

إقرار

أنا الموقع أدناه مقدم الرسالة التي تحمل العنوان:

The Role of Implementing Business Intelligence Dashboard Features in Decision Making: An Empirical Study at Paltel Company

أقر بأن ما اشتملت عليه هذه الرسالة إنما هو نتاج جهدي الخاص، باستثناء ما تمت الإشارة إليه
حيثما ورد، وإن هذه الرسالة ككل أو أي جزء منها لم يقدم من قبل لنيل درجة أو لقب علمي أو
بحثي لدى أي مؤسسة تعليمية أو بحثية أخرى.

DECLARATION

The work provided in this thesis, unless otherwise referenced, is the
researcher's own work, and has not been submitted elsewhere for any
other degree or qualification

Student's name:

اسم الطالب/ة: محمد ناجي الهندي

Signature:

التوقيع: 

Date:

التاريخ: 2016 / 01 / 31

The Islamic University Of Gaza
Deans of Graduates Studies
Faculty of Commerce
Business Administration



**The Role of Implementing Business Intelligence
Dashboard Features in Decision Making:
An Empirical Study at Paltel Company**

**دور تطبيق خصائص لوحة معلومات ذكاء الأعمال في اتخاذ القرارات:
دراسة تطبيقية على شركة الإتصالات الفلسطينية "بالتل"**

Prepared by:

Mohammed Nagi Alhendi

Supervised by:

Dr. Khalid Abed Dahleez

A Thesis Submitted in Partial Fulfillment of the requirement for the Degree
of Master of Business Administration

2016AD - 1437H



نتيجة الحكم على أطروحة ماجستير

بناءً على موافقة شئون البحث العلمي والدراسات العليا بالجامعة الإسلامية بغزة على تشكيل لجنة الحكم على أطروحة الباحث/ محمد ناجي خميس الهندي لنيل درجة الماجستير في كلية التجارة/ قسم إدارة الأعمال وموضوعها:

دور تطبيق خصائص لوحة معلومات ذكاء الأعمال في اتخاذ القرارات: دراسة تطبيقية على شركة الاتصالات الفلسطينية "بالتل"

The Role of Implementing Business Intelligence Dashboard Features in Decision Making: An Empirical Study at Paltel Company

وبعد المناقشة العلنية التي تمت اليوم الثلاثاء 16 ربيع الآخر 1437 هـ، الموافق 2016/01/26م الساعة الواحدة والنصف ظهراً بمبنى طيبة، اجتمعت لجنة الحكم على الأطروحة والمكونة من:

د. خالد عبد دهليز مشرفاً و رئيساً
أ.د. يوسف حسين عاشور مناقشاً داخلياً
د. سناء وفا الصايغ مناقشاً خارجياً

وبعد المداولة أوصت اللجنة بمنح الباحث درجة الماجستير في كلية التجارة/ قسم إدارة الأعمال.

واللجنة إذ تمنحه هذه الدرجة فإنها توصيه بتقوى الله و لزوم طاعته وأن يسخر علمه في خدمة دينه ووطنه.

والله ولي التوفيق ،،،

نائب الرئيس لشئون البحث العلمي والدراسات العليا

أ.د. عبدالرؤف علي المناعمة

Dedication

I dedicate this work...

To my Beloved Parents,

To my Loving Wife,

To my Brother and Sisters,

To my parents in law,

To my Family,

To all my Friends,

To my Respectful University...

Researcher

Mohammed N. Alhendi

Acknowledgement

By the Name of Allah, the Most Gracious and the Most Merciful

First, I would like to express my appreciation to Allah, the Most Gracious and the Most Merciful, and the Most Compassionate who has granted me the ability and willing to start and complete this dissertation.

My most profound thankfulness goes to my supervisor Assistant Prof. Dr. Khalid Dahleez, for his constant support, guidance, and knowledge as well as his unending patience. I am gratefully and deeply thank him for his support and cooperation as being equipped to provide his best help. Without such kind of support and supervision the emergence of this dissertation would have been next to impossible.

My sincere appreciation to Prof. Dr. Yousef Ashour and Dr. Sanaa El Sayegh who accepted to examine the research. My thanks also go to all the lecturers who helped me to collect my data during their classes. "May Allah bless all of them".

Special thanks to those noble people who helped me during data collection stage and validation stage. My demonstrative appreciations are to all my friends, my job colleagues and everyone who put the hand either directly or indirectly to complete this dissertation.

Last and least, I wish to thank all my dearest family member, especially my parents, my lovely brothers and sisters. The deepest appreciation is expressed to my wife, for her silent sacrifice and endless support throughout this long journey as a graduate student.

Abstract

Efficient internal processes contribute much towards the growth and success of any organization. As the growing of organizations, the amount of data required becomes massive. Collecting and analyzing vast amount of data can be a tedious process. Lack of availability of data in the right form at the right time can result in a delay in a decision that may need to be made related to that data.

This research aimed to explore the extent of implementing BI Dashboard features related to the information systems of Palestinian Communication Company and to make the possibility of implementing system in the future. BI Dashboard is a software tool that display graphical reports and information by linking the system with the company databases.

The descriptive analytical approach was followed in conducting the research, and a questionnaire was designed as basic tool for data collection. The research population was composed of Paltel employees using Information Systems of the company in Gaza strip. 108 of the 120 distributed questionnaires have been retrieved, forming a recovery percentage of 90%.

The findings of this research show that the BI Dashboard features are available relatively in Paltel Information systems and Paltel is ready of implementing the system at the company. Also the finding show that Paltel employees need for the features of the system and it is beneficial on the decision making process for all departments and hierarchal levels.

They research recommends that Paltel can invest to develop the system to be integrated in a solution to the existing information systems and customize it for all different employees' tasks to benefit from it.

Abstract in Arabic

ملخص الرسالة

تساهم العمليات الداخلية ذات الكفاءة بشكل كبير نحو نمو ونجاح أي منظمة . ومع نمو المنظمات فإن كمية البيانات المطلوبة تصبح كبيرة جداً، وبالتالي فإن جمع وتحليل كميات ضخمة من البيانات تكون عملية شاقة. كما أنّ عدم توفر البيانات بالشكل والوقت المناسبين يمكن أن يؤدي إلى تأخير في القرارات التي قد تكون متعلقة بتلك البيانات.

تهدف الدراسة إلى استكشاف مدى تطبيق مميزات لوحة معلومات ذكاء الأعمال في أنظمة المعلومات الخاصة بشركة الإتصالات الفلسطينية "بالتل" وإمكانية تطبيق النظام في المستقبل، حيث تعتبر لوحة معلومات ذكاء الأعمال أداة تقوم بعرض التقارير الرسومية والمعلومات من خلال ربط النظام مع قواعد بيانات الشركة.

تم اتباع المنهج الوصفي التحليلي لإتمام الدراسة، واستخدام استبانة صُممت كأداة رئيسة لجمع المعلومات. شمل مجتمع الدراسة موظفي شركة الإتصالات الفلسطينية الذين يستخدموا أنظمة معلومات الشركة في قطاع غزة، حيث تم استرداد 108 استبانة من أصل 120 أي بنسبة 90%.

النتائج المستخلصة من هذه الدراسة تشير إلى أن مميزات لوحة عرض معلومات ذكاء الأعمال متوفرة بشكل نسبي في أنظمة معلومات شركة الإتصالات وأنّ الشركة جاهزة لتطبيق النظام. كما أظهرت النتائج أن موظفي شركة الإتصالات بحاجة لخصائص النظام؛ حيث أنها ستفيد في عملية إتخاذ القرارات لكل الأقسام والمستويات الإدارية.

توصي الدراسة بتطبيق النظام ليكون متكاملًا مع أنظمة المعلومات الحالية، وتخصيصه لكل الموظفين للاستفادة من مميزاته.

Table of Contents

Dedication	I
Acknowledgement	II
Abstract	III
Table of Contents	V
List of Tables	VII
List of Figures	VIII
List of Abbreviations	IX
Chapter One General Framework	1
1.1 Introduction.....	2
1.2 Statement of Problem.....	4
1.3 Research Objectives.....	5
1.4 Research Variables and Research Model:.....	5
1.5 Research Significance:.....	6
1.6 Definition of Key Terms.....	6
1.7 Research Limitations.....	7
1.8 Chapter Summary& Research Structure.....	7
Chapter Two Literature Review	9
2.1 BI Dashboard.....	10
2.1.1 BI Overview.....	10
2.1.2 Architecture of Business Intelligence.....	11
2.1.3 Business Intelligence Dashboards.....	13
2.1.4 Types of Dashboards.....	16
2.1.5 BI Dashboard Implementation.....	17
2.1.6 Features of BI Dashboard.....	20
2.1.7 Benefits of BI Dashboard.....	23
2.1.8 Challenges of BI Dashboards.....	26
2.2 Decision Making.....	27
2.2.1 Types of Decisions.....	28
2.2.2 Decision Making Process.....	29
2.2.3 Factors Affecting the Decision Making Process.....	30
2.2.4 Technology-Mediated Decision Making.....	30
2.3 Palestine Telecommunication Company (Paltel).....	30
2.3.1 Paltel Group.....	30
2.3.2 About Paltel.....	31
2.3.3 Paltel Information Systems.....	31
2.4 Previous Studies.....	32
2.5 Research Distinction.....	40

Chapter Three Research Methodology..... 41
3.1 Introduction..... 42
3.2 Research Design 42
3.3 Research Methodology: 43
 3.3.1 Data Collections 43
 3.3.2 Population and sample..... 43
3.4 Data Measurement 44
3.5 Statistical analysis Tools..... 44
3.6 Pilot Study..... 45
3.7 Questionnaire Validity 45
 3.7.1 Content Validity of the Questionnaire..... 45
 3.7.2 Statistical Validity of the Questionnaire..... 46
3.8 Test of Normality..... 50
3.9 Reliability of the Research..... 51
Chapter Four Data Analysis and Discussion..... 52
4.1 Introduction..... 53
4.2 Statistical Description of Personal Information..... 53
 4.3 Analysis and discussion for each dimension in the questionnaire 55
Chapter Five Conclusion & Recommendations..... 73
5.1 Introduction..... 74
5.2 Conclusion 74
5.3 Recommendations..... 75
5.4 Suggestions for Future Researches: 75
References..... 77
Appendices..... A-1

List of Tables

Table 2.1: Main characteristics of performance dashboard.....	17
Table 2.2: BI Dashboard Features.....	23
Table 2.3: Empirical Studies.....	38
Table 3.1: Correlation coefficient of each item of Existence of BI Dashboard Features.....	46
Table 3.2: Correlation coefficient of each item of Paltel Readiness Level.....	47
Table 3.3: Correlation coefficient of each item of “Need of BI Dashboard Features”	48
Table 3.4: Correlation coefficient of each item of “BI Dashboard Benefits”	48
Table 3.5: Correlation coefficient of each item of “Beneficiaries”	49
Table 3.6: Correlation coefficient of each field and the whole of questionnaire	50
Table 3.7: Kolmogorov-Smirnov test.....	50
Table 3.8: Cronbach's Alpha for each field of the questionnaire.....	51
Table 4.1: Demographic Characteristics.....	53
Table 4.2: Education.....	54
Table 4.3: Work Information.....	55
Table 4.4: Means and Test values for “Extent of Existence BI Dashboard Features”	56
Table 4.5: Means and Test values for “Paltel Readiness Level”.....	58
Table 4.6: Means and Test values for “The Need of BI Dashboard Features at Paltel”	60
Table 4.7: Means and Test values for “BI Dashboard Benefits”	64
Table 4.8: Means and Test values for “Beneficiaries”	66
Table 4.9: Independent Samples T-test of the fields and their p-values for gender	67
Table 4.10: ANOVA test of the fields and their p-values for Age.....	68
Table 4.11: Independent Samples T-test of the fields and their p-values for educational attainment.....	69
Table 4.12: ANOVA test of the fields and their p-values for field of specialization.....	69
Table 4.13: ANOVA test of the fields and their p-values for total years of experience.....	70
Table 4.14: Independent Samples T-test of the fields and their p-values for managerial level.....	71
Table 4.15: ANOVA test of the fields and their p-values for department.....	72

List of Figures

Figure 1.1: Research Model.....	6
Figure 2.1: Traditional BI Architecture.....	12
Figure 2.2: A typical Business Intelligence Architecture.....	13
Figure 2.3: BI Dashboard – Customer Experience Dashboard.....	15
Figure 2.4: BI Dashboard – Radio Towers Dashboard.....	15
Figure 2.5: Layered project structure of BI Dashboard.....	18
Figure 2.6: BI dashboard lifecycle.....	19
Figure 2.7: Phases of development of the BI Dashboard.....	19
Figure 2.8: Dashboard Requirements.....	22
Figure 2.9: Key Benefits BI/Performance Management tools.....	24
Figure 2.10: Most Significant Benefits of Dashboards.....	25
Figure 2.11: The top five reasons that drive dashboard initiatives.....	25
Figure 2.12: Challenges of BI and performance management implementation.....	26
Figure 2.13: Information Requirements of Key Decision-Making Groups.....	28
Figure 2.14: Decision-Making Process.....	29
Figure 3.1: Methodology Flow Chart.....	42

List of Abbreviations

ANOVA	Analysis of Variance
BI	Business Intelligence
BIS	Business Intelligence Systems
CAP	Capitalization
CRM	Customer Relationship Management
DIFC	Dubai International Financial Center
DSS	Decision Support Systems
EBIS	Enterprise Business Intelligence Suites
EIS	Executives Information Systems
ERP	Enterprise Resource Planning
ETL	Extraction-Transformation-Load tools
GDP	Gross Domestic Product
Geo-BI	Geographic Business Intelligence
GIS	Geographic Information Systems
ICT	Information and Communication Technology
IS	Information Systems
IT	Information Technology
KPI	Key Performance Indicators
MBI	Mobile Business Intelligence
MIS	Management Information Systems
OLAP	On-Line Analytical Processing
OR/MS	Operations Research/Management Science
Paltel	Palestinian telecommunications company
PEX	Palestine Exchange
ROI	Return on Investment
RTBI	Real Time Business Intelligence
SID	SMART Infrastructure Dashboard
SPSS	Statistical Package For Social Sciences

Chapter One

General Framework

This chapter consists of the following sections:

1.1 Introduction

1.2 Statement of Problem

1.3 Research Objectives

1.4 Research Variables and Research Model

1.5 Research Significance

1.6 Definition of Key Terms

1.7 Research Limitations

1.8 Chapter Summary & Research Structure

1.1 Introduction

In the recent years, the challenges have increased due to the scientific and technology revolution in all fields, which led to complexity in the performance of the organizations, so the use of the personal experience and the trial and error is no longer able to achieve the objectives of the organization which needs informed decisions in the investment of the human recourses, materials and financial investments. As the decision making process has become the essence of the management, and its device in achieving the objectives of the organization, as well as technological evolution of the organizations, in addition to the expansion of the multiple areas with a multinational organizations and then the globalization and the capitalism, which led to a complexity in the relations both between the single members of the organization or between the organizations, all these factors made the task of decision making much more difficult, and increased the responsibility; so the technology development has created a tough competition and time becomes a critical factor which leads to physical and mental stress for the decision maker .So the organizations have been forced to make quick effective decisions in order to continue to compete and maintain in the market, which requires new precise information to make the right decision; so accuracy increases the effectiveness of decision and thus the effectiveness of the organization's performance. The first priority for the decision maker in these days is to provide the organizations with the important precise information in the right time by using the appropriate communication ways with the lowest cost. Due to vast amount of data and information in the organizations, it became necessary to adopt information to ensure control this amount by storing, processing and displaying, in order to ensure the availability of all data and information in the sub-systems, and all levels so it will to be able to improve the performance and increase the efficiency of the decision (Manasreya, 2004).

One of the technologies allowing firms to do this is business intelligence. In a broader sense, business intelligence is sometimes defined as a managerial philosophy, but in a narrower sense, it is information technology that helps organizations manage business information with the goal of arriving at effective business decisions. It represents a basic managerial task – analyzing a complex business environment in order to make the best possible decisions. However, a true novelty of business intelligence is its ability to present business information in a fast, simple and efficient way so that users can understand the logic and meaning of business information by employing a wide range of analytical possibilities and ad-hoc queries (Hocevar & Jaklic, 2008).

On the other hand, business intelligence covers a wide range of applications and practices for the collection, integration, analysis, and presentation of business information, with the

most important objective to support organizational learning and better business decision making. However, business intelligence systems include information tools which help users obtain the required information efficiently and easily (Lonnqvist & Pirttimaki, 2006). BI can be used to support a wide range of business decisions ranging from operational to strategic. Basic operating decisions include product positioning or pricing. Strategic business decisions include priorities, goals and directions at the broadest level (Coker, 2014). Business intelligence can also provide information about the details of the company, products, services and customers. For users who have such a tool in the hands through which they can quickly and easily access information to the base of them have taken appropriate action or made a business decision business success is achieved (Bara & Knezevic, 2013).

Using business intelligence system provides its users with increased understanding of complex information, which puts them in the position of making faster and better business decisions and thereby effectively achieving business goals. Key benefits of business intelligence systems are reflected in the creation of a basis for increasing the effectiveness and efficiency of the company. Using business intelligence systems based on the aggressive and timely approach leads to reengineering of existing business processes and their changes and optimization, which consequently leads to new business opportunities and opportunities (Bob, 2001).

Laudon and Laudon (2016) identified the main functionalities of BI systems that are production reports, parameterized reports, dashboards/scorecards, ad hoc query/search/report creation, forecasts, scenarios and models.

Of all business intelligence functions, dashboards are being paid most attention these days. Even though a few years ago they were reserved solely for managers of the largest companies, nowadays they're quite common.

Dashboards are widely recognized as essential tools for monitoring business performance and empowering workers to make informed decisions more quickly. Given the complexity and dynamic nature of the current business environment, there has never been a greater need for a personalized visualization and dashboard solution that gives people the exact information from different sources and insight they need to be effective, efficient and proactive (McKendrick, 2012).

As the trend moves towards increased amount of information processing within companies in general, dashboards have emerged as a new tool to bring together only the most relevant data in order to enlighten the decision-making process (Rasmussen et al., 2009). A dashboard can be described as a computer interface consisting of charts, reports, visual indicators and alert mechanisms that is compiled into an information platform

(Malik, 2005). W. W. Eckerson (2011) uses the term performance dashboard which he defines as: “a layered information delivery system that parcels out information, insights, and alerts to users on demand so they can measure, monitor, and manage business performance more effectively”.

BI Dashboard can serve mainly top management in the companies by giving them quick overview of the information they need to monitor the company's performance and evaluate the performance and quality of the departments work as well as to track opportunities and work predictions for the future, but in recent years some companies have begun to design BI Dashboard systems to serve various administrative levels, that the middle administration is used to monitor and optimize operational processes and compare the results over time, and as well as operational levels can use it to monitor and keep track of transactions, events and activities in real-time, and get the information they need to perform their duties.

1.2 Statement of Problem

Paltel is considered to be one of the largest companies in the Palestinian market that employing highly precise information system, and always looking forward to deal with systems that meet its needs and expansion and help the company in taking decisions , but the serious problem that faces Paltel today is the huge increase in data dealing every day which needs processing and delivering to the various departments in the right time, and therefore the company needs to develop programs and tools display data regularly.

Thus, this research focuses on explore the potential impact **of implementing BI Dashboard on decision making process at Paltel.**

It also aims at answering the following research sub questions:

- a. What is the extent of existence of BI Dashboard features on the current information systems at Paltel?
- b. Is Paltel ready for implementing BI Dashboard?
- c. To what extent Paltel employees need for BI Dashboard to be used in decision-making?
- d. What are the benefits of implementing BI Dashboard on decision making in Paltel Company?
- e. Which hierarchical level and department need to use BI Dashboard at Paltel Company?
- f. Are there any differences between respondents that can be attributed to demographic, education, work?

1.3 Research Objectives

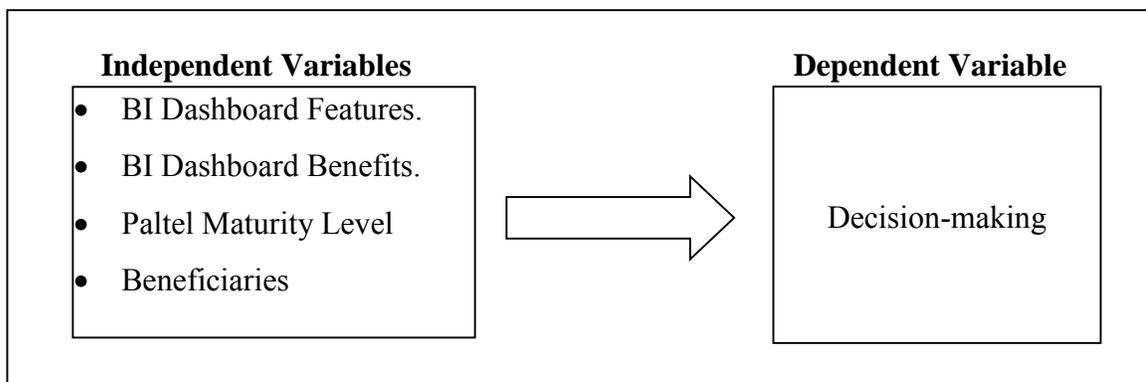
The general objective of the research is to explore the use of BI dashboard on decision making at Paltel Company which can be divided to the following sub objectives:

- a. Assess the existed BI Dashboard features on the current information systems at Paltel.
- b. Explore the degree of Paltel readiness for implementing BI Dashboard.
- c. Explore the degree of need to implement BI Dashboard to be used in decision-making at Paltel.
- d. Determine the benefits of implementing BI Dashboard on decision making in Paltel Company.
- e. Determine the hierarchical level and department that needed to use BI Dashboard at Paltel Company.

1.4 Research Variables and Research Model:

This research has the following variables which can be divided as:

- **Dependent Variable:**
 - The dependent variable is decision-making.
- **Independent Variables:**
 - The independent variables of the research are:
 - a. BI Dashboard features.
 - b. BI Dashboard benefits.
 - c. Paltel readiness level for implementing BI Dashboard.
 - d. Beneficiaries.



(Figure 1.1: Research Model: Self-development)

1.5 Research Significance:

The research significance can be summarized as a follow:

- a. Business intelligence is new topic and consider the most advanced information systems that are used in the global companies, so its expected that this research will support the researchers to address this topic, these kind of researches will contribute in the development of information systems in both public and private organizations, in order to keep pace with the rapid technology development globally, and achieve the benefits in various fields.
- b. In researcher knowledge, the research is considered as one of the few Arab researches that dealing with Business Intelligence subject, and the first research specializing in BI Dashboard that can enrich Scientific Research and beneficiaries in the Arabic World.
- c. This study identified the basic characteristics of BI Dashboard which helps in the decision making process, and therefore will help the companies that want to apply.
- d. Paltel is one of most important service organizations in Palestine, this research introduce useful recommendations to its leaders in order to develop Information Systems of the Company, which will benefit the company and its customers.
- e. Determining research for Paltel is particularly important for the presence of the Business Intelligence environment, which allows implementing the subject of research.

1.6 Definition of Key Terms

Business intelligence (BI)

A Set of techniques and tools for the transformation of raw data into meaningful and useful information for business analysis purposes (Rud, 2009).

BI Architecture

A framework for organizing the data, information management and technology components that are used to build business intelligence (BI) systems for reporting and data analytics (SearchBusinessAnalytics, 2010).

BI Dashboard

A visual display of the most important information needed to achieve one or more objectives; consolidated and arranged on a single screen so the information can be monitored at a glance (Few, 2013).

BI Dashboard Implementation

Complicated process to construct BI Dashboard system starting from design and building the system to ensure that the system meets quality standard

BI Dashboard Features

Key characteristics of BI Dashboard system that distinguish it from another BI tools and enable it to providing the desirable benefits.

BI Dashboard Benefits

An intangibles advantages that expected to gain from BI Dashboard.

Decision Making

Process of deciding what action to take; it usually involves choice between options (Adair, 2007).

Paltel

Palestine Telecommunications Company which provides fixed line, internet access via BSA and other value-added services to Palestinian Authority regions.

1.7 Research Limitations

The following are limitations of this research:

- a. The research was conducted at Paltel employees in Gaza Strip, because of the political conditions that limit communication with the West Bank.
- b. The scope of the research is limited to the features for BI Dashboard and its benefits on Decision-Making.
- c. Being a new system, the abbreviations of the BI Dashboard were not familiar to some of Paltel employees.

1.8 Chapter Summary & Research Structure

This chapter provides the reader with the introduction of the thesis, a statement of the problem, the purpose of the research, research questions. It also contain significance, distinction and limitations of the research.

This chapter is followed with the following chapters:

The second chapter represent the literature review that contain BI Dashboard, Decision-making, Paltel and previous studies.

The third chapter is about the research methodology discussing population, sampling, data collection and analysis, and piloting & testing of validity & reliability of research tools.

The fourth chapter aims at analyzing data and discussing the findings.

The fifth chapter lists recommendations and makes a conclusion of the research.

The last two parts of the research represent the references and appendices.

Chapter Two

Literature Review

This chapter consists of the following sections:

2.1 BI Dashboard

2.1.1 BI Overview

2.1.2 Architecture of Business Intelligence

2.1.3 Business Intelligence Dashboard

2.1.4 Types of Dashboards

2.1.5 BI Dashboard Implementation

2.1.6 Characteristics of dashboards

2.1.7 Benefits of BI Dashboard

2.1.8 Challenges of BI Dashboards

2.2 Decision Making

2.2.1 Types of Decisions

2.2.2 Decision Making Process

2.2.3 Factors Affecting the Decision Making Process

2.2.4 Technology-Mediated Decision Making

2.3 Palestine Telecommunication Company (Paltel)

2.3.1 Paltel Group

2.3.2 About Paltel

2.3.3 Paltel Vision & Mission

2.3.4 Paltel Information Systems

2.4 Previous Studies

2.5 Research Distinction

2.1 BI Dashboard

This section presents information relevant to Business Intelligence, and focus on BI Dashboard. It will provide overview of Business intelligence and its architecture, also it will include discussion of the implementation, features, benefits and challenges of the BI Dashboard.

2.1.1 BI Overview

Already in the 1950s, organizations realized the potential of computers and they began to play an important role. Between the mid1950s and the early 1970s, the use of computers and information systems (IS) in organizations grew tremendously but few of these systems had an impact on managers' decision making. In the 1970s, new systems were developed to support managers in accessing relevant business information needed for decision making (Gorry & Morton, 1989). These systems provided business managers with static, two dimensional reports without any analytical capabilities (Turban et al., 2007) .

In the 1980s, the systems evolved and started moving away from static reports. Instead, focus was shifted to monitoring the organizations' progress and performance towards critical goals (Burkan, 1991). Organizations did not only need information systems to support their ongoing operations, they needed systems that could assist managers with value added information in their decision making processes (Fernandez et al., 2003).

In the 1990s, the concept of decision support systems (DSS) grew and evolved out of two types of computer support systems for decision making. One was management information systems (MIS), which provided (1) scheduled reports for well-defined information needs, (2) demand reports for ad hoc information requests, and (3) the ability to query a database for specific data. The second contributing discipline was operations research/management science (OR/MS), which used mathematical models to analyze and understand specific problems (Kopackova & Skrobacova, 2006). DSS have moved towards an attempt to create an intelligent DSS. This attempt provided a great promise to improve both individual performance and organizational performance and is designed to support, not replace human decision makers (Dalal, 1992).

Moreover, the competition between companies and technological change in recent years, make the ability to obtain useful information in real time became extremely important, if not even a critical factor of success for companies. The time managers have available for making business decisions has been drastically reduced. Competitive pressures require businesses to make intelligent decisions based on their incoming business data, and these decisions must be made quickly (Intelligence & Warehousing, 2009) .

The tool that enables managers to do this is business intelligence. Given the rapid pace of today's business environment, these systems have become an almost indispensable part of the success of an organization. With the help of business intelligence, managers can quickly and effectively detect important trends, analyze the behavior of customers and facilitate expedient decision-making (Hocevar & Jaklic, 2008).

Howard Dresner introduced the term BI in 1989. He described it as a set of concepts and methods to improve decision making by using fact-based support systems. In later years, BI has been one of the fastest growing business software technologies in the world (Rasmussen et al., 2009).

BI is frequently referred to as an umbrella term that brings together almost all of the data disciplines of an organization (Shariat & Hightower, 2007). Lu and Zhou (2000) similarly, agreed with the same concept and argued that BI is a broad concept which includes the appropriate orientation of the entire organization. It deals with the acquisition, management and analysis of large amounts of data about business partners, products, services, customers, suppliers, activities, and transactions between them. In other words, it is an organized and systematic process by which an organization acquires, analyses and circulates information from internal and external sources which is relevant to its business activities and decision-making (Lonnqvist & Pirttimaki, 2006). In addition, BI is a comprehensive concept, an entire organization is committed to use the available information systems (including business intelligence) in the most effective way with the aim of obtaining quality and timely information for decision-making, subsequently creating competitive advantages. Such a concept must be supported by the senior management of a company and extended throughout the organization.

Betts (2003) argued that Business Intelligence will mean more people viewing more data in more detail. He believes that more companies will be putting Business Intelligence tools into the hands of the typical employee, not just the marketing or financial analyst. Additionally, unstructured data, predictive analytics, and integration will be key trends that will exist in the Business Intelligence domain.

2.1.2 Architecture of Business Intelligence

The tactical challenges for providing a framework for business intelligence involve collecting data from disparate distributed systems, consolidating that data into a centralized model, and organizing the data to feed the front-end applications for driving business analysis and reporting. As is seen in Figure 2.1, this requires data connectors to extract data from the sources, integration tools to assimilate and consolidate the data, servers and storage used to house the data warehouse and its database management

system, all feeding the front-end application architecture for reporting, dashboards, data mining, and dimensional analysis (Loshin, 2008).

Business Intelligence environment consists of many systems and tools, and has a structural framework. According to SearchBusinessAnalytics (2010) BI architecture is a framework for organizing the data, information management and technology components that are used to build Business Intelligence Systems (BIS) for reporting and data analytics", and they consider that Business intelligence architecture plays a vital role in business intelligence projects by influencing overall development and implementation decisions. Business intelligence architecture seeks to help organizations and businesses make better decisions.

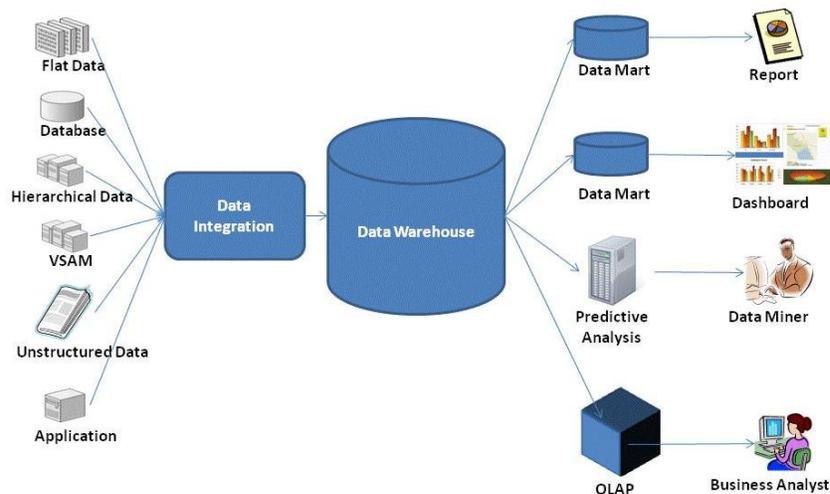


Figure 2.1: Traditional BI Architecture
[Source:(Vodapalli, 2009)]

Shariat and Hightower (2007) studied the BI architecture, they consider that BI architecture and infrastructure has been illustrated and presented in many different ways. Some use a traditional view of software architecture and describe the systems in terms of software, hardware, middleware, application suites, data warehouses and business transactions.

Olszak and Ziemba (2007) show the architecture from a technical perspective, that BI systems offer an integrated set of tools, technologies and software products that are used to collect heterogenic data from dispersed sources in order to integrate and analyze data to make it commonly available. BI tasks implicate a technological structure of the BI systems. The structure in question consists of the following modules:

- **Tools to extract, transform and load data (Extraction-Transformation-Load tools “ETL”)** : are mainly responsible for data transfer from transaction systems and the internet to data warehouses;
- **Data warehouses:** provide some room for thematic storing of aggregated and already analyzed data;
- **Analytic tools (On-Line Analytical Processing “OLAP”)** : let users access, analyze and model business problems and share information that is stored in data warehouses;
- **Data mining tools:** enable their users to discover various patterns, generalizations, regularities and rules in data resources;
- **Tools for reporting and ad hoc inquiring:** allow for creating and utilizing different synthetic reports; and
- **Presentation layer** : applications including graphic and multimedia interfaces whose task is to provide users with information in a comfortable and accessible form.

Finally, BI Architecture can be simplified the as the following figure:

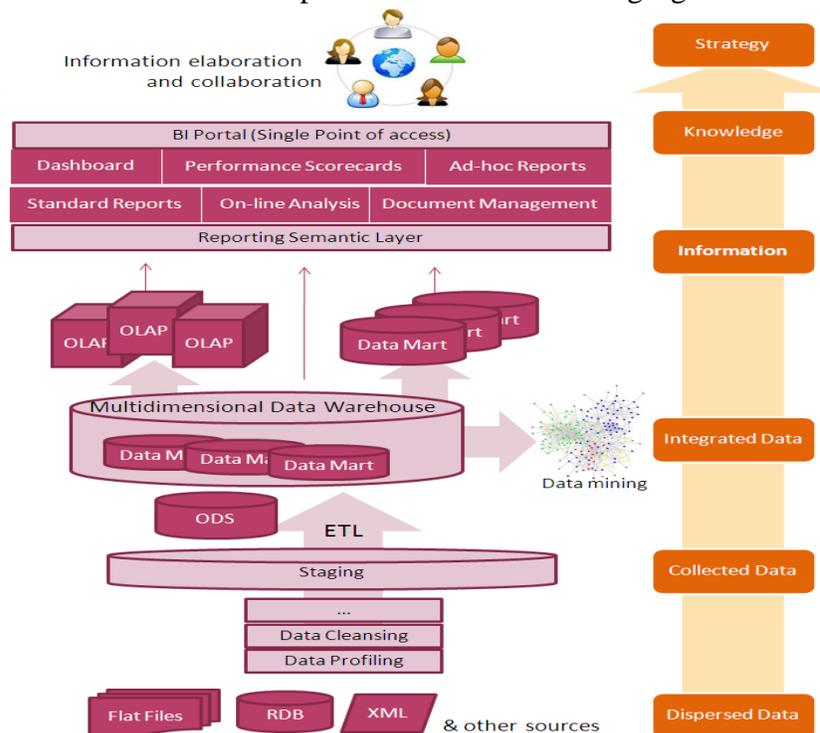


Figure 2.2: A typical Business Intelligence Architecture
[Source: (Jamaludin & Mansor, 2011)]

2.1.3 Business Intelligence Dashboards

As the trend moves towards increased amount of information processing within companies in general, dashboards have emerged as a new tool to bring together only the most relevant data in order to enlighten the decision-making process (Rasmussen et al., 2009). From a decision maker's perspective, the new BIS visualization tools such as Dashboards and Scorecards provide a useful way to view data and information. Outcomes displayed include single metrics, graphical trend analysis, capacity gauges, geographical maps, percentage share, stoplights, and variance comparisons (Hall Jr, 2003).

A dashboard can be described as a computer interface consisting of charts, reports, visual indicators and alert mechanisms that is compiled into an information platform (Malik, 2005). In a similar view, Few (2013) defined dashboard as a visual display of the most important information needed to achieve one or more objectives, consolidated, and arranged on a single screen, so the information can be monitored at a glance. He argued that dashboards primarily use graphics to present the information, with the support of text, since graphics communicate more efficiently.

From a practical perspective, dashboards have become very popular, especially for business management, and for monitoring the performance of a company (Rasmussen et al., 2009). They are often used as part of a company's business intelligence solution and presenting Key Performance Indicators "KPI". Dashboard allows monitoring the situation of the organization, warns it against the negative phenomena, and improves the decision-making process (Gannholm, 2013).

Dashboards attempt to give decision-makers a complete overview of their business operations, and should allow follow-up on important business decisions without a complicated interface. This is achieved by using charts that are relatively simple compared to some of the graphical displays that are often applied in more sophisticated analytic applications. Furthermore a key element which simplifies the interface is to using as few colors as possible and standardizing their meaning. For example, red should indicate something negative, yellow a risk, and green a positive (Fuchs, 2006).

The following figures represents an examples of BI dashboards that is used in telecommunications companies to monitor the performance of their business.

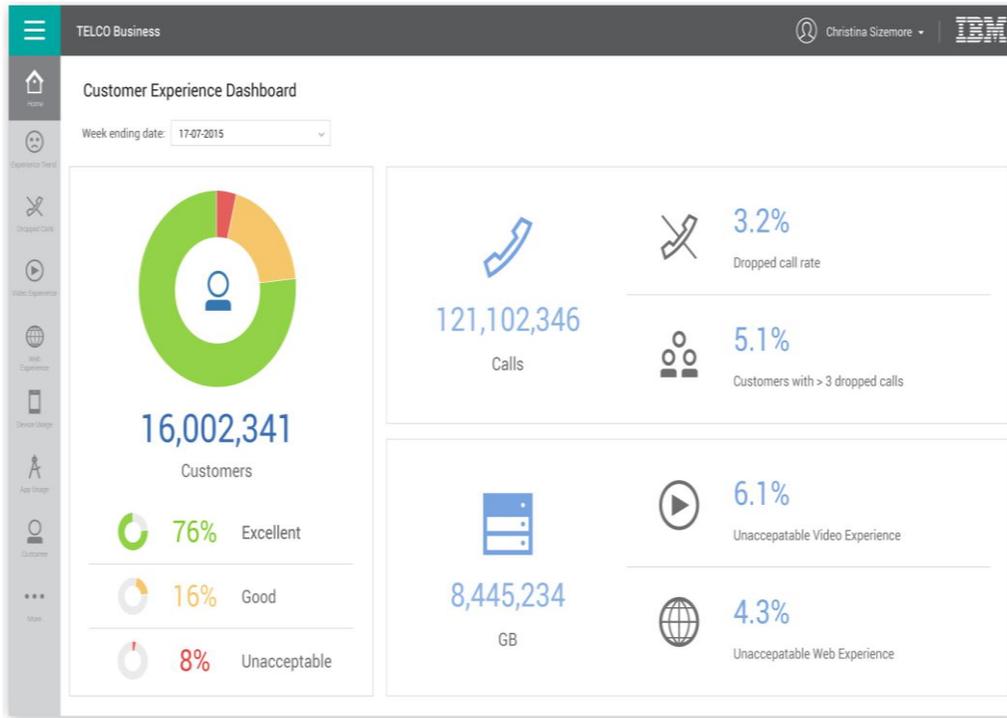


Figure 2.3: Customer Experience Dashboard
[Source: (Deshpande, 2015)]

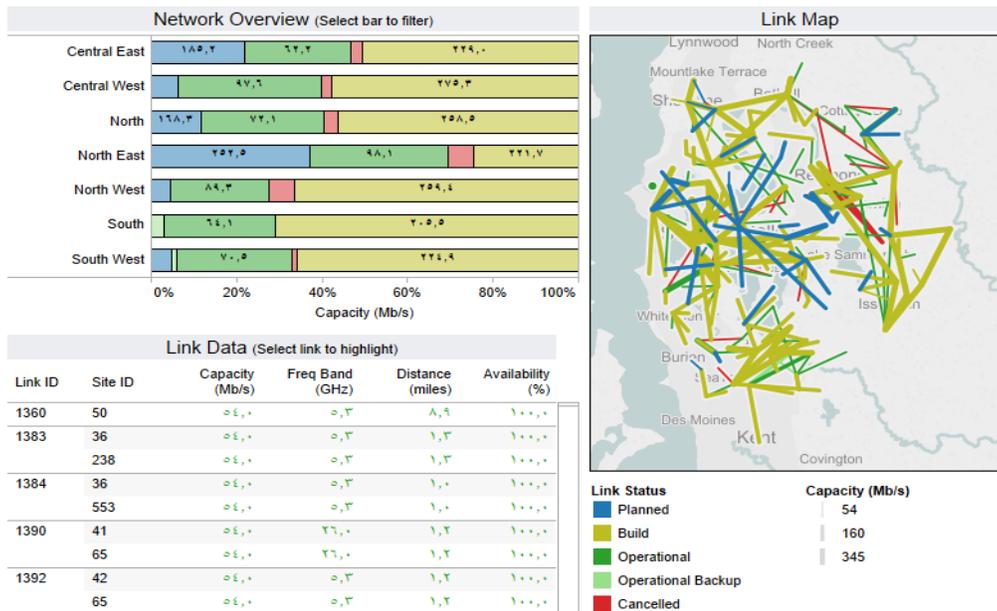


Figure 2.4: Radio Towers Dashboard
[Source:(Tableau, 2015)]

2.1.4 Types of Dashboards

Dashboards can be an effective way for organizations and institutions to track what is happening within the operations, match effort to strategy, and demonstrate internal and external accountability (Mitchell & Ryder, 2013). BI Dashboards can serve different users. For instance, staff needs to act on different information as a managers or an executives (Soest, 2013).

Few (2006) and W. W. Eckerson (2011) categorized dashboards into three types, that are operational, tactical, and strategic dashboards. Given the different applications associated with them, each type of dashboard has its own set of design, data, and functionality considerations. They described them as a follow:

Operational Dashboards: Most often used for monitoring processes and situations that demand a timely response. Design must be clear and simple, so that alerts to areas needing attention may be easily noticed. Data must be actionable without interpretation and updated in real time so alerts and responses can be immediate. Functionality for operational dashboards must be live and dynamic.

Tactical Dashboards: Analysts or managers use it to optimize processes and compare results over time, usually in light of strategic goals and objectives. Design is more complex and includes portals or drop down menus that permit access to data drawn from multiple sources about different areas of the organization. Data are refreshed much less frequently than for operational dashboards. Functionality must permit categorical and longitudinal comparisons of multiple layers of data, usually in the form of charts or tables that users can then manipulate to see how certain actions may affect results.

Strategic Dashboards: Managers or executive-level personnel use them to document, review progress and develop future plans. Design is relatively simple, so these dashboards usually require high-level information rather than fine grained operational data, and data are updated only periodically, at the end of each quarter or academic term. Given the planning-oriented purpose and static data in strategic dashboards, functionality requirements are quite minimal.

W. W. Eckerson (2011) makes an important remark about these dashboards; while each dashboard might serve its own purpose, it is important that metrics have the same definition, the data is shared and that a common infrastructure is used. In this way, we can have different versions of different types of dashboards, but they represent the same information.

Table 2.1: Main characteristics of performance dashboard
 [Source: (Soest, 2013) adapted from (W. W. Eckerson, 2011)]

	Operational	Tactical	Strategic
Purpose	Control operations	Optimize processes	Manage strategy
Scope	Operational	Departmental	Enterprise
Users	Staff +	Managers +	Executives +
Primary activity	Act	Analyze	Review
Focus	Current	Past	Future
Data refresh	Daily/Intraday	Daily/Weekly	Monthly/Quarterly
Information	Detailed	Detailed/Summary	Summary
Architecture	Core systems	Data warehouse	Excel or data mart
Metrics	Drivers	Drivers/Outcomes	Outcomes
“ Looks like a ... ”	Dashboard	Metrics Portal	Scorecard

2.1.5 BI Dashboard Implementation

The need for the implementing and using of Business Intelligence currently is derived mainly from the high demands placed on managers of enterprises. In an environment of increasingly fierce competition where business managers and analysts need to make decisions under time pressure and at the same time with high responsibility. For relevant decisions, they need to be given relevant and objective information that would be available quickly, with minimal technical complexity of handling and taking with rapidly formulate new demands for further information corresponding to the current situation of the business (Ferencz, 2013).

Implementation of the system is one of the stages distinguished in the life cycle of the IT system. The implementation process is considered to be one of the most complex tasks, due to the fear of changes perceived by the organization’s employees (Kisielnicki & Sroka, 2005). However, it is always important that the decision on such an investment be economically justified. It would make no sense to introduce such expensive systems just to stay in touch with the latest technology trends (Moss & Atre, 2003).

In a different view, Olszak and Ziembra (2007) concluded that each methodology of information system designing and implementing should be characterized by certain canons. In case of BIS particular attention ought to be paid to the following issues: BI solutions ought to be flexible, scalable and based on modern technologies, independent of their hardware and software platforms for better adjusting the system; while creating BI systems, it should be necessary to pay some attention to the fact that there are different IT systems in organizations.

There are two groups of factors affect the success of a company: factors from its internal and external environments. The company should know, for example, how much it is

spending on research and development, what the life cycle is of its products, what its revenue and profitability levels are, how efficient the production process is, and how successful its employees are in sales and marketing. One can identify several key success factors that help management understand the situation within the company. The purpose of most business intelligence systems is exactly to provide an insight into and an understanding of the internal business environment. Already at first sight, it is clear that this is only part of the necessary information – the company must also be aware of its external environment in order to achieve strategic advantages.

There are various types of BI implementation in today’s business including Enterprise Business Intelligence Suites (EBIS) which typically provide BI scalability and extend not only to internal users but also to key customers, suppliers sometimes the general public, query and reporting tools, advanced BI tools primarily On-Line Analytical Processing (OLAP), advanced analytic tools, and BI platforms for developing BI applications (Bell et al., 2007).

Empirically, Hurwitz et al. (2005) conducted a research about BI Dashboard implementation and they focused on how the corporations continue to search for ways to improve their performance, understanding and leveraging their corporate, customer and partner. Information becomes increasingly more important as well as more complex. According to the previous, they want to analyze management and operational data as quickly as possible, using current information from multiple sources to increase their responsiveness to changing business conditions. This information is often located in a wide variety of data sources such as spreadsheets, stand-alone databases, data warehouses, internal applications, and external information services. In fact, the results of the survey indicated that companies surveyed are typically integrating, on average, 6-10 data sources to build their dashboards.

Technically, Furmankiewicz et al. (2015) confirmed that dashboard implementation is a complicated process and depends on many factors. It is possible to distinguish three layers of developed project: data source layer, BI layer and data visualization layer. It is presented in Figure 2.5.

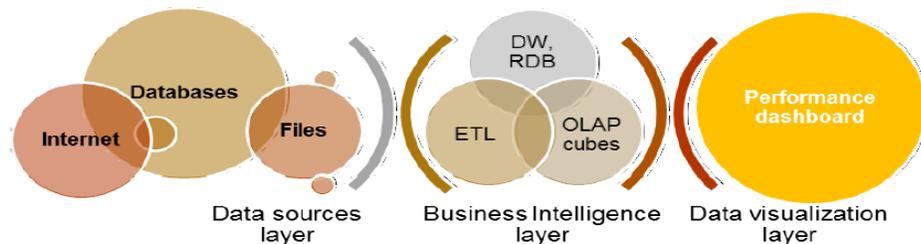


Figure 2.5: Layered project structure of BI Dashboard
[Source: (Ziuzianski et al., 2014)]

As Figure 2.5 presents dashboard visualize data extracted, transformed from sources and loaded to database and to data warehouse.

There is suggested lifecycle approach to develop BI Dashboard system presented in Figure 2.6. Pre-phase of dashboard lifecycle consists defining and initiation of governance, resources and strategies. First phase is for designing technical and business solutions and KPIs (Furmankiewicz et al., 2015).

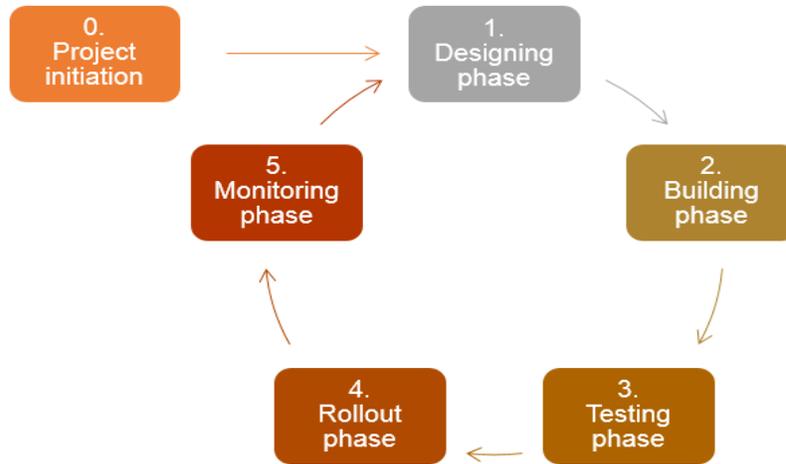


Figure 2.6: BI dashboard lifecycle
 [Source: (Ziuzianski et al., 2014)]

During building phase data access is constructed and tools are chosen. After that, a testing phase starts. If project passed this phase users participate in conduct pilot. Last phase in cycle is for monitoring dashboard, evaluating feedback and prepare for next iteration (Donovan et al., 2010). Construction of the dashboard proceeds in stages. In literature, one can find such a construction’s basic stages, which are presented in figure 2.7:

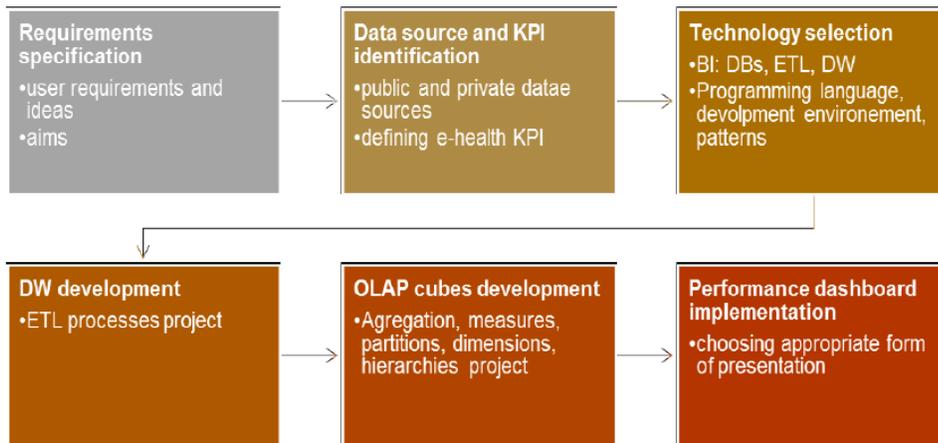


Figure 2.7: Phases of development of the BI Dashboard
 [Source: (Ziuzianski et al., 2014)]

The basis for the design of a dashboard should be accurate defining of the expectations and requirements of the end user of the dashboard. They should take into account (Alexander et al., 2011):

- KPIs corresponding to the initial objectives,
- Transfer meaning the objectives executed by dashboards,
- Users, which allows to specify more specific requirements,
- Dimensions (data clustering) and filters (data sorting),
- The type of mining data relevant to specific measures,
- The availability and quality of data sources,
- The data update schedule.

On the other hand, the authors Karimi and Sullivan (2013) identified many of the key infrastructure elements necessary to build successful dashboards:

- A comprehensive data warehouse,
- Security infrastructure,
- Including a single sign-on process,
- Campus-wide web-based transaction & reporting systems,
- Business portals,
- Technical expertise for building dashboard components,
- Excellent relationship and trust between departments.

Terkla et al. (2012) refer to the identification of dashboard's indicators in as the most critical step in the dashboard development process. These indicators, they argue, must be: a) easy to understand, b) relevant, c) strategic, d) quantitative, and e) up-to-date with latest information.

2.1.6 Features of BI Dashboard

Features in general refer to characteristics of a particular entity (Vodapalli, 2009). Malik (2005) have borrowed inspiration about dashboard features from an airplane cockpit that are essential for a successful outcome. These are summarized in the acronym SMART:

- *Synergetic*: A dashboard must be ergonomically and visually effective in order for the user to be able to synergize information of different nature within a single screen view.
- *Monitor KPIs*: The dashboard shall illustrate the critical KPIs that are needed for effective decision making within the domain the dashboard serves.

- *Accurate*: The information that is included in the dashboard must be completely accurate in order to reach full user confidence in the dashboard. The data must be well tested and validated before included in the dashboard.
- *Responsive*: The dashboard must include functions that create user alerts like sound alarms, e-mails, blinkers etc. in order to aware the users about critical matters.
- *Timely*: The information must be real-time and right-time; it must be updated to the latest version possible in order to achieve effective decision making.

In addition to the elements of SMART, Malik (2005) emphasized the importance of including more advanced features that cannot be found in an airplane cockpit but are essential to achieve effective organizational management. These features are captured in the acronym IMPACT:

- *Interactive*. It should provide an ability to drill down information to look at details and find root causes.
- *More data history*. The user should be able to review historical trends for the different KPIs.
- *Personalized*. The information presented in the dashboard shall match the specific domain of the user; only the data relevant for their field should be presented for more efficient usage.
- *Analytical*. The dashboard should provide the user with the ability to carry out guided analyses like what-if analysis. In addition, the user should be able to drill down, compare, contrast and analyze different business variables.
- *Collaborative*. The dashboard should enable user to exchange notes on specific observations on their dashboard.
- *Trackability*. It should enable the user to customize what metrics to track.

Empirically, Hurwitz et al. (2005) surveyed 113 IT executives from large companies, who had implemented or were planning to implement dashboards. They found that there was solid agreement among respondents regarding requirements for their dashboards. Interestingly, while companies wanted the ability to integrate across multiple data sources, as well as provide analytic capabilities, they were also interested in a number of other requirements that pointed to the need for a portal framework for scalability (Figure 2.8). These include:

- *Access to both historical and time sensitive information*: Companies are looking to access time sensitive operational data as well as the historical data. Approximately 70% of the companies that connect their dashboard to a data warehouse are also integrated with enterprise applications, stand-alone databases, and spreadsheets.

- *Tailor views*: Another key requirement is the ability to tailor dashboard views; 98% cited tailored dashboard views for different users; i.e. by role, organization, geography, access privileges, etc. as very important or important to have in a dashboard.
- *Collaboration*: Users also wanted the ability to take action utilizing built-in collaboration capabilities and the ability to kick-off cross-application business processes.
- *Security*: Companies also want to be able to provide convenient and secure access to information, which means dashboards should have an easy-to-use user interface and should provide a single sign-on capability. These capabilities as well as other valuable software services are provided in a portal framework.

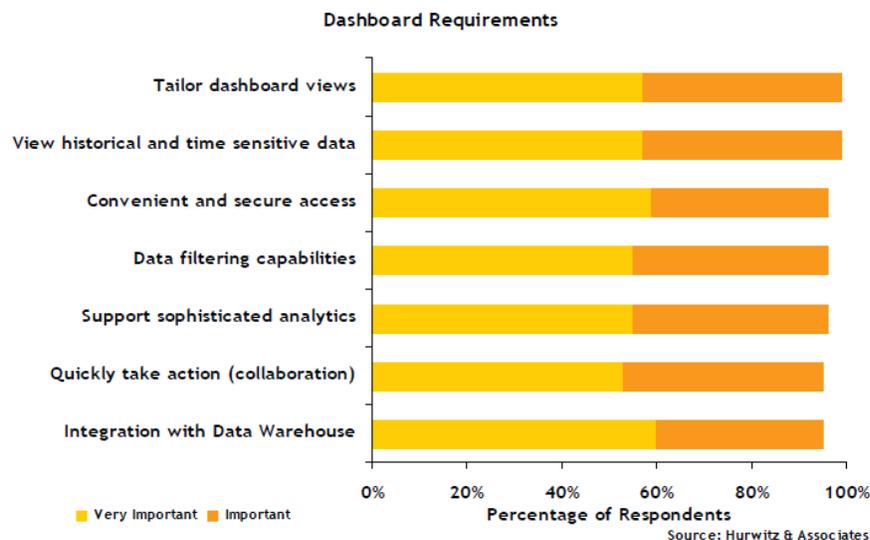


Figure 2.8: Dashboard Requirements
[Source:(Hurwitz et al., 2005)]

While (Alexander et al., 2011) confirm that the basis for the design of a dashboard should be accurate defining of the expectations and requirements of the end user of the dashboard. They should take into account:

- KPIs corresponding to the initial objectives,
- Transfer meaning the objectives executed by dashboards,
- Users, which allows to specify more specific requirements,
- Dimensions (data clustering) and filters (data sorting),
- The type of mining data relevant to specific measures,
- The availability and quality of data sources,
- The data update schedule.

In conclusion, the common features of BI Dashboard between previous studies can be summarized as a follow:-

Table 2.2: of BI Dashboard Features

Feature	Research
Presentation Flexibility	(Velcu-Laitinen & Yigitbasioglu, 2012) (Njuguna, 2013) (Alexander et al., 2011) (Malik, 2005)
Drill-Down Feature	(Velcu-Laitinen & Yigitbasioglu, 2012) (Njuguna, 2013) (Malik, 2005)
Data filtering capabilities	(Hansoti, 2010) (Hurwitz et al., 2005) (Alexander et al., 2011)
Timely data	(Malik, 2005) (Alexander et al., 2011)
Accessibility Integration	(Hurwitz et al., 2005) (Alexander et al., 2011)
Data visualization	(Hansoti, 2010) (Elkrunz, 2013)
Customization	(Hansoti, 2010) (Hurwitz et al., 2005) (Malik, 2005) (Alexander et al., 2011)
One integrated screen	(Malik, 2005) (Karimi & Sullivan, 2013)

2.1.7 Benefits of BI Dashboard

BI systems can bring multiple benefits according to (Hocevar & Jaklic, 2008) research, for example, via faster and easier access to information, savings in information technology ('IT') and greater customer satisfaction all the way through to the improved competitiveness of enterprises. Yet, most of these benefits are often very difficult to measure, because of their indirect and delayed effects on business success. Therefore, for this purpose, more appropriate methods are those based mainly on a qualitative approach, such as case studies, empirical analyses, user satisfaction analyses, and others that can be employed independently or can help us complete the whole picture in conjunction with

the previously mentioned methods. Since there is no universal approach to the evaluation of an investment in information technology and business intelligence, it is necessary to approach each case in a different way based on the specific circumstances and purpose of the evaluation.

Computerworld (2007) measured the benefits of BI and performance management tools, and it found the key benefit that is derived or expected to be derived from BI and performance management tools is improvement of the decision-making process, such as the quality and relevance of decisions made. Producing a single, unified view of enterprise wide information, better aligning resources with strategies, speeding up the decision-making process, and responding to user needs for availability of data on a timely basis are the other top BI benefits reported by IT respondents.

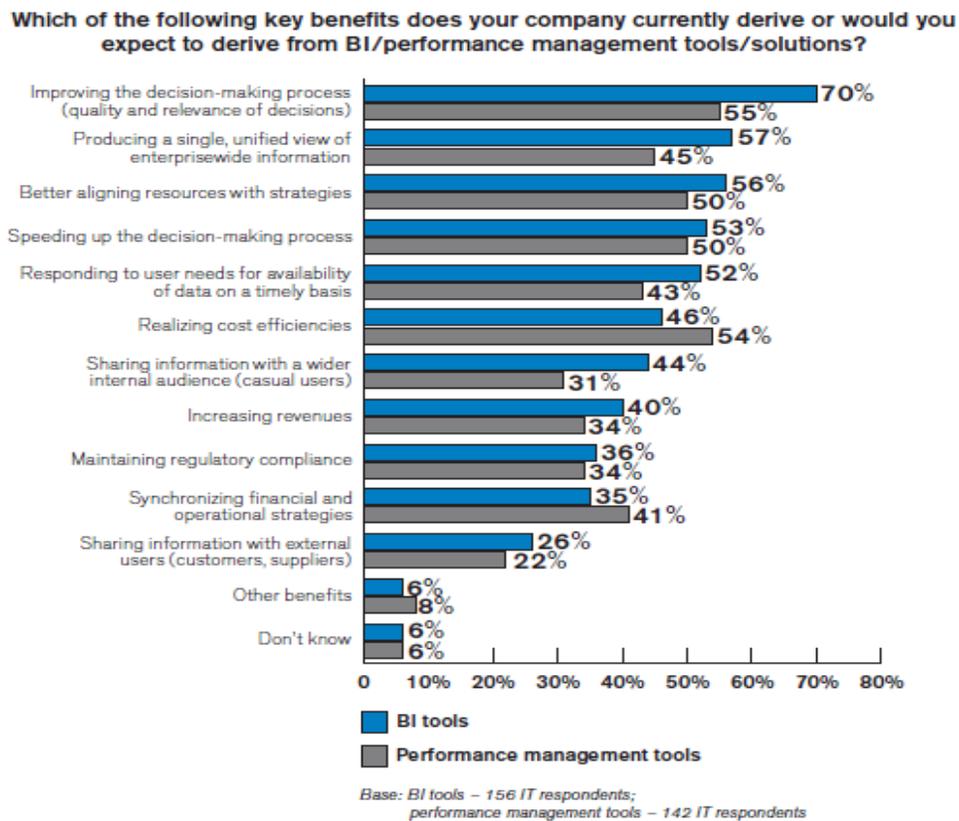


Figure 2.9: Key Benefits BI/Performance Management tools
 [Source: (Computerworld, 2007)]

For instance, Hurwitz et al. (2005) measured the benefits of Dashboards and found that they could enable companies to fine tune their decisions and accelerate corporate performance. Companies are looking to dashboards, not only to help them make better decisions, but also to drive down costs associated with these otherwise manually intensive

methods. When asked about dashboard related benefits, 67% of the respondents who had implemented dashboards rated the ability to cut down on manual, administrative work as one of the most important benefits of dashboards. This was followed by improved operational efficiencies via more timely delivery of data, and the ability to respond faster to changes in Key Performance Indicators (KPI). This is illustrated in Figure 2.10.

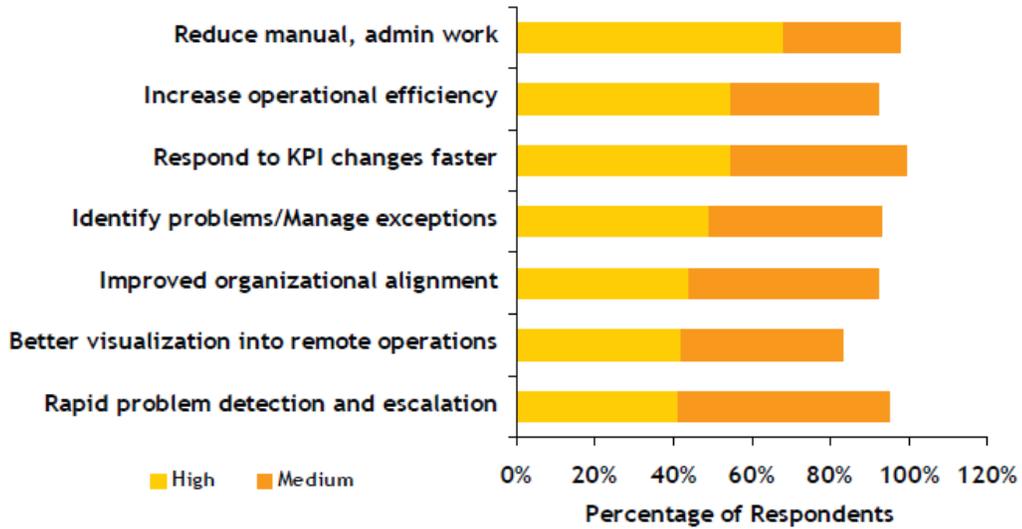


Figure 2.10: Most Significant Benefits of Dashboards
 [Source:(Hurwitz et al., 2005)]

In a research conducted by (AberdeenGroup, 2009), the top five reasons that drive dashboard initiatives among 285 companies are illustrated in figure 2.10.

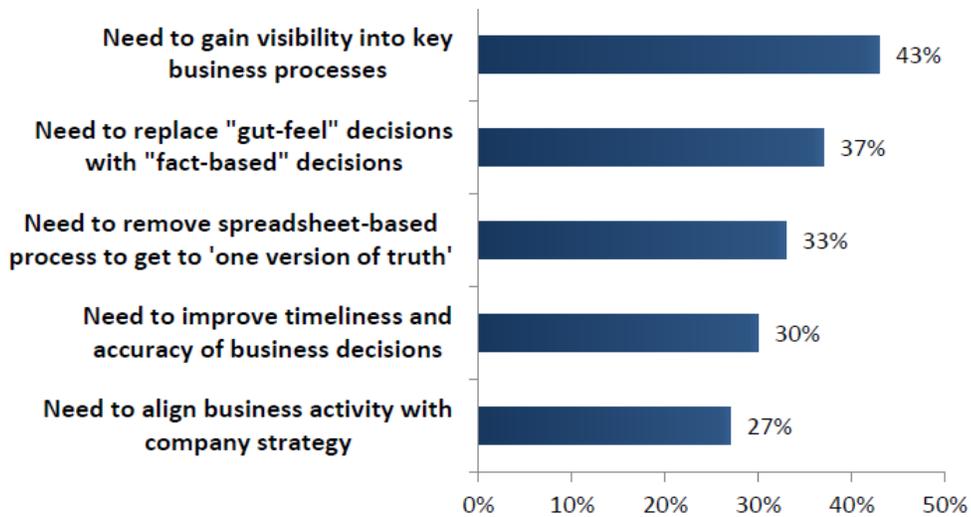


Figure 2.11: The top five reasons that drive dashboard initiatives
 [Source:(AberdeenGroup, 2009)]

2.1.8 Challenges of BI Dashboards

Developing and implementing a dashboard system provides a myriad of challenges range from under-the-hood issues of technology and interfacing with data to confidentiality to determining the purpose of indicators (strategic, analytical, and operational) to optimal design of dashboards to deciding how to respond to dashboard data (Mitchell & Ryder, 2013). One of the greatest challenges attached to the implementation of a dashboard system relates to technology and infrastructure. Prior to developing or implementing a dashboard system, infrastructure needs to be in place (Harel & Sitko, 2003; Seybert, 2012). To ensure optimal functioning and effectiveness, dashboards need to be supported by a formal, underlying data structure equipped with drill-down capabilities (Seybert, 2012). In addition, data, system, and network security must be in place to ensure that reports are not sent to the wrong place or fall into the wrong hands (Harel & Sitko, 2003). Implementing a dashboard system on campus can be complex and require expert consultation as well as complex understandings of factors, including the data sources, definitions, and technical or system requirements (Seybert, 2012). According to Computerworld (2007), the key technology or business challenges faced or anticipated for both BI and performance management tools is data integration with multiple source systems. This shows that all organizations struggle with the challenge of trying to get disparate systems to work in concert with new BI or performance management tools/solutions. Some challenges listed in this question, showing that organizations are dealing with a widespread number of challenges related to BI and performance management.

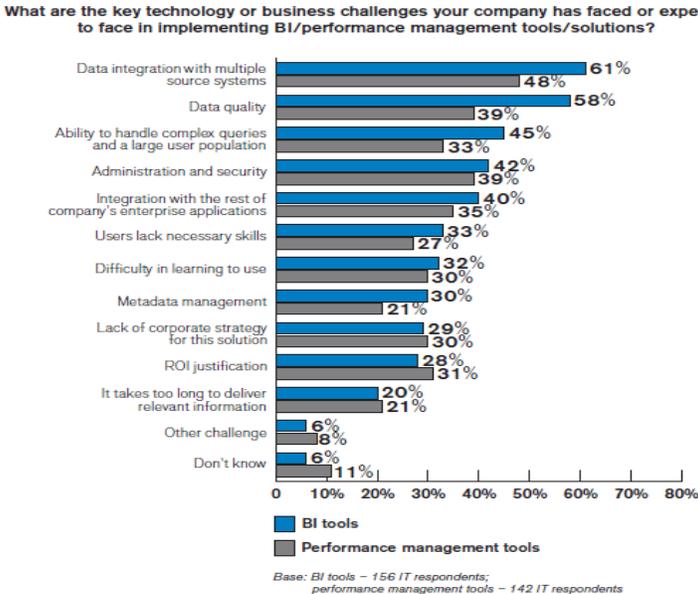


Figure 2.12: Challenges of BI and performance management implementation
 [Source: (Computerworld, 2007)]

Rasmussen et al. (2009) mentioned to some pitfalls with using dashboards presented in the following listed below:

- Manual data entry or lack of automated data
- Lack of useful metrics to support decision making
- Poor dashboard design

2.2 Decision Making

Humans have always been forced to make various decisions in different situations. Decisions can be very simple, without major impact and consequences, or be of a very complex nature, with a huge impact on millions of people. In organizations, managers have always been making decisions concerning operational, managerial, and strategic matters and these decisions can have an impact on the organizations' stakeholders, ranging from the employees to the government. Managers often try to predict and understand the outcome of different decisions they make. This could be extremely difficult, because speculating in a future context is always a daunting task. However, a successful prediction can be very helpful in order to select the right decision to achieve the desired outcome or best alternative (Andersson et al., 2008).

Thus, one of the most important activities engaged in by any organization is decision making which is the process of deciding what action to take; it usually involves choice between options (Adair, 2007). A decision is easy to make when one option will clearly bring about a better outcome than any other. Decisions become more difficult when more than one alternative seems reasonable and when the number of alternative is great. A decision is easy to make when one option will clearly bring about a better outcome than any other. Decisions become more difficult when more than one alternative seems reasonable and when the number of alternative is great (Oz, 2009).

On the other hand, the quality and timeliness of decisions made and the processes through which they are arrived at can have an important impact on organization effectiveness. Every success, every mishap, every opportunity seized or missed is the result of a decision that someone made or failed to make. Never mind what industry you're in, how big and well known your company may be, or how clever your strategy is. If you can't make the right decisions quickly and effectively, and execute those decisions consistently, your business will lose ground (Rogers & Blenko, 2006).

Decision making is the process of developing and analyzing alternatives to make a decision - a choice from the available alternatives. Most decisions are made in response to a problem - a discrepancy between a desirable and an actual decision and involve

judgment - the cognitive aspects of the decision-making process (Kopackova & Skrobacova, 2006).

2.2.1 Types of Decisions

Many classifications of decisions was made, while some of the classifications may be considered structure or nature of the task, others inherited the classification from computer world.

According to Laudon and Laudon (2016), the decisions can be classified in three types, based on the type of structure or nature of the task:

Structured decisions: are repetitive and routine, and they involve a definite procedure for handling them so that they do not have to be treated each time as if they were new.

Unstructured decisions: are those in which the decision maker must provide judgment, evaluation, and insight to solve the problem. Each of these decisions is novel, important, and non-routine, and there is no well-understood or agreed-on procedure for making them.

Semi-structured: many decisions combined between both previous types, where only part of the problem has a clear-cut answer provided by an accepted procedure.

In general, structured decisions are more prevalent at lower organizational levels, whereas unstructured problems are more common at higher levels of the firm. Senior executives face many unstructured decision situations, such as establishing the firm's five- or ten-year goals or deciding new markets to enter. Middle management faces more structured decision scenarios but their decisions may include unstructured components (Laudon & Laudon, 2016).

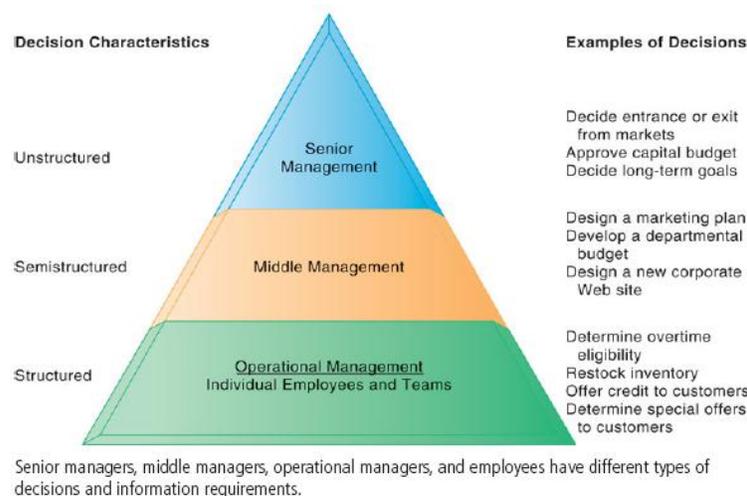


Figure 2.13: Information Requirements of Key Decision-Making Groups in a Firm [Source:(Laudon & Laudon, 2016)]

In the wide range of different decision types, (Simon, 1960) distinguished between two extremes, programmed decisions and non-programmed decisions:

Programed decisions: is borrowed from, and used in the same way as in the computer world. A program is essentially a list of instructions or strategies executed in a certain order. Thus, programmed decisions are repetitive and routine. They follow definite processes or procedures which are well-known, defined, and do not have to be treated as new every time they occur. Examples of programmed decisions are: sending out invoices; reorder supplies; paying a vendor.

Non-programmed decisions: are unstructured and unusually consequential. No best practice for handling the problem exists because the problem has not occurred before, the problem is of such complex nature, or the problem has such high importance that it requires additional attention and handling. The decision to move manufacturing abroad or outsource the IT department are typical non-programmed decisions. He pointed out how decisions exist in every shade of gray in this spectrum and programmed and non-programmed are simply the far extremes.

2.2.2 Decision Making Process

Although the scope and impact of a decision varies greatly from one level in the organizational to another (Simon, 1960) argued that some generalization is possible. According to him, decision making includes four distinct phases. The first phase is finding situations for making a decision, intelligence. The second phase is referred to as design, where different courses of action are investigated. In the third phase, one of the available courses of action is chosen. He named as the choice activity. The fourth phase is implementation, involves making the chosen alternative work and continuing to monitor how well the solution is working. These phases are illustrated in Figure 2.14 below.

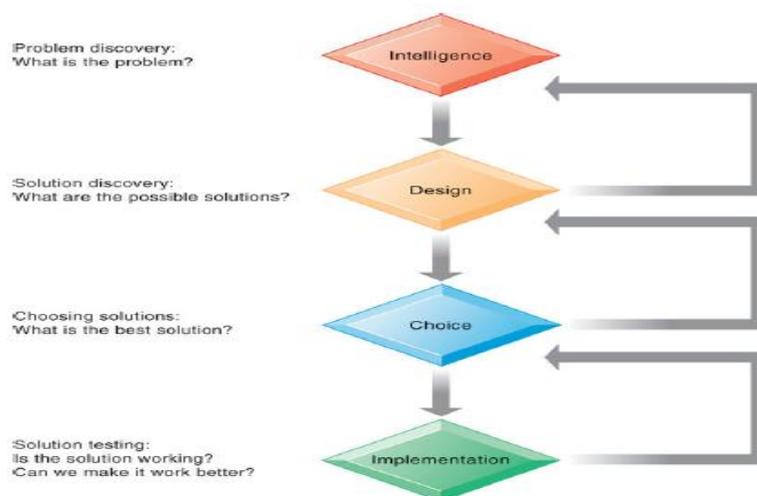


Figure 2.14: Decision-Making Process
[Source: (Simon, 1960)]

2.2.3 Factors Affecting the Decision Making Process

(Larbi et al., 2013) pointed that decision making is influenced by many factors:

- Behavior and personality of the decision maker;
- Structure and corporate culture;
- Level of rationality;
- The nature of the decision;
- Environment;
- Strategic lines of business;
- Performance objectives.

2.2.4 Technology-Mediated Decision Making

Hansoti (2010) suggested that decision making process consists of making judgments regarding several investments and resources based on the quantitative and qualitative data. There are several different systems like data warehouse, Enterprise Resource Planning (ERP), etc currently used by organizations for decision making processes. These systems have progressed tremendously in the last few years by making large amounts of information accessible using data marts and data warehouses (Wixom & Watson, 2001). These systems allow managers to analyze data depending upon the business requirements. These systems have made the decision-making process easy to a certain extent, but if not used effectively, they can prevent optimization of the decision making process. Visualization is function of business intelligence systems that used to make data more understandable and clear to end users. Decision makers can browse the interface and analyze data in real time and examine organizational performance data (W. Eckerson, 2003).

2.3 Palestine Telecommunication Company (Paltel)

2.3.1 Paltel Group

Paltel Group started its operations in Palestine in 1997 with Paltel, the public shareholding company.

The Group provides state of the art services to the Palestinian community. Its services include: Local and international fixed telephony services, internet, data communications, mobile services and next generation services. Paltel Group was able to achieve the highest standard in telecommunication services by wisely investing in modern technologies, telecom infrastructure and human resource development (PaltelGroup, 2012).

Today Paltel Group consists of the following subsidiaries (PaltelGroup, 2012):

- *Palestine Telecommunications Company (Paltel)*, which provides fixed line, internet and other value added services.

- *Palestine Cellular Communications Company (Jawwal)*, the first mobile operator in Palestine.
- *Hadara Technology Investment Company*, the leading internet service provider in Palestine.
- *Reach for Communications Services Company*, the first contact center in *Palestine Palmedia for Multimedia Services Company*, the media arm of Paltel Group.
- *Hulul IT Company*, the IT arm of Paltel Group.

On the off-shore investments side, the Group holds a 25.3% stake in Vtel holdings and Vtel MEA shares; Vtel is registered at the Dubai International Financial Center (DIFC) one of the most reputable financial centers in the region. Vtel share ownership is considered to be an important achievement in the company's goals towards growth and expansion.

Paltel Group significantly contributes to the Palestinian GDP, in addition, Paltel stock represents 33% of the total market CAP of the Palestine Exchange (PEX) at the end of 2012. Paltel's net earnings grew rapidly during the past years which provided the company with financial stability to further invest in technology and development across the ICT industry. Furthermore, Paltel Group is the biggest employer in Palestinian private sector with more than 3000 employees(PaltelGroup, 2012).

2.3.2 About Paltel

Paltel aims at enriching the lives of its subscribers through providing creative and entertaining solutions for both corporate and residential lines as a reward to their loyalty. The company achieves this through providing innovative and distinguished telecom services of high quality including fixed line, internet and data in addition to value added services. To this end, Paltel strives to continue leading the telecom and IT sector in Palestine since it was incorporated more than 15 years ago as the first company in Paltel Group.

Paltel vision statement is to enrich the life of our subscribers with innovative communication and entertainment solutions that allow the subscriber to live life the way he wants it. While its mission statement is to provide high quality services, with competitive prices that meet their customers' expectations which lead them to new horizons in the world of telecommunications (PaltelGroup, 2012).

2.3.3 Paltel Information Systems

Paltel is a Palestinian leader Company which has a technology strategy in case IT systems are frequently updated and applications are frequently developed to adapt with the rapid acceleration in technologies (Elkrunz, 2013).

Paltel has two BI systems to cover all Paltel departments and services as follow:

1. CRM for commercial and technical departments.
2. Oracle BI for financial and administrative departments.

Another information systems used in Paltel, that are:

1. Geographical Information System “GIS”.
2. E-help System for technical support to the employees.
3. E-Info System is to provide information about the work to the employees.

2.4 Previous Studies:

Business intelligence in general and Dashboard in particular are considered to be modern topics, and until these days, the studies are not enough compared with the importance of the subject, as well as the scarcity of the Arabic studies that have addressed the issue of the business intelligence, so through this section will highlight some of the studies that addressed the issue of the BI Dashboard and some studies that addressed business intelligence. These studies have been classified according to the history of the publication from latest to older, as follows:

a) (Elkrunz, 2013) “The Role of Implementing Mobile Business Intelligence (MBI) in Decision Making Process: An Empirical research at Jawwal Company”

This research aimed to implement Mobile Business intelligence (MBI) system for Jawwal Company which is user-driven business intelligence that helps people make decisions based on multiple sources of insight: data, people, and the environment.

The research used the descriptive analytical approach and utilized both primary and secondary sources for data collection. The research population was composed of Jawwal employees in Gaza strip and West Bank. 307 of the 350 distributed questionnaires have been retrieved, forming a recovery percentage of 87.8%.

The findings from the data analysis clearly showed the employees’ approval of implementing MBI system and there exists significant positive effect of implementing MBI on Decision Making Process at Jawwal Company. Also Jawwal is very ready for implementing MBI system in addition to that all hierarchal levels of Jawwal employees are in need of implementing MBI and the implementing will add a competitive advantage for Jawwal Company. Also the findings showed that Mobile based Applications will rapidly replace the desktop applications and give the ability to integrate with enterprise applications such as CRM. The research recommended that Jawwal should invest to become “a knowledge bank” of MBI services and solutions, be prepared to provide a seal of approval for mobile applications, identify partners to facilitate a go-to-MBI strategy.

b) (Njuguna, 2013) “Adoption of Business intelligent Dashboard and Decision Making at Kenya Power”

The main objective of this research was to examine the benefits, challenges of BI dashboard system and performance implications of the new system in Kenya Power. A descriptive survey was carried out with questionnaire being used to gather information. A sample of 50 staff members was used that is 15% of the target population. All staff surveyed from this Kenya Power filled in and returned the questionnaires. Quantitative data was received and analyzed using the computer programs and statistical programs. The findings from the research showed that BI dashboard system has had a major impact in the company and it continues to influence the business processes in Kenya Power in a positive way, another findings of this research that dashboard is used more frequently by higher management and non-technical people, but users acknowledged that dashboard keep everyone in the organization constantly informed about the different processes and action plan being undertaken in various departments. However the staff strongly agreed that data accuracy act as a major hindrance to decision making process. This is attributed to the fact that data is gathered from different systems in the organization and when the system do not integrate well with dashboard, the accuracy of the information is compromised, although there are few challenges but these are minimal considering the larger picture of the benefits and decision making improvement that have so far been achieved.

c) (Larbi et al., 2013) “Dashboard as a Tool for Decision Support Development in Algeria”

This paper aimed to study use of the dashboard in the decision-making in different sectors in Algeria. It considered an explanatory framework for practical dashboards. This paper used an empirical research. Thus, the survey questionnaire was sent by mail, electronically, after collecting data from 42 firms, they were subjected to an exploratory analysis. The results showed that the majority of institutions in the interrogation of 57% using the dashboard in the decision and the majority of the sector of services which can be traced back to the nature of the product, as well as sector NTIC. The industrial sector is using the dashboard, but do not use it in decision-making and remains the agriculture sector does not use the dashboard and in the majority of them do not know it. And result show that the sectors that rely more on organizational restructuring and decision-making, use of the dashboard and more, and whenever the absence of a regulatory decision-making and have a personal whenever used dashboard less.

d) (Azzawi, 2013) “The utilization of business intelligence systems in the development of human capital: an exploratory study in the ministry of Health”

This research aimed to know the role of business intelligence systems in the development of human capital. A descriptive survey was carried out with questionnaire being used to gather information of the sample of 31 staff members in the ministry of Health in Bagdad. There was a set of findings which most of them assured the existence of correlation coefficient and impact among the business intelligence systems and the development of the human capital in the intended organization, therefore, the research recommended the necessary for the mean organization to develop its human capital. Through reviewing the experiments of the development counties and making use of them in addition to providing all the necessary requirements.

e) (Velcu-Laitinen & Yigitbasioglu, 2012) “The use of dashboards in performance management: evidence from sales managers”

This paper is aimed to identify and empirically examine the key features, purposes, uses, and benefits of performance dashboards. The population of the research was companies in Finland with a turnover of at least 1 million EUR regarding the 2010 Financial Year. The target respondents for the survey were high level sales managers. 145 of the 851 distributed questionnaires have been retrieved, forming a recovery percentage of 17%. This paper found that only about a quarter of the sales managers surveyed in Finland used a dashboard, which was lower than previously reported. Dashboards were used for four distinct purposes: monitoring, problem solving, rationalizing, and communication. There was a high correlation between the different uses of dashboards and user productivity indicating that dashboards were perceived as effective tools in performance management, not just for monitoring performance but for other purposes including communication. The quality of the data in dashboards did not seem to be a concern (except for completeness) but it was a critical driver regarding its use. The research highlights the research potential and benefits of dashboards, which could be valuable for future researchers and practitioners.

f) (Mohammad, 2012) “The Impact of Business Intelligence and Decision Support on the Quality of Decision Making”

The main objective of this research was to explore the impact of Business Intelligence and decision support on the quality of decision making in Five Stars Hotels in Amman Capital. This research was applied on Five Stars Hotels in Amman Capital, and took the samples from the middle and top management. The populations of the research was the Five Stars hotels in Amman capital. The researcher selected a random sample consists of 150 managers will be chosen from the top and middle management in the Five Stars Hotels in Amman capital. After distributing 150 questionnaires of the research sample, a total of 121 answered questionnaires were retrieved, of which 8 were invalid. Therefore, 113 answered questionnaires were valid for research.

The research came to show high level of importance for the research variables in Five Stars Hotels, and showed there is a significant positive direct impact of Business Intelligence on decision making quality, information quality and content quality in Five Stars Hotels in Amman Capital. Finally, this research set the following recommendations: the Five Stars Hotels must build an integrated model to maximize net profit from using decision support systems. Also it operates the proposed model based on the outcomes of demand forecasting model, the data of actual fact, estimated data for several alternative scenarios, to reach appropriate net profit in light of business processes and Business Intelligence relationships.

g) (Karlsen & Eidene, 2012) “Real Time Business Intelligence and Decision-Making”

This research aimed to show why there is a need for a real time business intelligence solution and how that can change the current decision processes and make them more efficient. Further it indicates that there are challenges to the current decision processes that need to be addressed. This research was conducted as a qualitative exploratory case study in the Byggma group, with 16 face-to-face interviews.

The research concluded that a real time business intelligence solution would be beneficial for supporting the operational and tactical layers of decision making within an organization. By implementing an RTBI solution, it would provide the decision maker with fresh and reliant data to base the decisions on. Visualization of the current decision processes showed that by adding a real time business intelligence solution it would help eliminate the use of intuition, as there would be more data available and the decisions can be made where the work is performed.

The case study contributes to research by visualizing how a real time business intelligence solution can shorten a complex decision process by giving the correct information to the right people. It also shows that factors used when there is not sufficient information available, can be eliminated. Further it suggests that organizations need to address potential challenges as part of a pre-project of a real time business intelligence implementation.

h) (Yigitbasioglu & Velcu, 2012) “A Review of Dashboards in Performance Management: Implications for Design and Research”

This paper aimed to identify the critical issues organizations might need to consider when implementing dashboards. It conducted a comprehensive multidisciplinary literature review. This paper showed that dashboards are likely to succeed and solve the problems of presentation format and information load when certain visualization principles and features are present (e.g. high data-ink ratio and drill down features). It recommended that dashboards come with some level of flexibility, i.e. allowing users to

switch between alternative presentation formats. Also some theory driven guidance through popups and warnings can help users to select an appropriate presentation format.

i) (Hansoti, 2010) “Business Intelligence Dashboard in Decision Making”

This research focused on evaluating the effectiveness of a business intelligence dashboard in the decision making process across three different departments and also drew a comparative analysis between the usages of different functionalities across the three departments. The population being considered for this research was a group of employees who are familiar with business intelligence dashboards and have experience working with them. This research dealt with conducting in depth interviews and surveys with five-seven employees from three different departments in a manufacturing organization.

This research confirmed that there was a difference between the effectiveness and usages of dashboard across different departments. Results of the quantitative data indicated that there was no significant difference between the effectiveness of a dashboard across the three departments. The mean response of the Supply Chain department was less than that of Information Technology and Sales and Marketing. The qualitative interview responses indicated that users from the Supply Chain department were not happy with the limited access and response rate of the dashboard. Also, there was a statistically significant difference seen with the use of the data filtering capability functionality. The Information Technology department used the function more as compared to Supply Chain and Sales and Marketing. Based on the job function, effectiveness of dashboard varied. In conclusion, this research helped in identifying the difference between the usages of dashboard across the three departments and also identified additional features that should be added to the dashboard to improve its performance and effectiveness.

j) (Marshall & De la Harpe, 2009) “Decision making in the context of business intelligence and data quality”

This article aimed to identifying the underlying factors that prevent information from being easily and effectively utilized and understanding how these factors can influence the decision-making process, particularly within a BI environment. This article used a qualitative approach. An exploratory investigation was conducted at a large retail organization in South Africa to collect empirical data from BI users through unstructured interviews.

Some of the main findings indicated specific causes that impact the decisions of BI users, including accuracy, inconsistency, understandability and availability of information. Key performance measures that are directly impacted by the quality of data on decision-making include waste, availability, sales and supplier fulfilment. The time spent on investigating and resolving data quality issues has a major impact on productivity. The importance of documentation was highlighted as an important issue that requires further investigation.

The initial results indicate the value of research to investigate information quality in a BI environment.

k) (Andersson et al., 2008) “Business Intelligence: The Impact on Decision Support and Decision Making Processes”

This research aimed to investigate if and how Business Intelligence has changed decision support and decision making processes. This research used a qualitative approach with semi-structured elite interviews at the manufacturing industry located in the Jonkoping region in Sweden.

The research analysis showed positive effects of Business Intelligence in organizations with improvements of decision support due to timeliness, accessibility, quality, and better control of organizational information. As improvements in decision support has occurred, decision making has become better. Complicated problems are now easier to interpret by decision makers. This research also concludes that intuition still has a major impact in decision making processes.

l) (Hurwitz et al., 2005) “Dashboards - Enabling Insight and Action”

This paper aimed to evaluate the using of dashboard in the large companies which had implemented or were planning to implement dashboards. This paper surveyed 113 of IT executives at the targeted companies. The purpose of the survey was to understand the driving demand for business dashboards and assess corporate requirements for implementing them. The results of the survey support their general market observations about the importance of dashboards to companies, the value that dashboards provide, as well as provide a basis for requirements moving forward.

The paper found that management’s use of business dashboards in large companies is growing and is widespread across industries. It also found that IT Executives considering implementing dashboards were being met by their current methods of disseminating information. Based on the value dashboards are creating for current users, more than half of the IT executives surveyed are planning to add 500 or more additional business dashboard users within the next eighteen months. The paper also highlighted that Dashboards provide a visualization value to information that improves management decision-making by enabling a more rapid response to changes in key performance indicators.

The following table will address the previous empirical studies related to this research:

Table 2.3: Empirical Researches

Research	Variables	Main findings
(Elkrunz, 2013)	<ul style="list-style-type: none"> • MBI Features • MBI Functions • MBI Applications • Jawwal maturity level • Beneficiaries • Decision Making 	<ul style="list-style-type: none"> • There is positive effect of implementing MBI on Decision Making Process • Jawwal is very ready for implementing MBI system • All hierarchal levels of Jawwal employees are in need of implementing MBI • Mobile based Applications will rapidly replace the desktop applications
(Njuguna, 2013)	<ul style="list-style-type: none"> • BI Dashboard Implications • BI Dashboard Benefits • BI Dashboard Challenges • Decision Making 	<ul style="list-style-type: none"> • Dashboard assist in the decision making process • BI dashboard system has a positive impact • There are few serious challenges that need to be addressed
(Larbi et al., 2013)	<ul style="list-style-type: none"> • BI Dashboard usage • Decision Making 	<ul style="list-style-type: none"> • Majority of institutions in the interrogation using the dashboard in the decision making
(Azzawi, 2013)	<ul style="list-style-type: none"> • BI Systems • Human Capital 	<ul style="list-style-type: none"> • Existence of correlation coefficient and impact among the business intelligence systems and the development of the human capital in the intended organization
(Velcu-Laitinen & Yigitbasioğlu, 2012)	<ul style="list-style-type: none"> • Dashboard Features • Dashboard Benefits • Dashboard Purposes • Performance Management 	<ul style="list-style-type: none"> • A quarter of the sales managers surveyed in Finland used a dashboard. • Dashboards were used for monitoring, problem solving, rationalizing, and communication. • Dashboards were perceived as effective tools in performance management.
(Mohammad, 2012)	<ul style="list-style-type: none"> • Information Quality • BI • Content Quality • Decision Making Quality 	<ul style="list-style-type: none"> • there is a significant positive direct impact of Business Intelligence on decision making quality, information quality and content quality in Five Stars Hotels in Amman Capital
(Karlsen & Eidene, 2012)	<ul style="list-style-type: none"> • RTBI • Decision-making 	<ul style="list-style-type: none"> • Real time business intelligence solution would be beneficial for supporting the operational and tactical layers of decision making within an organization • It would provide the decision maker with fresh and reliant data to base the decisions on
(Yigitbasioğlu & Velcu, 2012)	<ul style="list-style-type: none"> • Dashboard Features • Data quality • Performance Management 	<ul style="list-style-type: none"> • Dashboards were perceived as effective tools in performance management • The quality of the data in dashboards was a critical driver regarding its use

Table 2.3: Empirical Studies (continue)

Research	Variables	Main findings
(Hansoti, 2010)	<ul style="list-style-type: none"> • BI Dashboard Features • BI Dashboard Benefits • Decision Making 	<ul style="list-style-type: none"> • there was no significant difference between the effectiveness of a dashboard across the departments • there was a statistically significant difference seen with the use of the data filtering capability functionality. • The Information Technology department used the function more as compared to other departments
(Marshall & De la Harpe, 2009)	<ul style="list-style-type: none"> • Decision Making • Data Quality • BI 	<ul style="list-style-type: none"> • Key performance measures that are directly impacted by the quality of data on decision-making The time spent on investigating and resolving data quality issues has a major impact on productivity • The importance of documentation was highlighted as an important issue that requires further investigation • The initial results indicate the value of research to investigate information quality in a BI environment.
(Andersson et al., 2008)	<ul style="list-style-type: none"> • Business Intelligence • Decision Support • Decision Making 	<ul style="list-style-type: none"> • Positive effects of Business Intelligence in organizations with improvements of decision support • Decision making has become better • Complicated problems are now easier to interpret by decision makers
(Hurwitz et al., 2005)	<ul style="list-style-type: none"> • Dashboard Benefits • Dashboard Usage • Dashboard Requirements 	<ul style="list-style-type: none"> • management’s use of business dashboards in large companies is growing • IT Executives considering implementing dashboards were being met by their current methods of disseminating information • more than half of the IT executives surveyed are planning to add 500 or more additional business dashboard users within the next eighteen months • Dashboards provide a visualization value to information that improves management decision-making

2.5 Research Distinction

After reading and through examining the previous studies that related to the subject of this research, It can be concluded that the most of those studies was conducted on organizations that implemented the business intelligence systems, so the researchers studied the business intelligence tools adopted previously, while some of other researches concerned on the role of adopting other business intelligence tools as (Elkrunz, 2013) that studied mobile business intelligence. By these thesis, the researcher studied the impact of business intelligence dashboard before adopting it in the Palestinian communication company, and will focus to build dependable Business Intelligence Dashboard.

Chapter Three

Research Methodology

This chapter consists of the following sections:

3.1 Introduction

3.2 Research Design

3.3 Research Methodology:

 3.3.1 Data Collections

 3.3.2 Population and sample

3.4 Data Measurement

3.5 Statistical analysis Tools

3.6 Pilot Study

3.7 Questionnaire Validity

 3.7.1 Content Validity of the Questionnaire

 3.7.2 Statistical Validity of the Questionnaire

3.8 Test of Normality

3.1 Introduction

This chapter describes the methodology that was used in this research. The adopted methodology to accomplish this research uses the following techniques: the information about the research design, research population, questionnaire design, statistical data analysis, content validity and pilot study.

3.2 Research Design

Figure (3.1) shows the methodology flowchart, which leads to achieve the research objective.

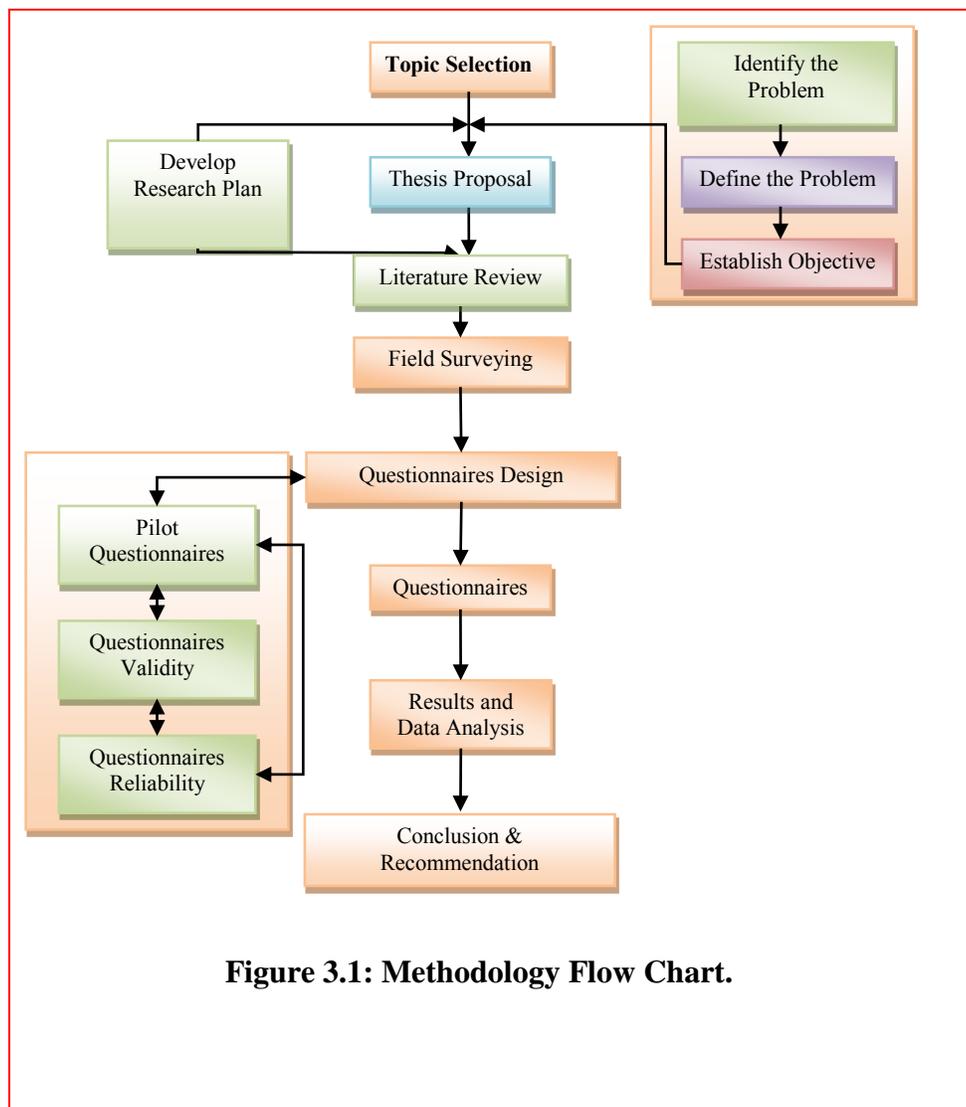


Figure 3.1: Methodology Flow Chart.

3.3 Research Methodology:

This section describes data collection tools to accomplish the research and selects the population and sample for the research.

3.3.1 Data Collections

As the exploratory research follows the analytical descriptive approach, different tools to collect primary and secondary data were utilized as follows:

Secondary data

To introduce the literature review of the subject, the following data sources were used:

- Periodicals, published papers and articles.
- Reports and statistics
- Web sites.
- Books.

Primary data

To collect the primary data of the research, a questionnaire was developed based on the literature and has been modified regarding the supervisor's recommendations and finally distributed to the sample of the research (Appendix 1, 2). The questionnaire consists of two parts:

- Part one: Include the personal and professional information about the respondents.
- Part two: Include the five dimensions of the research, which are:
 1. Existence of BI Dashboard features in the current information systems of Paltel.
 2. Paltel Readiness level of implementing BI Dashboard.
 3. Need of BI Dashboard features at Paltel.
 4. Benefit of BI Dashboard on decision-making process at Paltel.
 5. Effect of the level of business and department needed for creating BI Dashboard on decision-making process at Paltel.

3.3.2 Population and sample

The research population consist of 172 employees of Paltel in Gaza Strip using Paltel Information Systems.

Kasiulevicius et al. (2006) indicate that (Taro, 1967) provided a simplified formula to calculate sample sizes according to the following equation:

$$N = \frac{NP}{1 + (NP \times e^2)}$$

Where:

N: Sample size

NP: Is the size of population

E: Is the level of precision errors= 0.05

After applying the previous equation, it is clear that the sample size will be 120 employees. 108 of the 120 distributed questionnaires have been retrieved, forming a recovery percentage of 90%.

3.4 Data Measurement

In order to be able to select the appropriate method of analysis, the level of measurement must be understood. For each type of measurement, there is/are an appropriate method/s that can be applied and not others. In this research, ordinal scales were used. Ordinal scale is a ranking or a rating data that normally uses integers in ascending or descending order. The numbers assigned to the important (1,2,3,4,5) do not indicate that the interval between scales are equal, nor do they indicate absolute quantities. They are merely numerical labels. Based on Likert scale we have the following:

Item	<i>Strongly agree</i>	<i>Agree</i>	<i>Do not Know</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
Scale	5	4	3	2	1

3.5 Statistical analysis Tools

The researcher used both qualitative and quantitative data analysis methods. The Data analysis made utilizing (SPSS 22). The researcher utilize the following statistical tools:

- 1) Kolmogorov-Smirnov test of normality.
- 2) Pearson correlation coefficient for Validity.
- 3) Cronbach's Alpha for Reliability Statistics.
- 4) Frequency and Descriptive analysis.
- 5) Parametric Tests (One-sample T test, Independent Samples T-test and Analysis of Variance (ANOVA)).

T-test is used to determine if the mean of an item is significantly different from a hypothesized value 3 (Middle value of Likert scale). If the P-value (Sig.) is smaller than or equal to the level of significance, $\alpha \leq 0.05$ then the mean of an item is significantly different from a hypothesized value 3. The sign of the Test value indicates whether the mean is significantly greater or smaller than hypothesized value 3. On the other hand, if the P-value (Sig.) is greater than the level of significance $\alpha \geq 0.05$, then the mean an item is insignificantly different from a hypothesized value 3.

The Independent Samples T-test is used to examine if there is a statistical significant difference between two means among the respondents toward the impact of implementing business intelligence dashboard on decision making: an empirical research at Paltel Company due to (Gender, Educational Attainment and Managerial Level).

The One- Way Analysis of Variance (ANOVA) is used to examine if there is a statistical significant difference between several means among the respondents toward the impact of implementing business intelligence dashboard on decision making: an empirical research at Paltel company due to (Age, Field of Specialization, Total years of Experience and Department).

3.6 Pilot Study

A pilot study of 30 respondents for the questionnaire was conducted before collecting the results of the sample. It provides a trial run for the questionnaire, which involves testing the wordings of question, identifying ambiguous questions, testing the techniques that used to collect data, and measuring the effectiveness of standard deviation to respondents.

3.7 Questionnaire Validity

Validity refers to the degree to which an instrument measures what it is supposed to be measuring. Validity has a number of different aspects and assessment approaches. Content validity is used to evaluate the scope of the questionnaire, while the statistical validity is used to evaluate instrument validity, which include internal validity and structure validity.

3.7.1 Content Validity of the Questionnaire

Content validity test was conducted by consulting 10 academics' judgments (Appendix 3). The experts were requested to evaluate and identify whether the questions agreed with the scope of the items and the extent to which these items reflect the concept of the research problem. Also, to evaluate that the instrument used is valid statistically and that the questionnaire was designed well enough to provide relations and tests between variables. The experts did agree that the questionnaire was valid and suitable enough to measure the concept of interest with some simple modifications.

3.7.2 Statistical Validity of the Questionnaire

Internal Validity

Internal validity of the questionnaire is the first statistical test that used to test the validity of the questionnaire. It is measured by a scouting sample, which consisted of 30 questionnaires through measuring the correlation coefficients between each item in one field and the whole field.

Table 3.1 clarifies the correlation coefficient for each item of the "Existence of BI Dashboard features in the current information systems of Paltel" and the total of the field. The p-values (Sig.) are less than 0.05, so the correlation coefficients of this field are significant at $\alpha \leq 0.05$, so it can be said that the items of this field are consistent and valid to be measure what it was set for.

Table 3.1: Correlation coefficient of each item of Existence of BI Dashboard Features

No.	Item	Pearson Correlation Coefficient	P-Value (Sig.)
1.	Showing data in different ways (e.g. charts, tables, maps, graphs and gauges)	.660	0.000*
2.	Drill-Down information into more detailed data, eg: show the information about any operation included in operations menu in details	.632	0.000*
3.	Data filtering capabilities which allow displaying and getting the information related to the required subject according to the conditions set by the user” eg: Adding a condition on the date to view the data of current year	.712	0.000*
4.	Providing real-time data directly and continuously	.685	0.000*
5.	Accessing to the required information from different databases of the company through a single interface	.621	0.000*
6.	Presenting data in visual format through maps and charts with the support of text	.779	0.000*
7.	Customizing views for different users; i.e. by role, geography, access privileges, department and other variations	.669	0.000*
8.	The important information such as keys performance indicators is shown on one integrated screen which summarized latest updates data and reports	.776	0.000*

* Correlation is significant at the 0.05 level

Table 3.2 clarifies the correlation coefficient for each item of the Paltel Readiness level of implementing BI Dashboard" and the total of the field. The p-values (Sig.) are less than 0.05, so the correlation coefficients of this field are significant at $\alpha \leq 0.05$, so it can be said that the items of this field are consistent and valid to be measure what it was set for.

Table 3.2: Correlation coefficient of each item of Paltel Readiness Level

No.	Item	Pearson Correlation Coefficient	P-Value (Sig.)
1.	Paltel has a technology strategy (IT systems are frequently updated and applications are frequently developed to adapt with the rapid acceleration in technologies)	.795	0.000*
2.	Paltel employees enjoy the required competencies to use new technologies.	.757	0.000*
3.	I do collect the substantial related information about the work problems before making decisions using company information systems	.810	0.000*
4.	I encourage my company to build and implement BI Dashboard	.891	0.000*
5.	Business challenges (strategy, Readiness level and ROI measures) will not prevent implementing BI Dashboard in Paltel	.895	0.000*
6.	Technical challenges (security, data quality, data integration with multiple source system, design) will not prevent implementing MBI in Paltel	.838	0.000*
7.	The BI Dashboard as a new technologies will complement existing investments at Paltel	.841	0.000*
8.	Implementing BI Dashboard Strength a competitive advantage for Paltel.	.852	0.000*

* Correlation is significant at the 0.05 level *

Table 3.3 clarifies the correlation coefficient for each item of the “Need of BI Dashboard Features at Paltel” and the total of the field. The p-values (Sig.) are less than 0.05, so the correlation coefficients of this field are significant at $\alpha \leq 0.05$, so it can be said that the items of this field are consistent and valid to be measure what it was set for.

Table 3.3: Correlation coefficient of each item of “Need of BI Dashboard Features”

No.	Item	Pearson Correlation Coefficient	P-Value (Sig.)
1.	Showing data in different ways (e.g. charts, tables, maps, graphs and gauges)	.774	0.000*
2.	Drill-Down information into more detailed data, eg: show the information about any operation included in operations menu in details	.774	0.000*
3.	Data filtering capabilities which allow displaying and getting the information related to the required subject according to the conditions set by the user” eg: Adding a condition on the date to view the data of current year	.854	0.000*
4.	Providing real-time data directly and continuously	.772	0.000*
5.	Accessing to the required information from different databases of the company through a single interface	.887	0.000*
6.	presenting data in visual format through maps and charts with the support of text	.840	0.000*
7.	Customizing views for different users; i.e. by role, geography, access privileges, department and other variations	.875	0.000*
8.	The important information such as keys performance indicators is shown on one integrated screen which summarized latest updates data and reports	.809	0.000*

* Correlation is significant at the 0.05 level

Table 3.4 clarifies the correlation coefficient for each item of the “Benefit of BI Dashboard on Decision-Making Process at Paltel” and the total of the field. The p-values (Sig.) are less than 0.05, so the correlation coefficients of this field are significant at $\alpha \leq 0.05$, so it can be said that the items of this field are consistent and valid to be measure what it was set for.

Table 3.4: Correlation coefficient of each item of BI Dashboard Benefits

No.	Item	Pearson Correlation Coefficient	P-Value (Sig.)
1.	Maximizing the efficiency of the decision making process	.898	0.000*
2.	Facilitating the decision-making process	.917	0.000*
3.	Speeding up the decision-making process	.898	0.000*
4.	Assisting in identifying problems much faster	.870	0.000*
5.	Improving accuracy of business decisions	.908	0.000*
6.	Improving accuracy of data	.901	0.000*
7.	Assisting in assigning clear responsibilities for the employees and implementing decentralization in decisions-making process	.802	0.000*
8.	Reducing manual work	.781	0.000*

* Correlation is significant at the 0.05 level

Table 3.5 clarifies the correlation coefficient for each item of the “The Effect of The Level of Business and Department is needed for Creating BI Dashboard Implementation on Decision-Making Process at Paltel ” and the total of the field. The p-values (Sig.) are less than 0.05, so the correlation coefficients of this field are significant at $\alpha \leq 0.05$, so it can be said that the items of this field are consistent and valid to be measure what it was set for.

Table 3.5: Correlation coefficient of each item of Beneficiaries

No.	Item	Pearson Correlation Coefficient	P-Value (Sig.)
1.	I need a real time updates of information and reports which help me in decision making process	.911	0.000*
2.	When I’m showing the information in visual display, this facilitate my work and help me in taking affective decisions.	.883	0.000*
3.	My job nature enhanced when using dashboard at Paltel	.938	0.000*
4.	If I have BI Dashboard application on my desktop to immediate access and manipulate the required data of valuable resource, will that help me in decision making process	.884	0.000*
5.	My hierarchical level of Paltel is needed to implement BI Dashboard	.847	0.000*
6.	My Department of Paltel employees is needed to implement BI Dashboard	.902	0.000*
7.	BI Dashboard will enhance my job’s effectiveness	.929	0.000*
8.	BI Dashboard will enable me to accomplish tasks more quickly	.909	0.000*

* Correlation is significant at the 0.05 level

Structure Validity

Structure validity is the second statistical test that used to test the validity of the questionnaire structure by testing the validity of each field and the validity of the whole questionnaire. It measures the correlation coefficient between one field and all the fields of the questionnaire that have the same level of liker scale.

Table 3.6 clarifies the correlation coefficient for each field and the whole questionnaire. The p-values (Sig.) are less than 0.05, so the correlation coefficients of all the fields are significant at $\alpha \leq 0.05$, so it can be said that the fields are valid to be measured what it was set for to achieve the main aim of the research.

Table 3.6: Correlation coefficient of each field and the whole of questionnaire

No.	Field	Pearson Correlation Coefficient	P-Value (Sig.)
1.	Paltel Readiness Level of Implementing BI Dashboard at Paltel	.911	0.000*
2.	Need of BI Dashboard Features at Paltel	.936	0.000*
3.	Benefit of BI Dashboard on Decision-Making Process at Paltel	.931	0.000*
4.	Effect of The Level of Business and Department is needed for Creating BI Dashboard Implementation on Decision-Making Process at Paltel	.959	0.000*

* Correlation is significant at the 0.05 level

3.8 Test of Normality

The One-Sample Kolmogorov-Smirnov test procedure compares the observed cumulative distribution function for a variable with a specified theoretical distribution, which may be normal, uniform, Poisson, or exponential. The Kolmogorov-Smirnov Z is computed from the largest difference (in absolute value) between the observed and theoretical cumulative distribution functions. This goodness-of-fit test tests whether the observations could reasonably have come from the specified distribution. Many parametric tests require normally distributed variables. The one-sample Kolmogorov-Smirnov test can be used to test that a variable of interest is normally distributed (Thode, 2002).

Table 3.7 shows the results for Kolmogorov-Smirnov test of normality. From Table 3.1, the p-value for each variable is greater than 0.05 level of significance, then the distributions for these variables are normal distribution. Consequently, parametric tests should be used to perform the statistical data analysis.

Table 3.7: Kolmogorov-Smirnov test

Field	Kolmogorov-Smirnov	
	Statistic	P-value
Existence of BI Dashboard features in the current information systems of Paltel	0.800	0.545
Paltel Readiness level of implementing BI Dashboard	0.768	0.597
Need of BI Dashboard features at Paltel	0.783	0.572
Benefit of BI Dashboard on decision-making process at Paltel	0.980	0.293
Effect of The Level of Business and Department is needed for Creating BI Dashboard Implementation on Decision-Making Process at Paltel	0.881	0.419
All items of the questionnaire	0.971	0.302

3.9 Reliability of the Research

The reliability of an instrument is the degree of consistency which measures the attribute; it is supposed to be measuring (George & Mallery, 2006). The less variation an instrument produces in repeated measurements of an attribute, the higher its reliability. Reliability can be equated with the stability, consistency, or dependability of a measuring tool. The test is repeated to the same sample of people on two occasions and then compares the scores obtained by computing a reliability coefficient (George & Mallery, 2006). To insure the reliability of the questionnaire, Cronbach's Coefficient Alpha should be applied.

Cronbach's Coefficient Alpha

Cronbach's alpha is designed as a measure of internal consistency, that is, do all items within the instrument measure the same thing? The normal range of Cronbach's coefficient alpha value between 0.0 and + 1.0, and the higher values reflects a higher degree of internal consistency (George & Mallery, 2006) . The Cronbach's coefficient alpha was calculated for each field of the questionnaire.

Table 3.8 shows the values of Cronbach's Alpha for each field of the questionnaire and the entire questionnaire. For the fields, values of Cronbach's Alpha were in the range from 0.830 and 0.971. This range is considered high; the result ensures the reliability of each field of the questionnaire. Cronbach's Alpha equals 0.983 for the entire questionnaire which indicates an excellent reliability of the entire questionnaire.

Table 3.8: Cronbach's Alpha for each field of the questionnaire

No.	Field	Cronbach's Alpha
1.	Existence BI Dashboard Features in the current information systems of Paltel	0.830
2.	Paltel Readiness Level of Implementing BI Dashboard at Paltel	0.942
3.	Need of BI Dashboard Features at Paltel	0.921
4.	Benefit of BI Dashboard on Decision-Making Process at Paltel	0.960
5.	Effect of The Level of Business and Department is needed for Creating BI Dashboard Implementation on Decision-Making Process at Paltel	0.971

Thereby, it can be said that the researcher proved that the questionnaire was valid, reliable and ready for distribution for the population sam

Chapter Four

Data Analysis

and Discussion

This chapter consists of the following sections:

4.1 Introduction

4.2 Statistical Description of Personal Information

4.3 Analysis and Discussion for Each Dimension in the
Questionnaire

4.1 Introduction

This chapter represents the research findings and the statistical analysis of the data collected as part of this research. The purpose of this chapter is to provide a comprehensive overview of the entire data set collected and the characteristics of the respondents. In addition, it serves to describe the statistical procedures applied to the data in order to interpret and apply the data to the research questions.

4.2 Statistical Description of Personal Information

The gender statistics in table 4.1 shows that 77.8% of the sample are Males and 22.2% of the sample are Females, which is may according to the differences in numbers between the two genders in workforce.

The age statistics in table shows that 26.9% of the sample are " Less than 30 years ", 46.3% of the sample are of " From 30 to less than 40 years ", 18.5% of the sample are of " From 40 to less than 50 years " and 8.3% of the sample are of "50 Years and more ". This indicates that the respondents are from different categories of age, but most of the respondents are under forty “youths”.

Table 4.1: Demographic Characteristics (N=108)

Demographic Characteristics		Frequency	Percent
Gender	Male	84	77.8
	Female	24	22.2
Age	Less than 30	29	26.9
	From 30 to less than 40	50	46.3
	From 40 to less than 50	20	18.5
	50 Years and more	9	8.3

Educational attainment statistics in table 4.2 shows that 6.5% of the sample are " Secondary" holders, 18.5% of the sample are "Diploma" holders, 68.5% of the sample are "Bachelor" holders and 6.5% of the sample are " High Education " holders . Paltel is one of most leading organizations in Palestine, so it is normal that most of its employees from high degree holders 75% "Master and Bachelor degree". This indicate that Paltel has good staff that will be able to deal with the new technology much easier.

Field of specialization statistics in table 4.2 shows that 51.9% of the sample are "Commerce" specialization, 14.8% of the sample are "Engineering" specialization, 9.3% of the sample are "IT" specialization and 24.1% of the sample are other specializations.

In general, the majority of workers of the company are specialized in Engineering, IT and Commerce. So it can be indicated that most Paltel employees are very specialized in their positions.

Table 4.2: Education (N=108)

Education		Frequency	Percent
Educational Attainment	Secondary	7	6.5
	Diploma	20	18.5
	Bachelor degree	74	68.5
	High Education	7	6.5
Field of Specialization	Commerce	56	51.8
	Engineering	16	14.8
	IT	10	9.3
	Other	26	24.1

Total years of experience statistics in table 4.3 shows that 26.9% of the sample have experience "Less than 5 years", 24.1% of the sample have experience "5 – Less than 10 year ", 6.5% of the sample have experience "10- less than 15 years" and 42.6% of the sample have experience" 15 years and more ". These results reflect that 73.2% of the sample has 5 years and more experience, which reflects the capabilities of the sample and can serve it by valid and qualified answers.

Managerial Level statistics in table 4.3 shows that 3.7% of the sample are classified from the top management, 24.1% of the respondents are classified from the middle management, 71.3% of the respondents are from the low management level, and this results from the fact that the number of the employees at the low level management are more than those at the middle and top management levels so that the response rate is as the required in all management levels.

Department statistics in table 4.3 shows that there was 34.3% of the respondents are working at the technical department, 43.5% of the respondents are working at the technical department, and 22.2% of the respondents are working at the administrative and financial department. These results reflect that Paltel continued operating according to its strategy that evolves around maximizing the customer satisfaction since 43.5% of the respondents deal with customers and providing the latest up-to-date technology through several running projects.

Table 4.3: Work Information (N=108)

Work Information		Frequency	Percent
Total years of Experience	Less than 5 years	29	26.8
	5- less than 10 years	26	24.1
	10-less than 15 years	7	6.5
	15 years and more	46	42.6
Managerial Level	Top Management (Director/Manager)	4	3.7
	Middle Management (Head of Section/ Head of Unit)	27	25.0
	Operational Management (Engineer /Administrator/...)	77	71.3
Department	Technical	37	34.3
	Commercial	47	43.5
	Administrative and Financial	24	22.2

4.3 Analysis and discussion for each dimension in the questionnaire

1. Extent of existence BI Dashboard features in the current information systems of Paltel.

Table 4.4 shows that:

The mean of item #4 “Providing real-time data directly and continuously” equals 2.40 (79.94%), Test-value = 6.06, and P-value = 0.000 which is smaller than the level of significance $\alpha \leq 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 2. It can be concluded that the respondents agreed " Available" to this item, and in more details, there is 55 employees can reach real time data directly, 41 employees can reach it relatively and there are a little number “12” can’t reach real time data. This result show that most Paltel employees have real time data and the Paltel Information systems are up to date.

The mean of item #6 “presenting data in visual format through maps and charts with the support of text” equals 2.01 (66.98%). there is 29 employees can present data in visual format, but the largest number have a problem in the visual presentation of it. This result shows that the visualization is the lowest feature in Paltel Information Systems. The information delivered from Paltel Information System mainly consists of texts with some visual formats. To overcome this problem, employees used assistant programs such as Microsoft Excel to obtain visual formats like chaps, figures and tables for their reports. This takes a lot of time to be performed.

The mean of the field “Extent of Existence BI Dashboard Features in the current information systems of Paltel” equals 2.17 (72.49%), so the mean of this field is

significantly greater than the hypothesized value 2. We conclude that the respondents agreed “Available” to field of “The Extent of Existence BI Dashboard Features in the current information systems of Paltel”. These results show that Paltel adopts many features of BI Dashboard relatively in its Information Systems, but the lack of fully integrated features reduces achieving the benefits of BI Dashboard in the decision-making process.

Table 4.4: Means and Test values for “Existence of BI Dashboard Features”

#	Item	Mean	S.D	Proportional mean (%)	Not Available	Available Relatively	Available	Test value	P-value (Sig.)	Rank
1.	Showing data in different ways (e.g. charts, tables, maps, graphs and gauges)	2.19	0.71	72.84	19	50	39	2.70	0.004*	4
2.	Drill-Down information into more detailed data, eg: show the information about any operation included in operations menu in details	2.24	0.82	74.69	26	30	52	3.06	0.001*	2
3.	Data filtering capabilities which allow displaying and getting the information related to the required subject according to the conditions set by the user” eg: Adding a condition on the date to view the data of current year	2.15	0.75	71.65	23	45	39	2.06	0.021*	5
4.	Providing real-time data directly and continuously	2.40	0.68	79.94	12	41	55	6.06	0.000*	1
5.	Accessing to the required information from different databases of the company through a single interface	2.10	0.73	70.13	23	49	34	1.46	0.073	6
6.	Presenting data in visual format through maps and charts with the support of text	2.01	0.73	66.98	28	51	29	0.13	0.448	8
7.	Customizing views for different users; i.e. by role, geography, access privileges, department and other variations	2.21	0.71	73.77	18	49	41	3.11	0.001*	3
8.	The important information such as keys performance indicators is shown on one integrated screen which summarized latest updates data and reports	2.10	0.74	70.06	24	49	35	1.44	0.077	7
	All items of the field	2.17	0.51	72.49				3.56	0.000*	

* The mean is significantly different from 2

2. Paltel Readiness Level of Implementing BI Dashboard at Paltel

Table 4.5 4 shows that:

The mean of item #1 “Paltel has a technology strategy (IT systems are frequently updated and applications are frequently developed to adapt with the rapid acceleration in technologies)” equals 3.95 (79.07%), Test-value = 7.67 and P-value = 0.000 which is smaller than the level of significance $\alpha \leq 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 3. It can be concluded that the respondents agreed to this item. This result shows that Paltel Company is ready to apply BI Dashboard system since that BI Dashboard system must align with IT technology to enhance decision making process.

The mean of item #6 “Technical challenges (security, data quality, data integration with multiple source system, design) will not prevent implementing BI Dashboard in Paltel” equals 3.45 (69.07%), Test-value = 4.63, and P-value = 0.000 which is smaller than the level of significance $\alpha \leq 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 3. It can be concluded that the respondents agreed to this item, but the lowest agree value to this paragraph show that the technical challenges is the biggest challenge to implement BI Dashboard in the company, because there is some technical difficulties should be overcome from the engineering department.

The mean of the field “Paltel Readiness Level of Implementing BI Dashboard at Paltel” equals 3.66 (73.18%), Test-value = 8.43, and P-value=0.000 which is smaller than the level of significance $\alpha \leq 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 3. It can be concluded that the respondents agreed to field of “The Effect of Paltel Readiness Level of Implementing BI Dashboard at Paltel ”. This result show that there is positive Readiness level at Paltel Company to adopt BI Dashboard, and the company can overcome the business and technical challenges that may be faced in implementing the new system.

This result is in line with (Computerworld, 2007); that found 61% of respondents agree that the key technology or business challenges faced or anticipated for BI tools is data integration with multiple source systems. This shows that all organizations struggle with the challenge of trying to get disparate systems to work in concert with new BI or performance management tools/solutions. It is also agree with (Njuguna, 2013); that found there are few challenges in implementing BI Dashboard, but these are minimal considering the larger picture of the benefits and decision making improvement that have so far been achieved. And also it is agree with (Elkrunz, 2013); that found 78.16% of

respondents agree that Jawwal company is ready for implementing mobile business intelligence “MBI”. And also it consistent with (Mitchell & Ryder, 2013); which pointed that developing and implementing a dashboard system provides a myriad of challenges and one of the greatest challenges relates to technology and infrastructure. Finally (Hernaus et al., 2010); consistant with results and found that business strategy has a strong positive influence on the success of BI initiative if it is aligned with IT.

Table 4.5: Means and Test values for Paltel Readiness Level

No.	Item	Mean	S.D	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	Paltel has a technology strategy (IT systems are frequently updated and applications are frequently developed to adapt with the rapid acceleration in technologies)	3.95	1.29	79.07	7.67	0.000*	1
2.	Paltel employees enjoy the required competencies to use new technologies.	3.65	1.00	72.96	6.75	0.000*	4
3.	I do collect the substantial related information about the work problems before making decisions using company information systems	3.73	1.06	74.63	7.14	0.000*	3
4.	I encourage my company to build and implement BI Dashboard	3.56	1.01	71.13	5.70	0.000*	7
5.	Business challenges (strategy, readiness level and ROI measures) will not prevent implementing BI Dashboard in Paltel	3.57	0.98	71.48	6.10	0.000*	6
6.	Technical challenges (security, data quality, data integration with multiple source system, design) will not prevent implementing MBI in Paltel	3.45	1.02	69.07	4.63	0.000*	8
7.	The BI Dashboard as a new technologies will complement existing investments at Paltel	3.61	0.99	72.15	6.36	0.000*	5
8.	Implementing BI Dashboard Strength a competitive advantage for Paltel.	3.77	1.10	75.37	7.27	0.000*	2
	All items of the field	3.66	0.81	73.18	8.43	0.000*	

* The mean is significantly different from 3

3. Need of BI Dashboard Features at Paltel

Table 4.6 shows that:

The mean of item #4 “Providing real-time data directly and continuously” equals 3.94 (78.87%), Test-value = 9.02, and P-value = 0.000 which is smaller than the level of significance $\alpha \leq 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 3. It can be concluded that the respondents agreed to this item, that the existence of this feature is fundamental to perform the tasks in an appropriate manner, especially at an operational level. Without this, most of the employees will not be able to perform their tasks.

The mean of item #1 “Showing data in different ways (e.g. charts, tables, maps, graphs and gauges)” equals 3.55 (70.93%), Test-value = 5.22, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 3. It can be concluded that the respondents agreed to this item, that showing data in different way provide more comprehensive understanding of the data and help in presenting data in appropriate manner, especially that the employees of Paltel are dealing with vast amount of data therefore, they need a way to speed up and facilitate obtaining the required information.

The mean of the field “Need of BI Dashboard Features at Paltel” equals 3.67 (73.46%), Test-value = 8.61, and P-value=0.000 which is smaller than the level of significance $\alpha \leq 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 3. This result shows that these features of BI Dashboard are desirable for Paltel Company. Paltel employees are in need of all BI Dashboard features to perform their tasks.

This result is supported by (Yusof & Othman, 2012); that found the dashboard designed has to be in real-time, include historical and future data (if possible), include colorful graphs and charts for better visual. The graphs and charts must be clickable and have a drill-down capability in order to further finding the details of information or root cause of problems. It also agree with (Hansoti, 2010); which found that the most commonly used features of BI Dashboard are data filtering capabilities, data visualization. Statistically, a significant difference was not seen in the usage of other functionalities between three departments. It also in line with (Soest, 2013); which pointed that performance dashboard should presents metrics relevant for the user in his decision making process, based on multiple sources, in a single screen. In the presentation graphical elements like colored graphs and stoplights are commonly used. To get more detailed information, the ability to drill down should be present. That way, one system can be used to monitor, analyze and manage the performance. Furthermore it is important that the different sources of data can

be linked to each other. If there are multiple information systems in use, the data inside should not exclusively be available to that system. It also agree with (Furmankiewicz et al., 2015); which pointed that effective management dashboard provides a convenient access to the required knowledge. Due to its visual, simple and interactive form, dashboard could be a perfect knowledge management tool for managers. And also agree with (Velcu-Laitinen & Yigitbasioglu, 2012); that found desired functional features of dashboards are the drill down feature that received the highest score, followed by presentation flexibility and scenario analysis. And also consistent with (W. W. Eckerson, 2006); that found dashboards use a variety of visual display elements and they pull together data from many different sources and present them in a coherent display on a single screen for easy consumption. On average, dashboards pull data from eight different sources. It also in line with (Yigitbasioglu & Velcu, 2012); that found the functional design features of the dashboard to be dependent on the purpose of the dashboard, tasks, knowledge, and personality of the user. Because of this, it is important for the dashboard to incorporate interactivity and flexibility, i.e. to be able to display data in various formats and at different levels of aggregation. This way they can offer an elegant solution to the information presentation format problem, making them useful for both spatial and symbolic tasks, as well as to users with different knowledge (e.g. Accounting) and personality (e.g. highly analytic). It also consistent with (Hurwitz et al., 2005); that found the top-related dashboard features are tailor dashboard views (by function, geography, and other factors), view both historical and time sensitive operational data, quickly take action based on real-time information and collaborate with others across regions and functional areas. Finally, it agree with (Muntean et al., 2010); that found the main characteristics of the dashboard are: use visual components; gathers data from a variety of source systems; enables drill-down or drill-through to underlying data sources; presents a dynamic and single view of the business with timely data refreshes

Table 4.6: Means and Test values for “Need of BI Dashboard Features”

No.	Item	Mean	S.D	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	Showing data in different ways (e.g. charts, tables, maps, graphs and gauges)	3.55	1.09	70.93	5.22	0.000*	8

Table 4.6: Means and Test values for “Need of BI Dashboard Features” (continue)

No.	Item	Mean	S.D	Proportional mean (%)	Test value	P-value (Sig.)	Rank
2.	Drill-Down information into more detailed data, eg: show the information about any operation included in operations menu in details	3.55	1.01	71.03	5.64	0.000*	7
3.	Data filtering capabilities which allow displaying and getting the information related to the required subject according to the conditions set by the user” eg: Adding a condition on the date to view the data of current year	3.68	0.97	73.52	7.28	0.000*	4
4.	Providing real-time data directly and continuously	3.94	1.08	78.87	9.02	0.000*	1
5.	Accessing to the required information from different databases of the company through a single interface	3.64	0.97	72.83	6.82	0.000*	5
6.	presenting data in visual format through maps and charts with the support of text	3.70	1.01	74.07	7.26	0.000*	2
7.	Customizing views for different users; i.e. by role, geography, access privileges, department and other variations	3.64	1.00	72.78	6.64	0.000*	6
8.	The important information such as keys performance indicators is shown on one integrated screen which summarized latest updates data and reports	3.70	1.02	74.07	7.20	0.000*	2
	All items of the field	3.67	0.81	73.46	8.61	0.000*	

* The mean is significantly different from 3

4. Benefit of BI Dashboard on Decision-Making Process at Paltel

Table 4.7 shows that:

The mean of item #6 “Improving accuracy of data” equals 3.91 (78.15%), Test-value = 9.70, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 3. It can be concluded that the respondents agreed to this item. The right and accurate decisions are based on accurate data which involves improving the quality of the underlying data by filling information gaps, and enhancing the relevance of all business information by increasing the understanding of the complex information.

The mean of item #5 “Improving accuracy of business decisions” equals 3.63 (72.57%), Test-value = 6.31, and P-value = 0.000 which is smaller than the level of significance $\alpha \leq 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 3. It can be concluded that the respondents agreed to this item.

The mean of the field “Benefit of BI Dashboard on Decision-Making Process at Paltel” equals 3.72 (74.35%), Test-value = 8.43, and P-value=0.000 which is smaller than the level of significance $\alpha \leq 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 3. It can be concluded that the respondents agreed to field of “The Benefit of BI Dashboard on Decision-Making Process at Paltel ”. These results show that BI Dashboard would be beneficial and effective for supporting the Decision-Making Process by distributing updated information to relevant employees. The information on visualization and customization assist in assigning clear responsibilities for the employees and implementing decentralization in decisions-making process.

This result is supported by (Yusof & Othman, 2012); that found the dashboard for managers (Managerial Dashboard) will have an interface for knowledge, supplier and customer. This is to aid the decision makers to make a wiser and quicker business decision. The dashboards implemented have helped them gaining a lot of benefits internally with their employees and externally with their customers. It also supported by (Njuguna, 2013); that found BI dashboard system is an effective tool for decision making at Kenya Power Company, majority of respondents agree that the system is effective. It also agree with (AberdeenGroup, 2009); which found that the top pressures driving dashboard initiatives of the companies are sorely in need of a way to increase their confidence in decisions they make. That involves improving the quality of the underlying data by filling information gaps, and enhancing the relevance of all business information. Second, companies are consistently looking for ways to increase the speed of access to their data. And it agree

with (Fuchs, 2006); which pointed that dashboards attempt to give decision-makers a complete overview of their business operations, and should allow follow-up on important business decisions without a complicated interface. This is achieved by using charts that are relatively simple compared to some of the graphical displays that are often applied in more sophisticated analytic applications. And it also agree with (Hurwitz et al., 2005); that found dashboards are enabling companies to fine tune their decisions and accelerate corporate performance. 67% of the respondents who had implemented dashboards rated the ability to cut down on manual administrative work as one of the most important benefits of dashboards. It also in line with (Bara & Knezevic, 2013); that found using business intelligence system provides its users with increased understanding of complex information, which puts them in the position of making faster and better business decisions and thereby effectively achieving business goals. Key benefits of business intelligence systems are reflected in the creation of a basis for increasing the effectiveness and efficiency of the company. It also agree with (Karlsen & Eidene, 2012); that found real time business intelligence solution would be beneficial for supporting the operational and tactical layers of decision making within an organization. By implementing an RTBI solution, it would provide the decision maker with fresh and reliant data to base the decisions on. Visualization of the current decision processes showed that by adding a real time business intelligence solution it would help eliminate the use of intuition, as there would be more data available and the decisions can be made where the work is performed. It also agree with (Andersson et al., 2008); that found positive effects of Business Intelligence in organizations with improvements of decision support due to timeliness, accessibility, quality, and better control of organizational information. As improvements in decision support has occurred, decision making has become better. Complicated problems are easier to interpret by decision makers. And it consistent with (El-Shikhdeeb, 2008); which found that there is a significant correlation between modern communication technologies and decision making process in Paltel. It also consistent with (Olszak & Ziemba, 2006); that found the BI concept may contribute towards improving quality of decision-making in any organization, better customer service and some increase in customers' loyalty. On the other hand, this result is inconsistent with (Hansoti, 2010); that found employees from Sales and Marketing and Supply Chain did not agree that the dashboard improved the quality of the decision making process itself; according to them, it only helps in reducing the time spent on the decision making process. It also is disagree with (Al-Behesi, 2005); This research found that there was no considerable effect of modern technologies in decision-making process in the Palestinian firms. The author of this research refer this result to two reasons, the first is the qualifications of these firm's managers that not related to neither commercial science nor information technology. The second reason is that those managers did not receive any training courses in the field of technologies. Moreover, this research was conducted ten years ago.

Table 4.7: Means and Test values for “BI Dashboard Benefits”

No.	Item	Mean	S.D	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	Maximizing the efficiency of the decision making process	3.64	1.15	72.71	5.70	0.000*	7
2.	Facilitating the decision-making process	3.67	1.18	73.40	5.86	0.000*	5
3.	Speeding up the decision-making process	3.71	1.10	74.15	6.65	0.000*	4
4.	Assisting in identifying problems much faster	3.66	1.09	73.27	6.30	0.000*	6
5.	Improving accuracy of business decisions	3.63	1.02	72.57	6.31	0.000*	8
6.	Improving accuracy of data	3.91	0.97	78.15	9.70	0.000*	1
7.	Assisting in assigning clear responsibilities for the employees and implementing decentralization in decisions-making process	3.71	0.96	74.26	7.74	0.000*	3
8.	Reducing manual work	3.84	1.07	76.85	8.19	0.000*	2
	All items of the field	3.72	0.88	74.35	8.43	0.000*	

* The mean is significantly different from 3

5. Effect of The Level of Business and Department is needed for Creating BI Dashboard Implementation on Decision-Making Process at Paltel.

Table 4.8 shows that:

The mean of item #8 “BI Dashboard will enable me to accomplish tasks more quickly” equals 3.79 (75.74%), Test-value = 8.06, and P-value = 0.000 which is smaller than the level of significance $\alpha \leq 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 3. It can be concluded that the respondents agreed to this item. This result shows that speeding up performance of the tasks by the worker gives a more comprehensive picture to the required data.

The mean of item #1 “I need a real time updates of information and reports which help me in decision making process” equals 3.50 (70.09%), Test-value = 4.70, and P-value = 0.000 which is smaller than the level of significance $\alpha \leq 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this item. This result shows that Paltel employees use sound ways in decision making process by searching for updated information which they need.

The mean of the field “Effect of The Level of Business and Department is needed for Creating BI Dashboard Implementation on Decision-Making Process at Paltel” equals 3.65 (73.01%), Test-value = 7.46, and P-value=0.000 which is smaller than the level of significance $\alpha \leq 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 3 .It can be concluded that the respondents agreed to field of “The Effect of The Level of Business and Department is needed for Creating BI Dashboard Implementation on Decision-Making Process at Paltel”. This result shows that Paltel employees at all levels and departments need to implement the BI Dashboard system and believe that BI Dashboard system will enhance their decision making process.

This result is supported by (Hansoti, 2010); that found there was no significant difference between the effectiveness of a dashboard across the three departments. The mean response of the Supply Chain department was less than that of Information Technology and Sales and Marketing. It also supported by (Soest, 2013); which found that users in all levels can have his appropriate views in their dashboards. Executives usually are more interested in the big picture, compared to project managers who want detailed information. The performance dashboard will provide the organization with a tool to make the information visible, by collecting and aggregating the information in one place, and to communicate this with all interested members of the organization. This will make a performance dashboard even more valuable tool for the organization. It also agree with (Hernaus et al., 2010); that found information gained from BI systems is satisfactorily used not only at the top, but at various hierarchical levels. Top management used such systems in 53% of cases, middle management in 51%, while lower management levels and business analysts used them in 60% of companies. And it also agree with (Njuguna, 2013); that found BI Dashboard keep everyone in the organization constantly informed about the different processes and action plan being undertaken in various departments, but is used more frequently by higher management and non-technical people. It also consistent with (AberdeenGroup, 2009); which found that employees of all levels and functions are driving value from the business visibility that dashboard tools provide. Best-in-Class companies are employing both strategic and tactical dashboard solutions in order to drive

double digit improvement in profitability and have achieved substantial increases in customer service and sales performance. This benchmark research is based on feedback from 285 organization globally. I also agree with (Lofvinga, 2013); that found the Case Company’s dashboard application was most extensively used by strategic level employees, primarily for communication and decision rationalizing purposes. On the other hand, this result is inconsistent with (W. W. Eckerson, 2006); which found that departmental managers are the biggest users of dashboards (92%), followed closely by top executives (67%). However, corporate executives are usually served by financial analysts who are more or less dedicated to delivering data on demand, but there is little use of the front line workers (22%).

Table 4.8: Means and Test values for “Beneficiaries”

No.	Item	Mean	S.D	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	I need a real time updates of information and reports which help me in decision making process	3.50	1.11	70.09	4.70	0.000*	8
2.	When I’m showing the information in visual display, this facilitate my work and help me in taking affective decisions.	3.58	1.11	71.59	5.41	0.000*	7
3.	My job nature enhanced when using dashboard at Paltel	3.64	1.08	72.90	6.20	0.000*	5
4.	If I have BI Dashboard application on my desktop to immediate access and manipulate the required data of valuable resource, will that help me in decision making process	3.60	1.10	72.04	5.68	0.000*	6
5.	My hierarchical level of Paltel is needed to implement BI Dashboard	3.67	1.06	73.40	6.52	0.000*	4
6.	My Department of Paltel employees is needed to implement BI Dashboard	3.72	1.11	74.39	6.68	0.000*	2
7.	BI Dashboard will enhance my job’s effectiveness	3.71	1.02	74.26	7.24	0.000*	3
8.	BI Dashboard will enable me to accomplish tasks more quickly	3.79	1.01	75.74	8.06	0.000*	1
	All items of the field	3.65	0.91	73.01	7.46	0.000*	

* The mean is significantly different from 3

6. Effect of the Personal Information to BI Dashboard Implementation on Decision-Making Process at Paltel.

- **Gender Variable**

Table 4.9 shows that the p-value (Sig.) is greater than the level of significance $\alpha \geq 0.05$ for each field, then there is insignificant difference among the respondents toward each field due gender. It can be concluded that the personal characteristics' gender has no effect on each field, due to that two gender in the Paltel offices perform the same tasks and in the same conditions. Paltel policies and regulations do not separate between the two genders.

Table 4.9: Independent Samples T-test of the fields and their p-values for gender

No.	Field	Means		Test Value	Sig.
		Male	Female		
1.	Extent of Existence BI Dashboard Features in the current information systems of Paltel	2.15	2.26	-0.940	0.349
2.	The Effect of Paltel Readiness Level of Implementing BI Dashboard at Paltel	3.59	3.91	-1.750	0.083
3.	The Need of BI Dashboard Features at Paltel	3.59	3.95	-1.905	0.059
4.	The Benefit of BI Dashboard on Decision-Making Process at Paltel	3.66	3.92	-1.305	0.195
5.	The Effect of The Level of Business and Department is needed for Creating BI Dashboard Implementation on Decision-Making Process at Paltel	3.60	3.84	-1.188	0.237

- **Age Variable**

Table 4.10 shows that the p-value (Sig.) is smaller than the level of significance $\alpha \leq 0.05$ for the field “Extent of Existence BI Dashboard Features in the current information systems of Paltel”, then there is significant difference among the respondents toward this field due to Age. We conclude that the personal characteristics' Age has an effect on this field.

For the field “Extent of Existence BI Dashboard Features in the current information systems of Paltel”, the mean for the category “40 Years and more" respondents have the

highest among the other Age category's, then we conclude that the category " 40 Years and more "respondents is agreed much more than the other Age category. This is explained by that the elder employees have more experience and most of them hold high managerial levels.

For the other fields, the p-value (Sig.) is greater than the level of significance $\alpha \geq 0.05$, then there is insignificant difference among the respondents toward these fields due to Age. It can be concluded that the personal characteristics' Age has no effect on the other fields.

Table 4.10: ANOVA test of the fields and their p-values for Age

No.	Field	Means			Test Value	Sig.
		Less than 30	From 30 to less than 40	40 Years and more		
1.	Extent of Existence BI Dashboard Features in the current information systems of Paltel	2.15	2.07	2.37	3.269	0.042*
2.	The Effect of Paltel Readiness Level of Implementing BI Dashboard at Paltel	3.56	3.57	3.92	2.122	0.125
3.	The Need of BI Dashboard Features at Paltel	3.63	3.58	3.88	1.403	0.250
4.	The Benefit of BI Dashboard on Decision-Making Process at Paltel	3.68	3.58	3.99	2.038	0.135
5.	The Effect of The Level of Business and Department is needed for Creating BI Dashboard Implementation on Decision-Making Process at Paltel	3.55	3.58	3.88	1.258	0.288

* The mean difference is significant a 0.05 level

- **Educational Attainment Variable**

Table 4.11 shows that the p-value (Sig.) is smaller than the level of significance $\alpha \leq 0.05$ for each field, then there is significant difference among the respondents toward

each field due to educational attainment. It can be concluded that the personal characteristics' educational attainment has an effect on each field of Bachelor degree and more. This is related to the fact that highly educated employees are more qualified in understanding operational procedures managerial aspects of decision making.

Table 4.11: Independent Samples T-test of the fields and their p-values for educational attainment

No.	Field	Means		Test Value	Sig.
		Diploma and less	Bachelor degree and more		
1.	Extent of Existence BI Dashboard Features in the current information systems of Paltel	1.84	2.28	-4.170	0.000*
2.	The Effect of Paltel Readiness Level of Implementing BI Dashboard at Paltel	3.24	3.80	-3.209	0.002*
3.	The Need of BI Dashboard Features at Paltel	3.20	3.83	-3.702	0.000*
4.	The Benefit of BI Dashboard on Decision-Making Process at Paltel	3.31	3.85	-2.845	0.005*
5.	The Effect of The Level of Business and Department is needed for Creating BI Dashboard Implementation on Decision-Making Process at Paltel	3.31	3.77	-2.330	0.022*

* The mean difference is significant a 0.05 level

• **Specialization Variable**

Table 4.12 shows that the p-value (Sig.) is greater than the level of significance $\alpha \geq 0.05$ for each field, then there is insignificant difference among the respondents toward each field due field of specialization. It can be concluded that the personal characteristics' field of specialization has no effect on each field. Most employees in Paltel work in their specializations and understand the requirements of their tasks and information systems they deal with.

Table 4.12: ANOVA test of the fields and their p-values for field of specialization

No.	Field	Means				Test Value	Sig.
		Commerce	Engineering	IT	Other		
1.	Extent of Existence BI Dashboard Features in the current information systems of Paltel	2.17	2.20	2.28	2.14	0.171	0.916
2.	Paltel Readiness Level of Implementing BI Dashboard at Paltel	3.65	3.78	3.71	3.59	0.207	0.891
3.	Need of BI Dashboard Features at Paltel	3.70	3.79	3.68	3.54	0.362	0.780
4.	Benefit of BI Dashboard on Decision-Making Process at Paltel	3.73	3.84	3.55	3.68	0.241	0.867
5.	The Effect of The Level of and Department is needed for Creating BI Dashboard Implementation on Decision-Making Process at Paltel	3.70	3.89	3.41	3.48	0.967	0.411

• **Total Years of Experience**

Table 4.13 shows that the p-value (Sig.) is greater than the level of significance $\alpha \geq 0.05$ for each field, then there is insignificant difference among the respondents toward each field due total years of experience. It can be concluded that the personal characteristics' total years of experience has no effect on each field.

Table 4.13: ANOVA test of the fields and their p-values for total years of experience

No.	Field	Means			Test Value	Sig.
		Less than 5 years	Less than 15 years	15 years and more		
1.	The extent of existence BI Dashboard features in the current information systems of Paltel	2.11	2.07	2.29	2.181	0.118
2.	The effect of Paltel readiness level of implementing BI Dashboard at Paltel	3.51	3.65	3.76	0.904	0.408
3.	The need of BI Dashboard features at Paltel	3.58	3.66	3.74	0.355	0.702
4.	The benefit of BI Dashboard on decision-making process at Paltel	3.55	3.66	3.86	1.177	0.312
5.	The Effect of The Level of Business and department is needed for Creating BI Dashboard Implementation on decision-making process at Paltel	3.68	3.56	3.69	0.211	0.810

• **Managerial Level Variable**

Table 4.14 shows that the p-value (Sig.) is greater than the level of significance $\alpha \geq 0.05$ for each field, then there is insignificant difference among the respondents toward each field due managerial level. It can be concluded that the personal characteristics' managerial level has no effect on each field. All managerial levels and Departments in Paltel need to deal with BI Dashboard Features.

Table 4.14: Independent Samples T-test of the fields and their p-values for managerial level

No.	Field	Means		Test Value	Sig.
		Top / Middle Management	Operational Management		
1.	Extent of Existence BI Dashboard Features in the current information systems of Paltel	2.30	2.12	1.726	0.089
2.	Paltel Readiness Level of Implementing BI Dashboard at Paltel	3.91	3.56	1.958	0.056
3.	Need of BI Dashboard Features at Paltel	3.80	3.62	1.067	0.290
4.	Benefit of BI Dashboard on Decision-Making Process at Paltel	3.80	3.68	0.600	0.551
5.	Effect of The Level of Business and Department is needed for Creating BI Dashboard Implementation on Decision-Making Process at Paltel	3.75	3.61	0.683	0.498

• **Department**

Table 4.15 shows that the p-value (Sig.) is smaller than the level of significance $\alpha \leq 0.05$ for the field “The Effect of The Level of Business and Department is needed for Creating BI Dashboard Implementation on Decision-Making Process at Paltel”, then there is significant difference among the respondents toward this field due to department. We conclude that the personal characteristics’ department has an effect on this field.

For the field “The Effect of The Level of Business and Department is needed for Creating BI Dashboard Implementation on Decision-Making Process at Paltel”, The mean for the category " Commercial " respondents have the highest among the other department categories, then we conclude that the category " Commercial " respondents is agreed much more than the other department category. The commercial department needs to implement BI Dashboard in decision making, because they deal with customers and need the information system to facilitate and speed up their tasks.

For the other fields, the p-value (Sig.) is greater than the level of significance $\alpha \geq 0.05$, then there is insignificant difference among the respondents toward these fields due to department. It can be concluded that the personal characteristics’ department has no effect on the other fields.

Table 4.15: ANOVA test of the fields and their p-values for department

No.	Field	Means			Test Value	Sig.
		Technical	Commercial	Administrative and Financial		
1.	Extent of Existence BI Dashboard Features in the current information systems of Paltel	2.08	2.24	2.20	1.055	0.352
2.	Paltel Readiness Level of Implementing BI Dashboard at Paltel	3.52	3.78	3.64	1.063	0.349
3.	Need of BI Dashboard Features at Paltel	3.44	3.81	3.76	2.405	0.095
4.	Benefit of BI Dashboard on Decision-Making Process at Paltel	3.48	3.91	3.69	2.536	0.084
5.	Effect of The Level of Business and Department is needed for Creating BI Dashboard Implementation on Decision-Making Process at Paltel	3.43	3.90	3.50	3.240	0.043*

* The mean difference is significant a 0.05 level

Chapter Five Conclusion & Recommendations

This chapter consists of the following sections:

5.1 Introduction

5.2 Conclusions

5.3 Recommendations

5.4 Suggestions for Future Researches

5.1 Introduction

This research concentrates efforts to explore the extent of implementing BI Dashboard features related to the information systems of Paltel Company, and to make the possibility of implementing the BI Dashboard System in the future to enhance decision making process. The aim of this research was to examine the impact of implementing BI Dashboard on decision-making process in Paltel.

This chapter will consolidate the main results of the previous chapters in the light of research problem and objectives and focus on the conclusion and recommendation of this research. The conclusion will explain how this research achieves its goals according to the objectives and problem statement. Finally brief recommendations will be directed towards promoting the adoption and implementation of BI Dashboard System in Paltel. Suggestions obtained would be taken into consideration for enhancements and implementation.

5.2 Conclusion

This research tries to apply a new reporting system which will develop the query system in Paltel and give solutions for the most of its problems. BI Dashboard increases work efficiency and productivity since it enhances the ability of Information Systems on decision making process.

Paltel Company as leader Palestinian company is ready for implementing BI Dashboard system. Its employees have the requirements for implementing BI Dashboard System and they will accept, interact and benefit from it.

As well as it can be concluded that this research achieved its objectives since:

1. This research suggests BI Dashboard system which will enhance the ability of Paltel Information Systems on Decision-Making Process.
2. The main BI Dashboard features are relatively available in Paltel Information systems, , but the lack of fully integrated features reduces the benefits of BI Dashboard on the decision-making process.
3. (73.18%) of the respondents agree that there is positive effect of Paltel readiness level of implementing BI Dashboard at the company. So it can be concluded that Paltel is ready for implementing this system.
4. This result shows that there is positive readiness level at Paltel Company for adopting BI Dashboard, and the company can overcome the technical challenges that may be faced in implementing the new system.
5. (70.93%) of respondents are in need of BI Dashboard features (Presentation Flexibility, Drill-Down Feature, Data filtering capabilities, Timely data, Accessibility Integration, Data visualization, Customization, One integrated

screen). These features of BI Dashboard are desirable for Paltel Company and Paltel employees are in need of all BI Dashboard features to perform their tasks.

6. (74.35%) of respondents agree that BI Dashboard is beneficial in the decision making process. This is acceptable and supports the above objective.
7. BI Dashboard implementation has a positive effect on all levels of business and departments in Decision-Making at Paltel.
8. These results show that Paltel employees at all levels and departments are in need of implementing BI Dashboard system and they think that the BI Dashboard system will enhance their decision making process. So that supports implementing this system.
9. Commercial department is in more need for implementing BI Dashboard in the decision making.
10. The only barrier for implementing BI Dashboard system is some technical challenges specially security issues.

5.3 Recommendations

In the light of the research dy results and findings, Paltel can develop a BI Dashboard system for its employees. However, to do so Paltel Company must have:

1. IT strategy (IT systems are frequently updated and applications are frequently developed to adapt with the rapid acceleration in technologies).
2. Business strategy which support IT investment.
3. Business Intelligence Programming Platform to build and program BI Dashboard if the company would like to adopt the system internally.
4. Data Source - valuable information that employees need to access anytime.
5. A process for implementing the BI Dashboard System.
6. A BI Dashboard System to be an integrated solution to the existing systems for all different employees' tasks.
7. The ability to benefit from all BI Dashboard Features.

5.4 Suggestions for Future Researches:

This research was focused on BI Dashboard features and its relation to the decision making process. Due to the importance of Business Intelligence and especially BI Dashboard as an interface, further researches can be carried on:

1. The impact of BI Dashboard on the performance management.
2. The impact of BI Dashboard on the knowledge management.
3. The impact of BI Dashboard on strategic decisions of the firms.

4. The impact of BI Dashboard in maintains customer loyalty and customer satisfaction.
5. The impact of BI Dashboard as a tool for development planning.
6. The challenges of implementing BI Dashboard.
7. Critical success factors of implementing Business Intelligence Systems.
8. The impact of business intelligence on the organizational behavior.
9. Adopting Business Intelligence tools in the governmental ministries.

References

- AberdeenGroup. (2009). Executive dashboards: the key to unlocking double digit profit growth.
- Adair, J. E. (2007). Decision making and problem solving strategies (Vol. 9): Kogan Page Publishers.
- Al-Behesi, E. (2005). Information technology and it's influence on the decisionmaking at business organizations: Exploring study of the Palestinian environment. Gaza: Islamic University.
- Alexander, M., Walkenbach, J., & Bağ, A. (2011). Data Analysis and Presentation in Microsoft® Excel®: Handbook Walkenbach: Helion.
- Andersson, D., Fries, H., & Johansson, P. (2008). Business Intelligence: The impact on decision support and decision making processes.
- Azzawi, G. A. (2013). The utilization of business intelligence systems in the development of human capital: an exploratory study in the ministry of Health. *Azzy Journal for Economic and Administrative Science*, 9(28).
- Bara, D., & Knezevic, N. (2013). The impact of right-time business intelligence on organizational behavior. *Interdisciplinary Management Research*, 9, 27-42.
- Bell, T., Shegda, K. M., Gilbert, M. R., & Chin, K. (2007). Magic quadrant for enterprise content management. Gartner RAS Core Research Note G, 206900.
- Betts, M. (2003). The future of business intelligence. *Computer World*, 14.
- Bob, L. (2001). Business Intelligence: An Intelligent Move or Not. ProClarity Corporation.
- Burkan, W. C. (1991). Executive information systems: from proposal through implementation: Van Nostrand Reinhold Co.
- Coker, F. (2014). Pulse: Understanding the Vital Signs of Your Business: Ambient Light Publishing, 2014.
- Computerworld. (2007). Implementation of Business Intelligence and Performance Management Tools and Solutions.
- Dalal, N. P. Y., S. B. (1992). The Design of a Knowledge-based Decision Support System to Support the Analyst in Determining Requirements. *Decision Sciences*, 23 (6), 1373–1388.
- Deshpande, G. (2015). Gain new insights with advanced telecommunications industry solutions. Retrieved 11/12/2015, from <http://www.ibmbigdatahub.com/blog/gain-new-insights-advanced-telecommunications-industry-solutions>
- Donovan, C., Fairchild, K., Green, K., McKinney, C., Mollohan, B., Whitecar, M., & Zerkich, J. (2010). Executive Dashboard Implementation Guide 2010. Healthcare Information and Management Systems Society.
- Eckerson, W. (2003). Smart companies in the 21st century: The secrets of creating successful business intelligence solutions. TDWI Report Series, 7.
- Eckerson, W. W. (2006). Deploying dashboards and scorecards. The Data Warehouse Institute, 1-24.

- Eckerson, W. W. (2011). *Performance dashboards: measuring, monitoring, and managing your business* (2nd ed ed.): John Wiley & Sons.
- El-Shikhdeeb, Z. R. (2008). *The Role of Business Communication in Decision Making Process: Case Study-Palestinian Telecommunication Company (PalTel)*. The Islamic University-Gaza.
- Elkrunz, H. M. (2013). *The Role of Implementing Mobile Business Intelligence (MBI) in Decision Making Process: An Empirical Study at Jawwal Company*. SSRN 2450958.
- Ferencz, V. (2013). *Innovative Marketing*.
- Fernandez, O., Labib, A. W., Walmsley, R., & Petty, D. J. (2003). A decision support maintenance management system: development and implementation. *International Journal of Quality & Reliability Management*, 20(8), 965-979.
- Few, S. (2006). *Information dashboard design*: O'Reilly.
- Few, S. (2013). *Information Dashboard Design: Displaying data for at-a-glance monitoring*: Analytics Press.
- Fuchs, G. (2006). Beyond the Dashboard: Making Better Decisions. *Business Intelligence Journal*, 11(2), 30.
- Furmankiewicz, J., Furmankiewicz, M., Ziuzianski, P., & W Katowicach, E. (2015). Implementation of business intelligence performance dashboard for the knowledge management in organization. *Zeszyty Naukowe Politechniki Śląskiej. Seria: Organizacja i Zarządzanie*(78).
- Gannholm, L. (2013). *A Comparative Evaluation Between Two Design Solutions for an Information Dashboard*.
- George, D., & Mallery, P. (2006). *SPSS for windows step by step: A simple guide and reference* (Allyn Bacon, Boston).
- Gorry, G. A., & Morton, M. S. (1989). A framework for management information systems. *Sloan Management Review*, 30(3), 49-61.
- Hall Jr, O. P. (2003). Using Dashboard Based Business Intelligence Systems. An approach to improving business performance, <http://gbr.pepperdine.edu/034/bis.html>.
- Hansoti, B. (2010). *Business Intelligence Dashboard in Decision Making*. Purdue University West Lafayette, Indiana.
- Harel, E. C., & Sitko, T. D. (2003). *Digital Dashboards: Driving Higher Education Decisions*. Research Bulletin.
- Hernaus, T., Pejic, M., & Rebac, Z. (2010). Using Business Intelligence in Decision Making Process: An Amprical Study on Croatian Companies. *Annals of DAAAM & Proceedings*. Vienna: DAAAM International Vienna.
- Hocevar, B., & Jaklic, J. (2008). Assessing benefits of business intelligence systems—a case study. *Management: Journal of Contemporary Management Issues*, 13(2 (Special issue)), 87-119.
- Hurwitz, J., Halper, F., & Kaufman, M. (2005). *Dashboards—Enabling Insight and Action* Hurwitz Research.
- Intelligence, B., & Warehousing, D. (2009). *Transform Raw Data into Business Results*.(2005). Sun Microsystems, Inc.

- Jamaludin, I. A., & Mansor, Z. (2011). The Review of Business Intelligence (BI) Success Determinants in Project Implementation. *International Journal of Computer Applications*, 33(8).
- Karimi, A., & Sullivan, E. (2013). Student Success Dashboard at California State University, Fullerton.
- Karlsen, I. A., & Eidene, M. N. (2012). Real time business intelligence and decision-making: how does a real time business intelligence system enable better and timelier decision-making? An exploratory case study.
- Kasiulevicius, V., Sapoka, V., & Filipaviciute, R. (2006). Sample size calculation in epidemiological studies. *Gerantologija*. 2006; 7 (4): 225, 31.
- Kisielnicki, J., & Sroka, H. (2005). *Business Information Systems: Informatics for the Management: Publishing Agency "Placet"*.
- Kopackova, H., & Skrobacova, M. (2006). Decision support systems or business intelligence: what can help in decision making? *Scientific Papers of the University of Pardubice. Series D, Faculty of Economics and Administration*, 10.
- Larbi, M. B. M., Asma, M. Y., & Zaouawi, C. (2013). Dashboard as a Tool for Decision Support Development in Algeria.
- Laudon, K. C., & Laudon, J. P. (2016). *Management Information System: Managing the Digital Firm: Prentice Hall, New York*.
- Lofvinga, V. (2013). The purposes of performance dashboard use: A case of a procurement performance management SaaS provider.
- Lonnqvist, A., & Pirttimaki, V. (2006). The measurement of business intelligence. *Information Systems Management*, 23(1), 32.
- Loshin, D. (2008). *The Incremental Business Intelligence Infrastructure: A Strategy for Evolving Analysis Services*.
- Lu, H., & Zhou, A. (2000). *Web-Age Information Management: First International Conference, WAIM 2000 Shanghai, China, June 21-23, 2000 Proceedings (Vol. 1846): Springer Science & Business Media*.
- Malik, S. (2005). *Enterprise dashboards: design and best practices for IT: John Wiley & Sons*.
- Manasreya, E. (2004). *The Role of the Management Information System in Increasing the Effectiveness of the Decision-making Process: case study of the Algerian aluminum company. University of Mohamed Boudiaf*.
- Marshall, L., & De la Harpe, R. (2009). Decision making in the context of business intelligence and data quality. *South African Journal of Information Management*, 11(2).
- McKendrick, J. (2012). 3 reasons to love BI dashboards. from <http://www.zdnet.com/article/3-reasons-to-love-bi-dashboards-a-rebuttal/>
- Mitchell, J. J., & Ryder, A. J. (2013). Developing and using dashboard indicators in student affairs assessment. *New Directions for Student Services*, 2013(142), 71-81.
- Mohammad, H. A. (2012). *The Impact of Business Intelligence and Decision Support on the Quality of Decision Making. Middle East University*.

- Moss, L. T., & Atre, S. (2003). *Business intelligence roadmap: the complete project lifecycle for decision-support applications*: Addison-Wesley Professional.
- Muntean, M., Sabau, G., Bologa, A., Traian, S., & Alexandra, F. (2010). *Performance Dashboards for Universities*. Paper presented at the Proceedings of the 2nd International Conference on Manufacturing Engineering, Quality and Production Systems.
- Njuguna, J. W. (2013). *Adoption Of Business Intelligent Dashboard And Decision Making At Kenya Power*. School of Business, University of Nairobi.
- Olszak, C. M., & Ziemba, E. (2006). Business intelligence systems in the holistic infrastructure development supporting decision-making in organisations. *Interdisciplinary Journal of Information, Knowledge, and Management*, 1(1), 47-57.
- Olszak, C. M., & Ziemba, E. (2007). Approach to building and implementing business intelligence systems. *Interdisciplinary Journal of Information, Knowledge, and Management*, 2(2007), 134-148.
- Oz, E. (2009). *Management information systems*: Cengage Learning.
- PaltelGroup. (2012). *Annual Report*.
- Rasmussen, N. H., Bansal, M., & Chen, C. Y. (2009). *Business dashboards: a visual catalog for design and deployment*: John Wiley & Sons.
- Rogers, P., & Blenko, M. y. (2006). Who has the Descions ?: How clear Decision Roles Enhance Organizational Performance. *Harvard Business Review*.
- Rud, O. P. (2009). *Business intelligence success factors: tools for aligning your business in the global economy (Vol. 18)*: John Wiley & Sons.
- SearchBusinessAnalytics. (2010). *Business Intelligence Architecture*. Retrieved 16.10.2015, from <http://searchbusinessanalytics.techtarget.com/definition/business-intelligence-architecture>
- Seybert, J. A. (2012). *An Introduction to Dashboards in Higher Education: Graphical Representation of Key Performance Indicators*. from http://www.zogotech.com/demoFiles/presentations/intro_to_dashboards_in_higher_ed.pdf
- Shariat, M., & Hightower, J. (2007). Conceptualizing business intelligence architecture. *Marketing Management Journal*, 17(2), 40-46.
- Simon, H. A. (1960). *The new science of management decision*.
- Soest, J. (2013). *Designing a performance dashboard at Sigmax*.
- Tableau. (2015). *Telecommunications Analysis*. Retrieved 11/12/2015, from <http://www.tableau.com/solutions/telecommunications-analysis>
- Taro, Y. (1967). *Statistics: An introductory analysis*. Harper and Row, New York.
- Terkla, D. G., Sharkness, J., Cohen, M., Roscoe, H. S., & Wiseman, M. (2012). *Institutional Dashboards: Navigational Tool for Colleges and Universities*. Professional File. Number 123, Winter 2012. Association for Institutional Research (NJ1).
- Thode, H. C. (2002). *Testing for normality (Vol. 164)*: CRC press.

- Turban, E., Sharda, R., Aronson, J. E., & King, D. (2007). *Business intelligence: A managerial approach*: Pearson Prentice Hall Upper Saddle River.
- Velcu-Laitinen, O., & Yigitbasioglu, O. M. (2012). The use of dashboards in performance management: evidence from sales managers. *The International Journal of Digital Accounting Research*, 12(18), 39-58.
- Vodapalli, N. K. (2009). *Critical success factors of BI implementation*. IT University of Copenhagen.
- Wixom, B. H., & Watson, H. J. (2001). An empirical investigation of the factors affecting data warehousing success. *MIS quarterly*, 17-41.
- Yigitbasioglu, O. M., & Velcu, O. (2012). A review of dashboards in performance management: Implications for design and research. *International Journal of Accounting Information Systems*, 13(1), 41-59.
- Yusof, E. M. M., & Othman, M. S. (2012). A Review on the Dashboard Characteristics for Manufacturing Organizations. *Journal of Information Systems Research and Innovation*, ISSN, 2289-1358.
- Ziuzianski, P., Furmankiewicz, M., & Sołtysik-Piorunkiewicz, A. (2014). E-health artificial intelligence system implementation: case study of knowledge management dashboard of epidemiological data in Poland. *International Journal of Biology and Biomedical Engineering*, 8, 164-171.

Appendices

Appendix (1) - Final Questionnaire in English

The Islamic University Of Gaza

Dean of Postgraduate Studies

Faculty of Commerce

Business Administration Department



الجامعة الإسلامية - غزة

عمادة الدراسات العليا

كلية التجارة

قسم إدارة الأعمال

Dear Colleagues

The attached questionnaire is a tool of collecting data reference in order to conduct a thesis about **"The Impact of Implementing Business Intelligence Dashboard on Decision Making: An Empirical Study at Paltel Company"** to be submitted in partial fulfillment of the requirement for Master Degree in Business Administration of the Islamic University of Gaza.

This study is to explore the extent of implementing BI Dashboard features related to the information systems of Paltel Company, and to make the possibility of implementing the BI Dashboard System in the future.

BI Dashboard is software reporting tool that display graphical reports and information for each employee according to his position and privileges at work, with an automatic update of data we can get by linking the system with the company databases system. The system itself can be used to follow the basic flows in business operations to be monitored and controlled. BI Dashboard is characterized by many features and characteristics that help companies to understand their information easily in order to make appropriate decisions.

BI Dashboard is considered as tools of Business Intelligence (BI). BI is the combination of tools, techniques and programs that help in collecting and analyzing large amounts of data and presenting it in useful form to reach to the knowledge that can form the basis for making quick and informed decisions, which will contribute to improving the decision-making process in the field of Business. (BI Dashboard) represent interface to display the output of collecting and analyzing business intelligence data.

BI Dashboard can serve mainly top management in the companies by giving them quick overview of the information they need to monitor the company's performance and evaluate the performance and quality of the departments work as well as to track opportunities and work predictions for the future, but in recent years some companies have begun to design BI Dashboard systems to serve the rest of administrative levels. BI Dashboard is used by the middle administration to monitor and optimize operational processes and compare the results over time. The operational levels can use it to monitor and keep track of transactions, events and activities in real-time, and to get the information they need in performing their duties.

In accordance with achieving the aimed goal of this research; this questionnaire is designed in two parts: the first part include the general information of research Respondents. Part two: Include the five dimensions of the research, which are the following:

Therefore, achieving this objective requires your participation to answer all questions thoroughly, honestly and subjectively. You are kindly reminded that all submitted information will be treated as confidential and will be of major concern to us.

Thank you for your cooperation

Researcher\ Mohammed N. Alhendi

Part One: General Information:

****Please put out the signal (✓) in front of the correct answer**

1. Gender

Male Female

2. Age

Less than 30 From 30 to less than 40 From 40 to less than 50 50 Years and more

3. Educational Attainment

Secondary Diploma Bachelor degree High Education

4. Field of Specialization

Commerce Engineering IT Other Specify _____

5. Total years of Experience

Less than 5 years 5- less than 10 years 10-less than 15 years 15 years and more

Specify your experience years at Paltel _____

6. Managerial Level

Top Management (Director/Manager) Middle Management (Head of Section/ Head of Unit) Operational Management (Engineer /Administrator/...)

7. Department

Technical Commercial Administrative and Financial

Part Two: Questionnaire Dimensions:

Please indicate sign (×) in the appropriate location

The First dimension: The Extent of Existence BI Dashboard Features in the current information systems of Paltel:

Do you find the following features/capabilities in the Applications that you are dealing with at Paltel?

#	Features/Capabilities	Not available	Available "relatively"	Available
1.	Showing data in different ways (e.g. charts, tables, maps, graphs and gauges)			
2.	Drill-Down information into more detailed data, eg: show the information about any operation included in operations menu in details			

#	Features/Capabilities	Not available	Available "relatively"	Available
3.	Data filtering capabilities which allow displaying and getting the information related to the required subject according to the conditions set by the user" eg: Adding a condition on the date to view the data of current year			
4.	Providing real-time data directly and continuously			
5.	Accessing to the required information from different databases of the company through a single interface			
6.	presenting data in visual format through maps and charts with the support of text			
7.	Customizing views for different users; i.e. by role, geography, access privileges, department and other variations			
8.	The important information such as keys performance indicators is shown on one integrated screen which summarized latest updates data and reports			

The Second dimension: The Effect of Paltel Readiness Level of Implementing BI Dashboard at the Company:

#	Item	Disagree → Agree				
		1	2	3	4	5
1.	Paltel has a technology strategy (IT systems are frequently updated and applications are frequently developed to adapt with the rapid acceleration in technologies)					
2.	Paltel employees enjoy the required competencies to use new technologies.					
3.	I do collect the substantial related information about the work problems before making decisions using company information systems					
4.	I encourage my company to build and implement BI Dashboard					
5.	Business challenges (strategy, readiness level and ROI measures) will not prevent implementing BI Dashboard in Paltel					
6.	Technical challenges (security, data quality, data integration with multiple source system, design) will not prevent implementing MBI in Paltel					
7.	The BI Dashboard as a new technologies will complement existing investments at Paltel					
8.	Implementing BI Dashboard Strength a competitive advantage for Paltel.					

The third dimension: The Need of BI Dashboard Features at Paltel:

To what extent can the following features provided by BI Dashboard help on decision-making process at the Palestinian telecommunications company?

#	Item	Disagree → Agree				
		1	2	3	4	5
1.	Showing data in different ways (e.g. charts, tables, maps, graphs and gauges)					
2.	Drill-Down information into more detailed data, eg: show the information about any operation included in operations menu in details					
3.	Data filtering capabilities which allow displaying and getting the information related to the required subject according to the conditions set by the user” eg: Adding a condition on the date to view the data of current year					
4.	Providing real-time data directly and continuously					
5.	Accessing to the required information from different databases of the company through a single interface					
6.	presenting data in visual format through maps and charts with the support of text					
7.	Customizing views for different users; i.e. by role, geography, access privileges, department and other variations					
8.	The important information such as keys performance indicators is shown on one integrated screen which summarized latest updates data and reports					

The Fourth Dimension: The Benefit of BI Dashboard on Decision-Making Process at Paltel:

Is the existence of BI dashboard features that have been mentioned in the previous dimension will achieve the following benefits for Paltel Company?

#	Item	Disagree → Agree				
		1	2	3	4	5
1.	Maximizing the efficiency of the decision making process					
2.	Facilitating the decision-making process					
3.	Speeding up the decision-making process					
4.	Assisting in identifying problems much faster					
5.	Improving accuracy of business decisions					
6.	Improving accuracy of data					
7.	Assisting in assigning clear responsibilities for the employees and implementing decentralization in decisions-making process					
8.	Reducing manual work					

The Fifth Dimension: The Effect of The Level of Business and Department is needed for Creating BI Dashboard Implementation on Decision-Making Process at Paltel.

#	Item	Disagree → Agree				
		1	2	3	4	5
1.	I need a real time updates of information and reports which help me in decision making process					
2.	When I'm showing the information in visual display, this facilitate my work and help me in taking affective decisions.					
3.	My job nature enhanced when using dashboard at Paltel					
4.	If I have BI Dashboard application on my desktop to immediate access and manipulate the required data of valuable resource, will that help me in decision making process					
5.	My hierarchical level of Paltel is needed to implement BI Dashboard					
6.	My Department of Paltel employees is needed to implement BI Dashboard					
7.	BI Dashboard will enhance my job's effectiveness					
8.	BI Dashboard will enable me to accomplish tasks more quickly					

Appendix (2) - Final Questionnaire in Arabic

The Islamic University Of Gaza
Dean of Postgraduate Studies
Faculty of Commerce
Business Administration Department



الجامعة الإسلامية - غزة
عمادة الدراسات العليا
كلية التجارة
قسم إدارة الأعمال

السيد الفاضل / السيدة الفاضلة،
تحية طيبة وبعد،،،

يتشرف الباحث بأن يضع بين أيديكم استبانة لرسالة ماجستير بعنوان "أثر تطبيق لوحة قياس المؤشرات وذكاء الأعمال (Business Intelligence "BI" Dashboard) في عملية اتخاذ القرارات: دراسة حالة - شركة الاتصالات الفلسطينية"، وذلك لاستكمال متطلبات الحصول على درجة الماجستير في إدارة الأعمال من الجامعة الإسلامية بغزة.

تسعى هذه الدراسة لاستكشاف مدى تطبيق شركة الاتصالات الفلسطينية لخصائص نظام لوحة قياس المؤشرات وذكاء الأعمال (BI Dashboard) في برامجها الخاصة، وإمكانية تطبيق النظام بصورة متكاملة مستقبلاً، حيث أنّ (BI Dashboard) عبارة عن نظام معلومات "برنامج" يتم تصميمه وبرمجته للشركات ليكون بمثابة واجهة لاستخراج التقارير الرسومية والمعلومات وعرضها لكل موظف حسب موقعه وصلحياته في العمل، مع عمل تحديث تلقائي للبيانات من خلال ربط النظام مع قواعد بيانات البرامج المختلفة للشركة، ويمكن استخدامه لمتابعة التدفقات الأساسية في العمليات التجارية ليتم مراقبتها والتحكم بها، كما ويتميز (BI Dashboard) بالعديد من المميزات والخصائص التي تساعد الشركات على فهم معلوماتها بشكل سهل القراءة من أجل اتخاذ القرارات المناسبة. ويعتبر (BI Dashboard) أحد أدوات ذكاء الأعمال، وهو عبارة عن مجموعات أدوات وتقنيات وبرامج تساعد في جمع وتحليل كميات كبيرة من البيانات وتقديمها على شكل معلومات مفيدة للوصول إلى معرفة يمكنها أن تشكل أساساً لاتخاذ قرارات سريعة ومدروسة مما يسهم في تحسين عملية صنع القرار في مجال الأعمال التجارية، حيث يمثل (BI Dashboard) واجهة عرض لمخرجات جمع وتحليل بيانات ذكاء الأعمال.

يخدم (BI Dashboard) بشكل أساسي الإدارة العليا بالشركات من خلال إعطائهم لمحات سريعة عن المعلومات التي يحتاجونها لمراقبة أداء الشركة وتقييم أداء وجودة عمل الإدارات بالإضافة لتتبع الفرص وعمل تنبؤات عن المستقبل، ولكن خلال السنوات الأخيرة بدأت بعض الشركات بتصميم برامج (BI Dashboard) بحيث تخدم مختلف المستويات الإدارية، فالإدارة المتوسطة تستخدمه كذلك للاطلاع المباشر على سير العمل وتحسين العمليات ومقارنة النتائج مع مرور الزمن، وحتى العاملين بالمستويات التشغيلية بإمكانهم استخدام (BI Dashboard) لمراقبة وتتبع العمليات والأحداث والأنشطة في الوقت المناسب، والحصول على المعلومات التي يحتاجونها لإتمام مهامهم. ولتحقيق الهدف من هذه الاستبانة صممت من جزأين، الأول يتعلق بالبيانات الشخصية، والثاني يتعلق بالبيانات التخصصية من خلال خمسة محاور رئيسة تتعلق بتحديد مدى ملائمة نظام الداشبورده لشركة الاتصالات الفلسطينية والفائدة المرجوة منه. آملاً بتكرمكم بقراءة كل محور وعباراته، ومن ثم الإجابة بوضع إشارة (X) في المكان المناسب لكل عبارة، مع العلم أن مساهمتكم في تعبئة الاستبانة سيكون لها الأثر الأكبر في الحصول على النتائج المرجوة. سيتم التعامل مع البيانات بسرية تامة، وستستخدم فقط في أغراض البحث العلمي.

وتقبلوا بقبول فائق الاحترام والتقدير،،،

الباحث/ محمد ناجي الهندي

الجزء الأول: المعلومات الشخصية:

** الرجاء التكرم بوضع إشارة (/) أمام العبارة الصحيحة:

1. الجنس ذكر أنثى
2. الفئة العمرية أقل من 30 سنة من 30-40 من 40-50 من 50 سنة فأكثر
3. المؤهل العلمي ثانوية عامة دبلوم متوسط بكالوريوس دراسات عليا
4. الكلية التي تخرجت منها تجارة هندسة تكنولوجيا المعلومات تخصص آخر، حدد.....
5. عدد سنوات الخدمة أقل من 5 سنوات من 5-10 سنوات من 10-15 سنة من 15 سنة فأكثر
6. المستوى الإداري إدارة عليا (مدير عام/ مدير دائرة/ مدير إدارة) إدارة وسطى (رئيس وحدة/ رئيس قسم) إدارة تشغيلية (مهندس/ إداري/ ...)
7. الإدارة الفنية التجارية الإدارية والمالية

الجزء الثاني: يشتمل على البيانات التخصصية من خلال خمسة محاور رئيسة هي:

المحور الأول: مدى وجود خصائص (BI Dashboard) في أنظمة المعلومات الحالية لشركة الاتصالات.

هل تجد الخصائص/ المميزات التالية في البرامج الخاصة بشركة الاتصالات الفلسطينية التي تتعامل معها؟

م	البند	غير متوفرة	متوفرة بشكل نسبي	متوفرة
1	عرض البيانات بطرق مختلفة (مثل: الأشكال البيانية، الجداول، الخرائط، والمقاييس)			
2	وجود قائمة منسدلة (Drill-Down) تعرض العمليات "المعلومات" الأساسية، ثم اختيار واحدة منها للاطلاع على تفاصيلها، كاختيار أحد حملات الشركة من قائمة الحملات فيتم إظهار تفاصيل هذه الحملة والبيانات المتعلقة بها			

م	تابع - البند	غير متوفرة	متوفرة بشكل نسبي	متوفرة
3	خاصية فلتر المعلومات (Filtering) والتي تمكن من عرض والوصول للمعلومات ذات الصلة بالموضوع المطلوب فقط حسب الشروط التي يتم وضعها، فعلى سبيل المثال يمكن إضافة شرط على التاريخ بأن يتم عرض بيانات السنة الحالية فقط.			
4	توفير معلومات محدثة بشكل مباشر ومستمر			
5	الوصول للمعلومات المطلوبة من مختلف قواعد بيانات وبرامج الشركة عبر واجهة واحدة			
6	عرض البيانات بشكل رسومي من خلال الخرائط والأشكال البيانية، مع إضافة بعض النصوص للتوضيح			
7	تخصيص العرض (Customization) عبر إعطاء صلاحيات الوصول للمعلومات وطريقة عرضها للمستخدمين حسب أمور محددة كالمنطقة الجغرافية والقسم الذي يعملون به وغيرها			
8	عرض المعلومات المهمة مثل مقاييس الأداء الرئيسية على شاشة متكاملة واحدة (One integrated screen) بحيث تحتوي على آخر التحديثات التي تتعلق بأداء الشركة			

المحور الثاني: مستوى جهوزية شركة الاتصالات الفلسطينية لتطبيق (BI Dashboard) في الشركة.

م	البند	غير موافق ← موافق				
		5	4	3	2	1
1	تهتم شركة الاتصالات الفلسطينية بتكنولوجيا المعلومات (تعمل باستمرار على تحديث أنظمتها البرمجية، وتطبيقاتها؛ لتواكب التقدم التكنولوجي المتسارع)					
2	يتمتع معظم موظفو شركة الاتصالات الفلسطينية بالكفاءات اللازمة للتعامل مع أحدث تكنولوجيا المعلومات					
3	أقوم دائماً بجمع المعلومات المهمة المتعلقة بالعمل واللازمة لاتخاذ القرارات قبل أن أتخذ قراراتي باستخدام أنظمة المعلومات الموجودة في الشركة					
4	أشجع شركتي على بناء وتطبيق نظام (BI Dashboard) وسأستخدمه حتى لو لم يكن إجبارياً					
5	لن تعيق التحديات التجارية (مثل استراتيجية الشركة، مستوى جهوزيتها، وقياسات العائد على الاستثمار) من تطبيق (BI Dashboard) في شركة الاتصالات الفلسطينية					
6	لن تعيق التحديات التقنية (مثل: السرية، جودة البيانات، ربط البيانات من مصادرها المتعددة، وشكل التصميم) من تطبيق (BI Dashboard) في شركة الاتصالات الفلسطينية					
7	يعتبر تطبيق تقنية (BI Dashboard) مكماً للتقنيات المتوفرة في شركة الاتصالات الفلسطينية					
8	يساعد تطبيق (BI Dashboard) شركة الاتصالات على تعزيز ميزتها التنافسية					

المحور الثالث: مدى حاجة شركة الاتصالات الفلسطينية بشكل عام لخصائص ومميزات (BI Dashboard).
إلى أي مدى ممكن أن تساعد الخصائص التالية والتي يوفرها (BI Dashboard) في عملية اتخاذ القرارات
بشركة الاتصالات الفلسطينية؟

م	البند	غير موافق ← موافق				
		5	4	3	2	1
1	عرض البيانات بطرق مختلفة (مثل: الأشكال البيانية، الجداول، الخرائط، والمقاييس)					
2	وجود قائمة منسدلة (Drill-Down) تعرض العمليات "المعلومات" الأساسية، ثم اختيار واحدة منها للاطلاع على تفاصيلها					
3	خاصية فلتر المعلومات (Filtering) والتي تمكن من عرض والوصول للمعلومات ذات الصلة بالموضوع المطلوب فقط حسب الشروط التي يتم وضعها، فعلى سبيل المثال يمكن إضافة شرط على التاريخ بأن يتم عرض بيانات السنة الحالية فقط.					
4	توفير معلومات محدثة بشكل مباشر ومستمر					
5	الوصول للمعلومات المطلوبة من مختلف قواعد بيانات وتطبيقات الشركة عبر تطبيق "واجهة" واحدة					
6	عرض البيانات بشكل مرئي من خلال الخرائط والرسومات والأشكال البيانية، مع إضافة بعض النصوص للتوضيح					
7	تخصيص العرض (Customization) عبر إعطاء صلاحيات الوصول للمعلومات وعرضها للمستخدمين حسب أمور محددة كالمنطقة الجغرافية والقسم الذي يعملون به وغيرها					
8	عرض المعلومات المهمة مثل مقاييس الأداء الرئيسية على شاشة متكاملة واحدة (One integrated screen) بحيث تحتوي على آخر التحديثات التي تتعلق بأداء الشركة					

المحور الرابع: فوائد الـ (BI Dashboard) على عملية اتخاذ القرارات في شركة الاتصالات.
هل وجود خصائص الـ (BI Dashboard) التي تم ذكرها في المحور السابق ممكن أن تحقق الفوائد التالية
لشركة الاتصالات الفلسطينية؟

م	البند	غير موافق ← موافق				
		5	4	3	2	1
1	تحسين كفاءة عملية اتخاذ القرارات					
2	تسهيل عملية اتخاذ القرارات					
3	تسريع عملية اتخاذ القرارات					
4	المساهمة في تعريف المشاكل بشكل أسرع					
5	تحسين دقة القرارات					

م	البند	غير موافق ← موافق				
		5	4	3	2	1
6	زيادة دقة المعلومات					
7	المساهمة في إسناد مسؤوليات واضحة للموظفين، وتحقيق اللامركزية في عملية اتخاذ القرارات					
8	تقليل الأعمال اليدوية (manual work)					

المحور الخامس: مدى حاجة مختلف المستويات الإدارية والإدارات بشركة الاتصالات لتطبيق
(BI Dashboard).

م	البند	غير موافق ← موافق				
		5	4	3	2	1
1	أحتاج تحديثات آنية للمعلومات والتقارير اللازمة لاتخاذ القرارات أثناء تواجدي بالعمل					
2	عند استعراضي للمعلومات بطريقة عرض رسومية، فإنه يتيسر لي فهم أعمق للبيانات التي أتعامل معها					
3	طبيعة عملي ستتحسن مع استخدام (BI Dashboard) في الشركة					
4	إذا امتلكت (BI Dashboard) على جهازي في العمل، بحيث يُمكنني من الوصول السريع إلى البيانات اللازمة ومعالجتها بفعالية وأمان؛ فإن ذلك سيساعدني على إتخاذ قرارات فعالة					
5	المستوى الإداري الذي أعمل به بحاجة إلى التعامل مع (BI Dashboard)					
6	الإدارة الذي أعمل بها بشركة الاتصالات بحاجة للتعامل مع (BI Dashboard)					
7	استخدامي للـ (BI Dashboard) سيُحسن كفاءتي في العمل					
8	استخدامي للـ (BI Dashboard) سيساعدني في إتمام المهام بشكل أسرع					

Appendix (3)

Referees Who Judge the Reliability of the questionnaire

Refereeing and refining after designing and revising the questionnaire several times, it was refereed and refined by university Professors and Doctors. Finally the final copy was ready to be distributed to the research sample.

No.	Name	Working Place
1.	Prof. Dr. Yousef Ashour	Islamic University of Gaza
2.	Prof. Dr. Alaa El-Halees	Islamic University of Gaza
3.	Prof. Dr. Sami abu Naser	Al-Azhar University of Gaza
4.	Dr. Wasim Al Habil	Islamic University of Gaza
5.	Dr. Samy Abu El Ross	Islamic University of Gaza
6.	Dr. Wael El-Sarraj	Islamic University of Gaza
7.	Dr. Ashraf Alattar	Islamic University of Gaza
8.	Dr. Hatem Alaydy	Islamic University of Gaza
9.	Dr. Ahmed Mahmood	Al-Azhar University of Gaza
10.	Dr. Sanaa El Sayegh	University Collage of Applied Sciences