian commercial banks in Amman Governorate from the study sample viewpoint was moderate.

Adequacy of the Data to Test Study Hypotheses

Before testing the hypotheses of the study, the researcher conducted some tests in order to ensure the adequacy of the data for the assumptions regression analysis, it was confirmed that there is no high correlation between the independent variables. Multicollinearity using the Variance Inflation Factor (VIF) and test Tolerance for each variable of the study variables taking into account the Variance Inflation Factor not to exceed the allowable value (10). As well as, the Tolerance value greater than (0.05).

Were also ensure that the data follow the normal distribution calculates the skewness coefficient, as the data follow a normal distribution if the value of skewness coefficient is between (± 1). Table (4 - 6) shows the results of these tests.

Table (4 - 6)

Results of Variance Inflation Factor, Tolerance and skewness coefficient

No.	Independent Variables	VIF	Tolerance	Skewness
1	Technology Competence	2.323	0.431	- 0.421
2	Financial Concerns	1.931	0.518	- 0.379
3	Competitive Pressure	2.450	0.408	- 0.441

Evident from the results listed in Table (4 - 6) there is no multicollinearity between the independent variables, confirms that the values of Variance Inflation Factor of the dimensions are (2.323 ; 1.931 ; 2.450) , respectively, less than (10). As can be seen that the values of Tolerance are between (0.408 – 0.518) which is greater than (0.05). This is an indication that there is no Multicollinearity between the independent variables.

While to make sure that the data follow a normal distribution the researcher calculates the Skewness coefficient where the values were between (± 1).

Study Hypotheses Test

To test study hypotheses, the researcher used the multiple and simple regression analysis. The researcher formulates the main hypothesis as follows:

HO: There is no statistically significant impact of GIS determinants (Technology competence, Financial Concerns, and Competitive Pressure) on Intention to adopt GIS at level of ($\alpha \leq 0.05$).

Table (4 - 7)

Multiple regression analysis to ensure the impact GIS determinants (Technology competence, Financial Concerns, and Competitive Pressure) on Intention to adopt

Dependent Variable	Model Summary			ANOVA			Coefficients			
	(R)	(R ²)	Adjusted (R ²)	F Calculate	DF	Sig*	β	T Calculate	Sig*	
Intention to adopt	0.690	0.476	0.466	44.553	3	0.000	Technology competence	0.720	7.707	0.000
					147		Financial Concerns	0.346	5.083	0.003
					150		Competitive Pressure	0.548	6.040	0.000

Table (4 - 7) shows the impact of GIS determinants (Technology competence, Financial Concerns, and Competitive Pressure) on Intention to adopt GIS by Jordanian commercial banks in Amman Governorate. The regression model achieve a high degree of fit, as reflected by “R” and “R²” value (0.690) , (0.476), which asserted that (0.476) of the explained variation in Intention to adopt at Jordanian commercial banks in Amman Governorate can be accounted for GIS determinants (Technology competence, Financial Concerns, and Competitive Pressure). This was reflected by the net level of attention to GIS determinants after eliminating the standard errors resulting from the Intention to adopt at Jordanian commercial banks in Amman Governorate under study by the value of Adjusted R² (0.466). On the other hand, Table (4 - 7) for the executive data set indicated

the slope value of (0.720) ; (0.346) and (0.548) for the regression line. This suggested that for a one unit increase in GIS determinants (Technology competence, Financial Concerns, and Competitive Pressure) can significantly predict a (0.720) ; (0.346) and (0.548) increase in Intention to adopt at Jordanian commercial banks in Amman Governorate. As well as Table (R²) shows that the analysis of variance of the fitted regression equation is significant with F value of (44.553). This is an indication that the model is a good one. Since the p-value is less than (0.05), it shows a statistically significant relationship between the variables at (0.95) confidence level. The results also indicate that GIS determinants (Technology competence, Financial Concerns, and Competitive Pressure) has an impact on Intention to adopt at Jordanian commercial banks in Amman Governorate with a coefficient of (0.720) ; (0.346) and (0.548). Thus, GIS determinants (Technology competence, Financial Concerns, and Competitive Pressure) actually impact on Intention to adopt at Jordanian commercial banks in Amman Governorate. This further supported the main hypothesis:

There is statistically significant impact of GIS determinants (Technology competence, Financial Concerns, and Competitive Pressure) on Intention to adopt at Jordanian commercial banks in Amman Governorate at level of ($\alpha \leq 0.05$).

To investigate the impact of each GIS determinant on Intention to adopt at Jordanian commercial banks in Amman Governorate, the main hypothesis is divided into three sub-hypotheses, as follows:

H₀₁: There is no statistically significant impact of Technology competence on Intention to adopt GIS at the level of ($\alpha \leq 0.05$).

The results in table (4 - 8) showed that the value of the correlation (R) between Technology competence and Intention to adopt GIS by Jordanian commercial banks in Amman Governorate reached (0.465) at level ($\alpha \leq 0.05$). While it was found that the amount contribution of the Technology competence on Intention to adopt GIS at Jordanian commercial banks in Amman Governorate (0.217) (R²), which indicates that (21.7%) of

the changes in Intention to adopt GIS at Jordanian commercial banks in Amman Governorate result from a change in the level of interest in Technology competence. It was also found that the Adjusted R^2 coefficient reached (0.211), which reflects the net level of interest in Technology competence after eliminating the values of standard errors resulting from Intention to adopt GIS at Jordanian commercial banks in Amman Governorate.

Table (4 - 8)

Simple regression analysis to ensure the impact Technology competence on Intention to adopt

Dependent Variable	Model Summary		
	(R)	(R ²)	Adjusted (R ²)
Intention to adopt	0.465	0.217	0.211

To confirm the significance effect of Technology competence on Intention to adopt, the calculated (F) value for the effect model as a whole reached (41.207) and its significant at level ($\alpha \leq 0.05$) as shown in table (4 - 9).

Table (4 - 9)

Analysis of variance to ensure the impact Technology competence on Intention to adopt

Model	Sum of Squares	DF	Mean Square	F	Sig*
Regression	5.840	1	5.840	41.207	0.000
Residual	21.117	149	0.142		
Total	26.958	150			

The results also showed that the Standardized coefficient (β) value of the Technology competence effect on Intention to adopt was (0.465), and it's significant at level ($\alpha \leq 0.05$) with a calculated value (T) (6.419) as shown in table (4 - 10).

Table (4 - 10)

Coefficients value to ensure the impact Technology competence on Intention to adopt

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig*
	B	Std. Error			
Constant	1.780	0.264		6.738	0.000
Technology competence	0.448	0.070	0.465	6.419	0.000

This means that a one degree increase in the level of interest in Technology competence will result in an increase in Intention to adopt of (0.465). This confirms that the first sub-hypothesis is rejecting. As well as, accepts the alternative hypothesis which states:

There is statistically significant impact of Technology competence on Intention to adopt at Jordanian commercial banks in Amman Governorate at a level of ($\alpha \leq 0.05$).

H₀₂: There is no statistically significant impact of Financial Concerns on Intention to adopt GIS at the level of ($\alpha \leq 0.05$).

The results in table (4 - 11) showed that the value of the correlation (R) between Financial Concerns and Intention to adopt GIS by Jordanian commercial banks in Amman Governorate reached (0.464) at level ($\alpha \leq 0.05$). While it was found that the amount contribution of the Financial Concerns on Intention to adopt GIS at Jordanian commercial banks in Amman Governorate (0.215) (R^2), which indicates that (21.5%) of the changes in Intention to adopt GIS at Jordanian commercial banks in Amman Governorate result from a change in the level of interest in Financial Concerns. It was also found that the Adjusted R^2 coefficient reached (0.210), which reflects the net level of interest in Financial Concerns after eliminating the values of standard errors resulting from Intention to adopt GIS at Jordanian commercial banks in Amman Governorate.

Table (4 - 11)

Simple regression analysis to ensure the impact Financial Concerns on Intention to adopt

Dependent Variable	Model Summary		
	(R)	(R ²)	Adjusted (R ²)
Intention to adopt	0.464	0.215	0.210

To confirm the significance effect of Financial Concerns on Intention to adopt, the calculated (F) value for the effect model as a whole reached (40.854) and its significant at level ($\alpha \leq 0.05$) as shown in table (4 - 12).

Table (4 - 12)

Analysis of variance to ensure the impact Financial Concerns on Intention to adopt

Model	Sum of Squares	DF	Mean Square	F	Sig*
Regression	5.801	1	5.801	40.854	0.000
Residual	21.157	149	0.142		
Total	26.958	150			

The results also showed that the Standardized coefficient (β) value of the Financial Concerns effect on Intention to adopt was (0.464), and it's significant at level ($\alpha \leq 0.05$) with a calculated value (T) (6.392) as shown in table (4 - 13).

Table (4 - 13)

Coefficients value to ensure the impact Financial Concerns on Intention to adopt

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig*
	B	Std. Error			
Constant	1.999	0.232		8.633	0.000
Financial Concerns	0.403	0.063	0.464	6.392	0.000

This means that a one degree increase in the level of interest in Financial Concerns will result in an increase in Intention to adopt of (0.464). This confirms that the second sub-hypothesis is rejecting. As well as, accepts the alternative hypothesis which states:

There is statistically significant impact of Financial Concerns on Intention to adopt at Jordanian commercial banks in Amman Governorate at a level of ($\alpha \leq 0.05$).

H₀₃: There is no statistically significant impact of Competitive Pressure on Intention to adopt GIS at the level of ($\alpha \leq 0.05$).

The results in table (4 - 14) showed that the value of the correlation (R) between Competitive Pressure and Intention to adopt GIS by Jordanian commercial banks in Amman Governorate reached (0.688) at level ($\alpha \leq 0.05$). While it was found that the amount contribution of the Competitive Pressure on Intention to adopt GIS at Jordanian commercial banks in Amman Governorate (0.473) (R^2), which indicates that (47.3%) of the changes in Intention to adopt GIS at Jordanian commercial banks in Amman Governorate result from a change in the level of interest in Competitive Pressure. It was also found that the Adjusted R^2 coefficient reached (0.469), which reflects the net level of interest in Competitive Pressure after eliminating the values of standard errors resulting from Intention to adopt GIS at Jordanian commercial banks in Amman Governorate.

Table (4 - 14)

Sample regression analysis to ensure the impact Competitive Pressure on Intention to adopt

Dependent Variable	Model Summary		
	(R)	(R^2)	Adjusted (R^2)
Intention to adopt	0.688	0.473	0.469

To confirm the significance effect of Competitive Pressure on Intention to adopt, the calculated (F) value for the effect model as a whole reached (133.606) and its significant at level ($\alpha \leq 0.05$) as shown in table (4 - 15).

Table (4 - 15)

Analysis of variance to ensure the impact Competitive Pressure on Intention to adopt

Model	Sum of Squares	DF	Mean Square	F	Sig*
Regression	12.745	1	12.745	133.606	0.000
Residual	14.213	149	0.095		
Total	26.958	150			

The results also showed that the Standardized coefficient (β) value of the Competitive Pressure effect on Intention to adopt was (0.688), and it's significant at level ($\alpha \leq 0.05$) with a calculated value (T) (11.559) as shown in table (4 - 16).

Table (4 - 16)

Coefficients value to ensure the impact Competitive Pressure on Intention to adopt

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig*
	B	Std. Error			
Constant	1.554	0.167		9.289	0.000
Competitive Pressure	0.517	0.045	0.688	11.559	0.000

This means that a one degree increase in the level of interest in Competitive Pressure will result in an increase in Intention to adopt of (0.688). This confirms that the third sub-hypothesis is rejecting. As well as, accepts the alternative hypothesis which states:

There is statistically significant impact of Competitive Pressure on Intention to adopt at Jordanian commercial banks in Amman Governorate at a level of ($\alpha \leq 0.05$).

CHAPTER FIVE

Results Discussion and Recommendations

Overview

Results Discussion

Recommendations and Future Studies

Overview

In the light of the statistical analysis results, the researcher presents the results that were reached, as well as, according to results a set of recommendations and Suggestions were presented.

Results Discussion

1. The level of interest in geographic information systems by Jordanian commercial banks in Amman Governorate was high. In details, the Technology Competence came first with interest level high, as well as, the Competitive Pressure came second with interest level high. Finally, the Financial Concerns came third with interest level moderate.
2. The level of interest in Intention to Adopt by Jordanian commercial banks in Amman Governorate was moderate.
3. There is statistically significant impact of GIS determinants (Technology competence, Financial Concerns, and Competitive Pressure) on Intention to adopt at Jordanian commercial banks in Amman Governorate at a level ($\alpha \leq 0.05$).

This result consists with the AL-Zyood (2018) results that indicate per taining to the optimal location of ATMs helped to reach the conclusion that there is a univresal consensus among empirial studies that banks can benefit the great commercial advantages from the use of modern information system such as Geographic information system, allowing them to improve quality of services provided to customers as well as improving their competitive position

4. There is statistically significant impact of Technology competence on Intention to adopt at Jordanian commercial banks in Amman Governorate at a level ($\alpha \leq 0.05$).

This result consists with the Vicente et al. (2017) results that indicate A GIS allows the optimal control of market demand coverage through the collaborative strategies of the supplying retailers, in this case, car dealerships

5. There is statistically significant impact of Financial Concerns on Intention to adopt at Jordanian commercial banks in Amman Governorate at a level ($\alpha \leq 0.05$).

This result consists with the Ramadani et al. (2018) results that indicate the influence of Geo-marketing on business development for a majority of companies is positive.

6. There is statistically significant impact of Competitive Pressure on Intention to adopt at Jordanian commercial banks in Amman Governorate at a level ($\alpha \leq 0.05$).

Recommendations and Future Studies

1. Providing an effective work environment in Jordanian commercial banks focusing on information technology, especially geographic information systems, with a view to achieving competitive advantages in the long term, by concluding agreements with international banks in order to share knowledge and develop expertise regard to geographic information systems.

2. Pay more attention from Jordanian commercial banks to geographic information systems for their role in reducing the competitor's pressure, through the use of expert homes in geographic information systems.

3. Jordanian commercial banks should make more use of geographic information systems as they work to minimize costs on one hand, on the other hand to help them make decisions through making alliances with institutions that use geographic information systems.

4. Jordanian commercial banks should take advantage of their resources to use geographic information systems by working to balance between the availability of their resources and contemporary uses of this type of system to achieve their goals.

5. Conduct a future study that illustrates the role of application of geographic information systems determinants in reducing the impact of competitive pressures from other commercial banks.
6. Conduct a future study under title analyzing the role of GIS in achieving sphere of influence.
7. Conduct a future study titled the interactive effect of the relationship between information technology capabilities and GIS in achieving competitive advantage.

References

1. Aboelmaged, M. (2014). Predicting e-readiness at firm-level: An analysis of technological, organizational and environmental (TOE) effects on e-maintenance readiness in manufacturing firms. *International Journal of Information Management*, 34 (5), 639-651.
2. Adilson, Y and Alberto A. (2018). Effects of strategic information systems on competitive strategy and performance. *International Journal of Productivity and Performance Management*, 67 (9), 2018-2045.
3. Al Nahar, D. (2019). *The Impact of Internet of Things (IoT) on Financial Services Quality: Field Study in Jordanian Commercial Banks*. Amman: Faculty of Business Middle East University.
4. AL-Adwan, M. M. (2016, June). Management Information Systems & Their Impact on Improving the Quality of Service at the Commercial Bank Customers. *International Journal of Business and Social Science*, 7(6), 56-74.
5. Al-Fayoumi, N& Abuzayed, M. (2009). Assessment of the Jordanian banking sector within the context of GATS agreement. "Banks and Bank Systems, 69-79.
6. Alkhaffaf, H., Idris, K., Abdullah, A., & AlAidaros, A. (2018). The Influence of Technology Readiness on Information Technology Competencies and Civil Conflict Environment. *Indian-Pacific Journal of Accounting and Finance*, 2 (2), 51-64.
7. Al-Kodmany, K. (2012). Utilizing GIS in Nonprofit Organizations for Urban Planning Applications: Experiences from the Field . *Journal of Geographic Information System*, 4 (4), 279-297.
8. Alzighaibi, A; Mohammadian, M & Talukder, M. (2016). Journal of Geographic Information System Systems in the Public Sector in Saudi Arabia and Their Impact on Organizational Performance. *Journal of Geographic Information System*, 8, 396-411.
9. Al-Zyood, M. (2018, January). The Impact of using GIS on the Selection of ATM Sites and Their Effect on Profitability. *International Journal of Soft Computing and Engineering*, 7(6), 1-4.

10. Arvidsson, V; Holmstrom, J and Lyytinen, K. (2014). Information systems use as strategy practice: A multi-dimensional view of strategic information system implementation and use. *Journal of Strategic Information Systems*, 23 (1), 45-61.
11. Azaz, L. (2011). The use of Geographic Information Systems (GIS) in Business. *International Conference on Humanities* (pp. 299-303). Pattaya: Geography and Economics.
12. Bassellier, G; Reich, B. & Benbasat, I. (2001, march). Information Technology Competence of Business Managers: A Definition and Research Model. *Management Information Systems*, 17(4), 159-182.
13. Bourdeau, S; Hadaya, P & Lussier, J. (2018). Assessing the Strategic Alignment of Information Systems Projects: A Design Science Approach. *Projectics*, 20 (2), 115-154.
14. Bradley, S. & Nolan, L. (1998). *Sense and Respond: Capturing Value in the Network Era*. Boston: Harvard Business School Press.
15. Burton-Jones, A & Hubona, S. (2006, September). The mediation of external variables in the technology acceptance model. *Information & Management*, 43 (6), 706-717.
16. Cavallone, M; Magno, F & Zucchi, A. (2017). Improving service quality in healthcare organisations through geomarketing statistical tools. *The TQM Journal*, 29(5), 690-704.
17. Chursin, A., Shamin, R., & Fedorova, L. (2017). The Mathematical Model of the Law on the Correlation of Unique Competencies with the Emergence of New Consumer Markets. *European Research Studies Journal*, xx (3A), 39-56.
18. Chursin, A., Strenalyuk, V., & Agaptsov, S. (2019). Study of the Impact of Unique Technological Competencies on the Economic Growth of Large Enterprises and High-tech Industries. *IOP Conf. Series: Materials Science and Engineering* 476 (2019) 012004, 1 – 7.
19. Cristea, M and Gheorghiu, A. (2016). Attitude, perceived behavioral control, and intention to adopt risky behaviors. *Transportation Research Part F: Psychology and Behaviour*, 43, 157-165
20. D'Aveni, R. (2001). *Strategic Supremacy: How Industry Leaders Create Growth, Wealth, and Power Through Spheres of Influence*. Free Press: A Division of Simon & Schuster, Inc.

21. Dueker, K. (1979). Land Resource Information Systems: A Review of Fifteen Years Experience. *Geoprocessing*, pp. 105-128.
22. FU, Y. (2007). *Managing Customer Services Using GIS in Banks: A case Study in Chinese Competitive Enviroment*. China: Linköping University.
23. Garza, K. (2018). How do we close the intention–behavior gap?. *Journal of American Pharmacists Association*, 58 (3), 240–241
24. Gordon, K. M. (2017). *Business Site Selection, Location Analysis, and GIS*, 17.
25. Ibrahim, A and Naem, A. (2019). The Impact of Strategic Information System and Strategic Design on Organization's Competitiveness: A Field Study. 18 (1), 1 – 12.
26. Kabra, G; Ramesh, A; Akhtar, P and Dash, M. (2017). Understanding behavioural intention to use information technology: insights from humanitarian practitioners. *Telematics Inform.* 34, 1250–1261.
27. Kashirin, A., Semenov, A., Ostrovskaya, A., Kokuytseva, T., & Strenaluk, V. (2016). The Modern Approach to Competence Management and Unique Technological Competences. *Quality – access to success*, 17 (154), 105 - 109.
28. Makki, F. (2012). *Geographical Information Systems in Analysis and Enhancement for Problems Solving and Decision Making*. Amman: Middle East University.
29. Manda, N; Célio, S; Fernanda, B and Natan, S. (2014). Knowledge Acquisition Based on Geomarketing Information for Decision Making: A Case Study on a Food Company. *International Journal of Innovation, Management and Technology*, 5 (6), 422-427.
30. Martin, D. (1996). *Geographic Information Systems: Socioeconomic Applications*. New York: ROUTLEDGE.
31. Nelson et al. (2017). Determinants of Geographic Information Technologies Intention and Adoption and Mozambique Institutions' Perspectives. *Research Journal of Information Technology*, 9 (2), 64-73.
32. Nikoloski, K. (2014). The Role of Information Technology in the Business Sector. *International Journal of Science and Research*, 3 (12), 303-309.
33. Noorsazwan et al. (2016, March). Approach, Determination of New Bank Branch Location Using GIS. Singapore: Regional Conference on Science, Technology.

34. Oliveira, T., & Martins, M. F. (2011). Literature Review of Information Technology Adoption Models at Firm Level. *Electronic Journal Information Systems Evaluation*, 14 (1), 110-121.
35. Pandey, D; Shukla, K & Shukla, A. (2013). GIS: Scope and Benefits. ResearchGate, 60-65.
36. Pedro et al. (2014). Examine ERP post-implementation stages of use and value: Empirical evidence from Portuguese SMEs. *International Journal of Accounting*, 15 (2), 168-184.
37. Ramadani, V; Zendeli, D., Gerguri-Rashiti, S & Dana, L.-P. (2018). Impact of geomarketing and location determinants on business development and decision making. *Competitiveness Review*, 28(1), 98-120.
38. Rodríguez, V; Olarte-Pascual, C and Saco, M. (2017). Application of geographical information systems for the optimal location of a commercial network. *European Journal of Management and Business Economics*. 26 (2), 220-237.
39. Roy, S. (2017). App adoption and switching behavior: applying the extended tam in smartphone app usage. *Journal of Information Systems and Technology Management*, 14(2), 239-261.
40. Schwertner, K. (2017). Analysis and Visualization of Marketing, Statistical and Macroeconomic Data With GIS. *Economics World*, 389-398.
41. Thomas, T & Espadanal, M. (2014). Assessing the determinants of cloud computing adoption: An analysis of the manufacturing and services sectors. *Information Management*, 51 (5), 1-38.
42. UPADHYAY, A. (2019). GIS MAP corporation. Retrieved 12 17, 2019, from GIS MAP.com: <https://www.igismap.com/gis-in-banking-sector/>
43. Vasiljevic, M; Ng, L; Griffin, S; Sutton, S & Marteau, M. (2016). Is the intention-behaviour gap greater amongst the more deprived? A meta-analysis of five studies on physical activity, diet, and medication adherence in smoking cessation. *British journal of health psychology*, 21(1), 11–30.
44. Venkatesh, V & Davis, D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, 46 (2), 186-204.

45. Verschuren, M. (2006). *GEOMARKETING GIS & Marketing, New Combination of Knowledge*. Wageningen: Wageningen University and Research Centre.
46. Vicente et al. (2017). Application of geographical information systems for the optimal location of a commercial network. *European Journal of Management and Business Economics*, 26 (2), 220-236.
47. Vives, X. (2008). Innovation and Competitive Pressure. *The Journal of Industrial Economics*, 56 (3), 419 – 469.
48. Y-M Wang et al. (2010). Understanding the determinants of RFID adoption in the manufacturing industry. *Technological Forecasting & Social Change*, pp. 804-814.
49. Yoshikuni, A; Favaretto, R; Albertin, L & Meirelles, F. (2018). The Influences of Strategic Information Systems on the Relationship between Innovation and Organizational Performance. *Brazilian Business Review*, 15(5), 444-459

APPENDICES

- (1): Names of arbitrators
- (2): Persons Interviewed Names
- (3): Interview Question
- (4): Questionnaire

Appendix (1)
Names of arbitrators

No.	Name	Specialization	University
1	Prof. Ahmad Ali Saleh	Business Administration	MEU
2	Dr. Amjad Tawiqat	Business Administration	MEU
3	Dr. Sameer AL-Jabali	Marketing	MEU
4	Dr. Mohammad Al-Adayleh	Business Administration	MEU
5	Dr. Abdullah Al-Bataineh	Marketing	MEU
6	Dr. Husam Kokash	Marketing	AAU
7	Dr. Muad Barhoum	Manager, Central financial service	Jordan Commercial Bank
8	Ameed Al-Batran	Manager, Central Operations Department	Jordan Commercial Bank

Appendix (2)
Persons Interviewed Names

No.	Name	Job	Bank	Interview data
1	Ameed Al-Batran	Manager, Central Operations Department	Jordan Commercial Bank	18/08/2019
2	Amer Abu Laila	IT Manager	Bank al Etihad	20/08/2019
3	<u>Eyas Khawaja</u>	Chief Operating Officer	Capital Bank	25/08/2019
4	Rami AL-Karmi	Development and creative manager	Jordan Ahli Bank	28/08/2019

Appendix (3)
Interview Question

1. What a reality of using the geographic information system in Jordanian commercial banks?

2. What are the potential impact of GIS determinants on Intention to adopt GIS?

Appendix (4) Questionnaire

The Research Questionnaire

استبانة بحث ميداني

Mr / Ms Greetings

The researcher aims to carry out a study entitled "Attitudes of Jordan Commercial Banks Managers towards Dealing with Determinants of Geographic Information System and their Impact in Adopting". Where the study mainly aims to identify the Attitudes of Jordan Commercial Banks Managers towards Dealing with Determinants of Geographic Information System and their Impact in Adopting. I am currently enrolled in the master Business Administration program at the Middle East University, and I am in the process of writing my Master's Thesis. Your participation in this research project is completely voluntary. Your responses will remain confidential and anonymous. If you agree to participate in this project, please answer the questions on the questionnaire as best you can.

يهدف الباحث القيام بدراسة بعنوان "إتجاهات مديري البنوك التجارية الأردنية نحو التعامل مع محددات نظام المعلومات الجغرافية واثرها في تبنيه". حيث تهدف الدراسة إلى بيان إتجاهات مديري البنوك التجارية الأردنية نحو التعامل مع محددات نظام المعلومات الجغرافية واثرها في تبنيه. وحالياً فإنني طالب مسجل في برنامج الماجستير في إدارة الأعمال بجامعة الشرق الأوسط، وأنا بصدد كتابة رسالة الماجستير. إن مشاركتكم في مشروع الدراسة الحالية هو طوعي تماماً. علماً بأن استجاباتكم ستعامل بسرية تامة. إن لم يكن لديك أي مانع للمشاركة في تحقيق أهداف الدراسة الحالية، فإنني أتوجه لكم راجية الإجابة عن كافة الاسئلة في الإستبانة بأفضل ما لديك.

Researcher

Ramez Shaher Khreis

Supervisor

Dr. Ahmad AL- Sukkar

Section One: Personal and Occupational characteristics

(1) Gender	(1) الجنس
<input type="checkbox"/> Female	<input type="checkbox"/> Male
أنثى	ذكر
(2) Age	(2) العمر
<input type="checkbox"/> From 31 – 35 Years	<input type="checkbox"/> Less than 31 Years
من 31 – 35 سنة	أقل من 31 سنة
<input type="checkbox"/> 41 Years and above	<input type="checkbox"/> From 36 – 40
41 سنة فأكثر	من 36 – 40 سنة
(3) Qualification	(3) المؤهل العلمي
<input type="checkbox"/> Master	<input type="checkbox"/> Bachelors
ماجستير	بكالوريوس
	<input type="checkbox"/> Doctorate
	دكتوراه
(4) Years of Experience	(4) عدد سنوات الخبرة
<input type="checkbox"/> From 6 – 10 Years	<input type="checkbox"/> 5 Years or less
من 6 – 10 سنة	5 سنوات فأقل
<input type="checkbox"/> 16 Years and above	<input type="checkbox"/> From 11 – 15 Years
16 سنة فأكثر	من 11 – 15 سنة
(5) Job Position	(5) المنصب الوظيفي
<input type="checkbox"/> Deputy Manager	<input type="checkbox"/> Chief Executive Officer
نائب مدير عام	رئيس تنفيذي
<input type="checkbox"/> Division Manager	<input type="checkbox"/> Asst. General Manager
مدير قطاع	مساعد مدير عام
<input type="checkbox"/> Department Manager	
مدير دائرة	

Section Two: Please state your opinion on the following items to determine the extent of agreement on what is contained in each of the item in **Geographic Information System**.

No	Item	Answer alternatives بدائل الإجابة					الفقرة	ت
		Strongly disagree	Disagree	Neutral	Agree	Strongly Agree		
		لا أوافق بشدة	لا أوافق	محايد	أوافق	أوافق بشدة		
الكفاية التكنولوجية								
Technology Competence								
1	The Bank's infrastructure supports GIS						تدعم البنية التحتية للبنك لنظم المعلومات الجغرافية	1
2	The Bank's has high Competence for IT planning						يمتلك البنك كفاية عالية لتخطيط تكنولوجيا المعلومات	2
3	Bank staffs have a good knowledge of GIS						يمتلك موظفي البنك معرفة جيدة بنظم المعلومات الجغرافية	3
4	The Bank provides a GIS training program						يوفر البنك برنامج تدريبي لنظم المعلومات الجغرافية	4
5	Bank staffs have the necessary skills to implement GIS						يمتلك موظفي البنك المهارات اللازمة لتطبيق نظم المعلومات الجغرافية	5
الإهتمامات المالية								
Financial Concerns								
6	The Bank invests in GIS						يستثمر البنك في نظم المعلومات الجغرافية	6
7	The Bank allocates a budget for the operation of GIS						يخصص البنك ميزانية لتشغيل نظم المعلومات الجغرافية	7
8	The Bank seeks to maximize the benefits of adopting GIS						يسعى البنك إلى تعظيم فوائد تبني نظم المعلومات الجغرافية	8
9	The Bank seeks to reduce GIS maintenance costs						يسعى البنك إلى تخفيض تكاليف صيانة نظم المعلومات الجغرافية	9
الضغط التنافسي								
Competitive Pressure								
10	GIS contributes in revitalizing the bank's competitive level						تساهم نظم المعلومات الجغرافية في تنشيط مستوى تنافسية البنك	10
11	GIS contributes to reducing the pressure of competitors						تساهم نظم المعلومات الجغرافية بتدنية ضغوطات المنافسين	11
12	Our competitors use GIS						يستخدم منافسينا نظم المعلومات الجغرافية	12
13	The Bank's GIS gives preference to competitors						تقدم نظم المعلومات الجغرافية للبنك أفضلية على المنافسين	13

Section Three: Please state your opinion on the following items to determine the extent of agreement on what is contained in each of the item in **Intention to Adopt**.

No	Item	Answer alternatives بدائل الإجابة					الفقرة	ت
		Strongly disagree	Disagree	Neutral	Agree	Strongly Agree		
		لا أوافق بشدة	لا أوافق	محايد	أوافق	أوافق بشدة		
14	The Bank intends to use GIS						يعتزم البنك استخدام نظم المعلومات الجغرافية	14
15	The Bank collects information on GIS for use						يقوم البنك بجمع معلومات حول نظم المعلومات الجغرافية بقصد استخدامها	15
16	The Bank conducts experimental GIS assessment tests						يقوم البنك بإجراء إختبارات تجريبية لتقييم نظم المعلومات الجغرافية	16
17	The Bank expects that it will use GIS						يتوقع البنك أنه سيستخدم نظم المعلومات الجغرافية	17
18	The Bank interested in alliances with other financial institutions using GIS						يهتم البنك بإجراء تحالفات مع مؤسسات مالية أخرى تستخدم نظم المعلومات الجغرافية	18
19	The Bank's management received various offers for the operation of GIS						تلقت إدارة البنك عروضاً مختلفة لتشغيل نظم المعلومات الجغرافية	19
20	The Bank seeks to use GIS in the future						يسعى البنك لإستخدام نظم المعلومات الجغرافية في المستقبل	20