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The Role of Implementing Mobile Business Intelligence (MBI) in Decision Making Process: An Empirical Study at Jawwal Company

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ABSTRACT

Research Title: The Role of Implementing Mobile Business Intelligence (MBI) in Decision Making Process: An Empirical Study at Jawwal Company

Mobile phones hold great potential to become a common way of conducting services transactions on a global scale in the near future. Smartphones represent an opportunistic agent to increase work efficiency and facilitate decision making process.

This study aims 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. Users can create and share knowledge and analysis in groups and across organizations since MBI platforms deliver insight everywhere, an application model, mobility and reassembly, and a social and collaborative experience.

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

The findings from the data analysis clearly show the employees' approval of implementing MBI system. The findings show that there exists significant positive effect of implementing MBI on Decision Making Process at Jawwal Company. Also the findings show that Jawwal is very ready for implementing MBI system in addition to that all hierarchal levels of Jawwal employees are in need of implementing MBI. The finding shows that implementing MBI considers a competitive advantage for Jawwal Company. Also the findings show that Mobile based Applications will rapidly replace the desktop applications and give the ability to integrate with enterprise applications such as CRM.

They study recommends 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.

ملخص الرسالة

عنوان الرسالة :

"أثر تطبيق ذكاء الأعمال الإداري باستخدام الهواتف الذكية (MBI) على عملية اتخاذ القرارات "
(دراسة حالة – شركة الاتصالات الخلوية الفلسطينية جوال)

وتهدف هذه الدراسة لتطبيق نظام ذكاء الأعمال الإداري باستخدام الهواتف الذكية (MBI) لشركة جوال؛ وذلك لزيادة كفاءة العمل، ولتسهيل عملية صنع القرارات. حيث يعتبر الـ(MBI) تطوير لاستخدام نظام ذكاء الأعمال الإداري التقليدي (BI) المستخدم على أجهزة الكمبيوتر ليمتد استخدامه إلى الهواتف المحمولة. فيعتبر الـ(MBI) نظام موجه للمستخدم ليساعده على اتخاذ قرارات استنادا إلى مصادر متعددة: البيانات، والأشخاص، والبيئة. ومن خلال الـ(MBI) يمكن للمستخدمين إنشاء ومشاركة المعرفة وتحليل المعلومات عبر مجموعات أو الشركة ككل. حيث تساعد الهواتف الذكية المستخدمة في الـ(MBI) موظفي الشركة على طرح الأسئلة والحصول على إجاباتها ومشاركة الخبرة وتتبع مسار عملهم ومدى صحته وتبصيرهم بكل ما يحتاجون إليه في أي مكان وأي وقت.

استخدمت الدراسة المنهج الوصفي التحليلي، واعتمدت على عدد من المصادر الرئيسة والثانوية في جمع المعلومات؛ حيث مثلت المصادر الأولية في استبانة صممت خصيصاً لهذه الدراسة. ويشمل مجتمع الدراسة موظفي جوال في قطاع غزة والصفة الغربية؛ حيث تم استرداد 307 استبانة من أصل 350 أي بنسبة 87.8%.

النتائج المستخلصة من تحليل البيانات تشير بوضوح إلى رضا موظفي جوال لتطبيق نظام ذكاء الأعمال الإداري باستخدام الهواتف الذكية(MBI). حيث تدل النتائج على وجود علاقة ايجابية بين تطبيق نظام ذكاء الأعمال الاداري باستخدام الهواتف الذكية(MBI)، وعملية اتخاذ القرارات في شركة جوال. كما وأظهرت مقدار جاهزية جوال لتطبيق هذا النظام بالاضافة إلى مدى احتياج موظفي جوال بكل مستوياتهم الادارية لمثل هذا النظام. كما وأظهرت النتائج بأن تطبيق نظام ذكاء الأعمال الاداري باستخدام الهواتف الذكية(MBI) يتعبير ميزة تنافسية لشركة جوال بالاضافة إلى أن تطبيقات الهواتف الذكية ستحل محل برامج الكمبيوتر، وستُمكِّننا من استخدام برامج الشركة مثل (CRM).

توصي الدراسة شركة جوال بتبني النظام والاستثمار فيه لتصبح بنك المعرفة لهذا النظام وخدماته والحلول التي يقدمها؛ لتكون جاهزة لتطبيقه والذهاب في استراتيجية الـ(MBI).

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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.

DEDICATION

TO MY DEAR FATHER AND MOTHER . . .

WITH LOVE AND APPRECIATION

TO THE FUTURE OF PALESTINE . . .

MY SON's. . .

MAHMOUD & AYHAM

TO MY BELOVED WIFE …

WHOMWITHOUT HER I COULD NOT FINISH THIS WORK

TO MY WONDERFUL BROTHERS AND SISTERS …

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LIST OF ABBREVIATIONS

1G	The first generation of mobile telephony systems
2.5G	It extends 2G of mobile telephony systems
2G	The second generation of mobile telephony systems
3.5G	It extends 3G of mobile telephony systems
3G	Third generation technology
4G	Fourth generation mobile technology
ADX	Abu Dhabi Securities Exchange
API	Application Programming Interface
AR	Access Requester
BA.	Bachelor's degree
BI	Business Intelligence
CAGR	Compound Annual Growth Rate
CDMA	Code Division Multiple Access
CEO	Chief Executive Officer
CRM	Customer Relationship Management
CTIA	Cellular Telecommunications Industry Association
DSS	Decision Support System
EDGE	Enhanced Data rates for GSM Evolution
EFMF	Evolving Fuzzy Modeling Framework

EPC	Electronic Product Code
GEOBI	GEOSPATIAL Business Intelligence
GPRS	General Packet Radio Service
GPS	Global Positioning Systems
GSM	Global System for Mobile Communications
GT	Grounded Theory approach
IOS	Internetwork Operating System
IT	Information Technology
ITU	International Telecommunication Union
KPIs	Key Performance Indicators
LDAP	Lightweight Directory Access Protocol
MADI	Mobile Applications Developers and Innovators Project
MA.	Master degree
MANETs	Mobile Ad Hoc Networks
MMS	Multimedia Messaging Service
MOS	Mobile Operating Systems
OLAP	On-line Analytical Processing
PC	Personal Computer
PDA	Personal Data Assistant

PDP	Policy Decision Point
PEP	Policy Enforcement Point
PICTI	Palestine Information and Communications Technology Incubator
PSE	Palestinian Stock Exchange
QoS	Quality of Packet Transmission Services
RFID	Radio Frequency Identification
ROI	Return On Investments
SCM	Supply Chain Management
SMS	Short Message System
SPSS	Statistical Package for the Social Sciences
SSM	Soft Systems Methodology
TCO	Total Cost of Ownership
UI	User Interface
VAS	Value-Added Services
VPN	Virtual Private Network
WAP	Wireless Access Protocol
Wi-Fi	Medium-Range Wireless Networks

GLOSSARY OF TERMS

1G	The first Generation of mobile phones was voice oriented analogue mobile and cordless telephones which were not suitable for modern mobile commerce services.
2G	The second generation of mobile telephony systems uses digital encoding. 2G networks support high bit rate voice, limited data communications and different levels of encryption. 2G networks include GSM, and CDMA. 2G networks can support SMS applications.
2.5G	2.5G extends 2G systems, adding features such as packet-switched connection and enhanced data rates. 2.5G networks include EDGE and GPRS. These networks support WAP, MMS, SMS mobile games, and search and directory.
3G	The third generation of mobile systems is based on the International Telecommunication Union (ITU) family of standards under the International Mobile Telecommunications IMT-2000 program. It provides high-speed data transmissions of 5-10 Mbps and higher. 3G supports multimedia applications such as full-motion video, video conferencing and Internet access.
Bluetooth	Short Range Wireless Networks.
Briefing Books	Report decks which can be assembled online then captured and delivered for offline consumption. Once generated, a Briefing Book becomes a multi-page pdf document with built-in outline-level navigation controls as well as navigation within pages. Any pdf reader can be used to consume this versatile format.
Cellular Operator	Represent the telecommunication company which provides mobile services.

EDGE	Enhanced Data rates for GSM Evolution (EDGE) or Enhanced GPRS (EGPRS), is a digital mobile phone technology that allows increased data transmission rates and improved data transmission reliability. Although technically a 3G-network technology, it is generally classified as the unofficial standard 2.75G.
EPC	Electronic Product Code is a family of coding schemes to be used with RFID tags. The EPC was created as a low-cost method of tracking goods in the supply chain using RFID technology.
GPRS	GPRS is a radio technology for GSM networks that adds packet-switching protocols. As a 2.5G technology, GPRS enables high-speed wireless Internet and other data communications. GPRS networks can deliver SMS, MMS, email, games and WAP applications.
GSM	Abbreviation for Global System for Mobile Communications. The uniform GSM standard ensures perfect compatibility between networks and mobile phones in any location. For example, a user in Switzerland can use his mobile phone to call or receive calls from Germany or Spain. The abbreviation originally stood for "Group Special Mobile", which was the name of the study group that developed a European standard for mobile networks in 1982. Today, this network is the result of their work - the standard for digital mobile telephony (now used all over the world). See UMTS.
HTML5	Is a markup language for structuring and presenting content for the World Wide Web, and is a core technology of the Internet originally proposed by Opera Software. It is the fifth revision of the HTML standard (created in 1990 and standardized as HTML4 as of 1997) and, as of August 2012, is still under development. Its core aims have been to improve the language

with support for the latest multimedia while keeping it easily readable by humans and consistently understood by computers and devices (web browsers, parsers, etc.). HTML5 is designed to provide a comprehensive application development platform for Web pages that eliminate the need to install third-party browser plug-ins such as Java and Flash. HTML5 provides support for 2D graphics, document editing, drag and drop, browser history management, video playback and local file storage.

Mobile Users	Represent all active subscriptions or SIM cards used by subscribers. One subscriber can have multi-active subscriptions.
RFID	Radio Frequency Identification. With an RFID reader, an EPC-compliant RFID tag and a distributed EPC network, a business can look up detailed information about a product or package, such as its date of manufacture or expiration.
SPSS	SPSS (originally, Statistical Package for the Social Sciences) is a computer program used for statistical analysis.
WAP	Wireless Access Protocol (WAP) is an open international standard for application-layer network communications in a wireless-communication environment. Most use of WAP involves accessing the mobile web from a mobile phone or from a PDA.
Wi-Fi	Medium-Range Wireless Networks.

CHAPTER ONE
INTRODUCTION

This chapter consists of the following sections:

1.1 Introduction

1.2 Problem Statement

1.3 Research Objectives

1.4 Research Variables

1.5 Research Hypothesis

1.6 Research Significance

1.7 Previous Studies

1.8 Research Distinction

1.1 Introduction

In a world where speed and adaptability can make or break a business, increasing of organization is how companies win and keep on winning (Cook and Macaulay, 2004). What separates the winners is the ability to make the rest important decisions well-and then to make them happen. The key is not structure but rather an integrated organizational system. Decisions, if you can't make them; you won't be an effective manager. It requires getting the right people focused on those decisions at the right time. That's true whether the decisions involve the largest issues that a company faces (what's our strategy?) or more tactical, day-to-day concerns (should we buy more components now or next month? Should we accept this customer's return?) (Bateman & Snell, 2004). However, there still are three common measures that every business and every industry must monitor: Revenue, Operational Cost and Compliance a new measure must also be added and defined in the context of the industry, which is agility. Agility is the ability to respond customer and market demand and making decision on the fly can only be possible having mobile business intelligence as an integral part of the business intelligence strategy (Scalable Systems, 2011). Decision making is not something that happens only in the back office or the boardroom. Decisions are made on the road, in warehouses, in client meetings and in airport lounges, and the decision maker often needs only quick access to a few key metrics shown on a mobile device (Bitterer & Sood, 2011).

The age of static business and slow information flow, when most decision was based on day-or week-old data, has come to an end. Now new technology helps organizations provide a more agile and flexible approach to business. The e-business notion together with the notion of business intelligence and mobile business, represent a new way to manage through electronic interconnection in an efficient and innovative way. Two key technologies, the Internet/Web and mobile communications, are transforming the way we contact business (Stefanescu, 2008). A recent BusinessWeek study found that 60% of the respondents to the publication's survey regarding business intelligence rely on their "gut feel" when making a decision 50% of the time (Alfradique & Abreu, 2010).

"We're using wireless more every day, and the consensus of experts is that demand will continue to skyrocket by more than 50 times within the next five years. These are the

reasons why our members need more spectrums," said Steve Largent, President and CEO of CTIA. By making underutilized or unused spectrum available for auction, carriers will continue to invest billions of dollars in their infrastructure, generate hundreds of billions of dollars in benefit to our economy and create up to a half a million new jobs (Mansfield, 2011). With 5.9 billion mobile-cellular subscriptions, global penetration reaches 87%, and 79% in the developing world. Mobile-broadband subscriptions have grown 45% annually over the last four years and today there are twice as many mobile-broadband as fixed broadband subscriptions (ICT Indicators database, 2011).
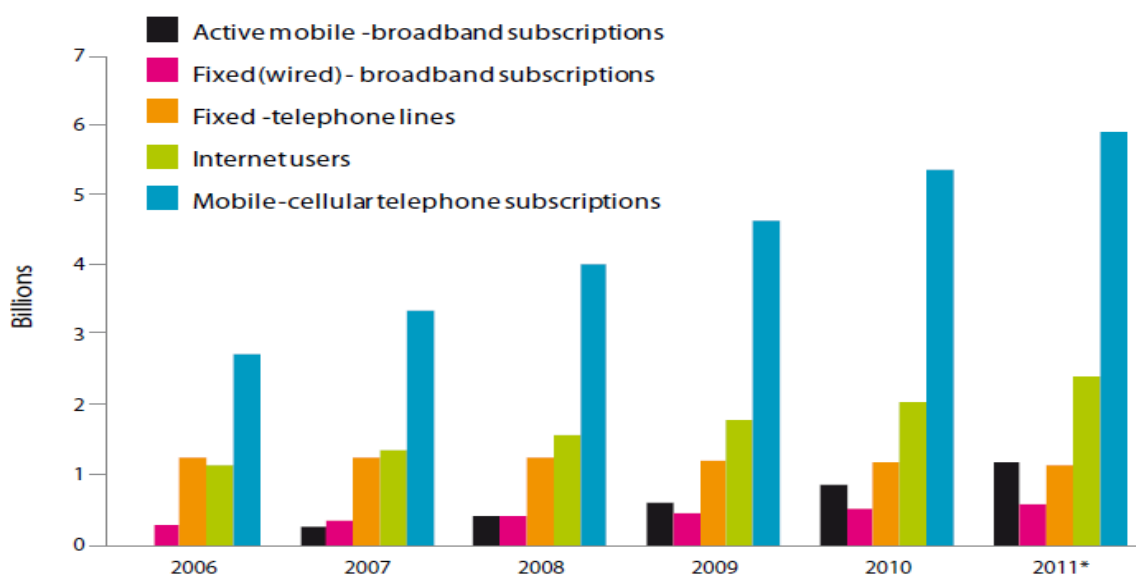
Figure1.1: Mobile Subscribers vs. others technologies (Source: ICT Indicators database, 2011)

By 2015, more U.S. Internet users will access the Internet through mobile devices than through PCs or other wire line devices. As smartphones begin to outsell simpler feature phones, and as media tablet sales explode, the number of mobile Internet users will grow by a compound annual growth rate (CAGR) of 16.6% between 2010 and 2015 (Mansfield, More Mobile Internet Users Than Wireline Users in the USA by 2015, 2011).

(Gartner, 2011) predicts that by 2015, 50% of the web sales will be done over mobile applications and by 2013, 80% of the businesses will support a workforce using tablets. By 2013 75.5% of the U.S. workforce will be considered mobile.

Informa Telecoms & Media forecasts that the revenues generated by the global mobile industry will grow at a modest CAGR 3.3% between 2010 and 2015. Data revenues represent a clear opportunity for top-line revenue growth. Although they will compensate for the decline of voice revenues – with a CAGR forecast at 12.3% over the next five years (Informa Telecoms & Media, 2011).
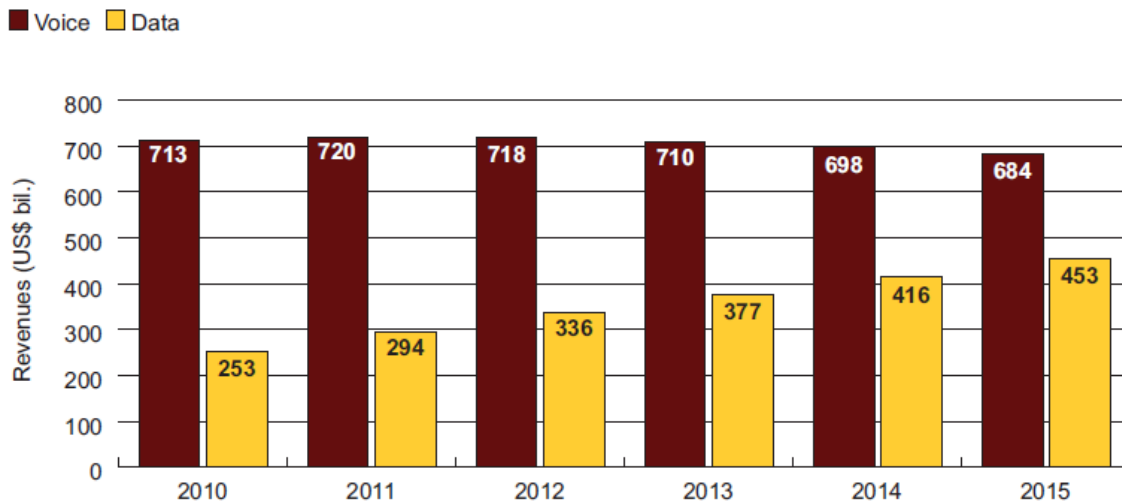
Figure1.2: Global, voice and data service revenues, 2010-2015 (source: Informa Telecoms & Media, 2011)

In order to support and improve business decisions and cooperate competitiveness, IT systems are used to collect and process business data. These business intelligence systems (BI systems) strive to combine formerly spread and fragmented data from different parts of a company. Through analysis and transformation, data is turned into information, a basis for strategic decisions. The increased availability and system performance of mobile systems allows flexible on site data collection and processing, thus extending business intelligence to mobile business intelligence. So an ever increasing amount of functionality is incorporated into mobile phones—this trend will continue as new mobile phone platforms are more widely used such as the iPhone or Android. Along with this trend, however, new risks arise, especially for enterprises using mobile phones for security-critical applications such as business intelligence (BI) (Mustafa, et al., 2011).

According to Gartner, the CAGR of BI platforms market is expected to be 8.1% through 2015 (Hagerty, Sallam, & Richardson, 2012). By 2013, 33 percent of BI functionality will be consumed via mobile devices (Gassman, Sallam, Bitterer, Hagerty, & Chandler, 2010). (IBM, 2010) predicted that more than half of the 2,000 IT professionals in 87 countries surveyed believe that within the next 5 years, more developers will be working on mobile- and cloud-based applications than traditional computing platforms for the enterprise.

While mobile technologies are spreading exponentially in work and life context, while Business Intelligence (BI) practices are generalizing in business organization, while major BI vendors have Mobile BI offering in place and despite an increase of mobile workers, Mobile BI uses remain extremely anecdotal. The level of adoption of Mobile BI is not consistent with the rapid expansion of its related technologies, mobile and BI. However, business users are actually aware of the functionality which is usually part of the standard functionalities they expect from a BI solution. Nevertheless, only few implement Mobile BI as part of a larger BI initiative and even fewer make this functionality their central initiative (PIMIENTA, 2010, P3). (Aberdeen Group, 2010) found that BI usage among organizations with MBI was twice the level of those who had not mobilized their BI (Figure 3).

Survival and long-term success will often depend on finding the right solution. To take the right decision is typically not a simple matter, as most decision problems are highly complex in nature. A key issue for all managers is how far they should share decisions with their team or colleagues (Adair, 2007). Integral to decision-making is the management and creation of shared meaning, focusing on MBI is inseparable from effective decision-making.
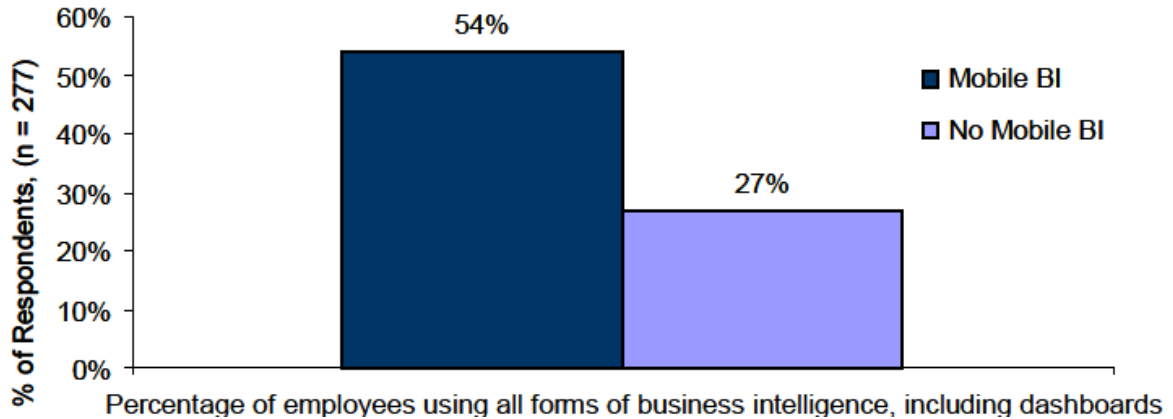
Figure 1.3: Mobility Increases BI Usage [Source: (Aberdeen Group, 2010)]

1.2 Problem Statement

In any Company, there is a lot of data that should be used in decision making process. But there is also a lot of data that is not used. Also some data are treated in a slow way. Systems that deal with data are sometimes not integrated. For these purposes we need a fast and reliable system that gives us the required data for decision making on real time and at any place. Jawwal Company as a telecoms company is supposed to use such systems in order to keep its decision making on the right track and retain its success. Jawwal employees need to have more flexibility. They wouldn't to be office based employees even though they need to be time and place independent in order to make proper decisions and take proper actions that lead them to achieve their goals.

So the main question that will be addressed in this research is: **What will be the impact of implementing MBI system on decision making process at Jawwal?**

1.3 Research Objectives

The main objective of this research is to overcome the problem statement, for that this research is being carried out with several objectives and it is important to state them clearly, to ensure that the research is kept on track.

The second main objective of this research is to determine the effect of implementing MBI on decision making process in Jawwal Company which can be divided to the following sub objectives:

1. To find out the effect of MBI platforms' features on decision-making process in Jawwal Company.
2. To find out the effect of Mobile MBI functions on decision-making process in Jawwal Company.
3. To find out the effect of Mobile MBI applications on decision-making process in Jawwal Company.
4. Determine the barriers of the Implementation of Mobile Business Intelligence to be used in process of decision-making in Jawwal Company.
5. Find out how much the need for implementing Mobile Business Intelligence in Jawwal.
6. Find out how much Jawwal is ready for implementing Mobile Business Intelligence to be used in process of decision-making.
7. Find out if using Mobile Business Intelligence in process of decision-making in Jawwal Company is appropriate for each particular hierarchical level or only exclusives on top management.

1.4 Research Variables

The research title which is that the role of Implementing Mobile Business Intelligence in the Decision making process, indicates the following variables which can be divided as:

1.4.1 Dependent Variable:

The dependent variable is the decision making process.

1.4.2 Independent Variables:

The independent variables of the research are:

1. Features of MBI Platforms.
2. MBI Functions.
3. MBI Applications.
4. Jawwal maturity level of implementing MBI.
5. The level of business need for creating a MBI implementation.

1.5 Research Hypothesis

Tow hypothesis are differentiated form research variables as follow:

Hypothesis1

There is significant positive effect of implementing MBI at the level ($\alpha \leq 0.05$) on Decision Making Process, which can be divided into the following hypothesis.

Hypothesis2

There are no significant statistical differences at significant level ($\alpha \leq 0.05$) among the respondents' answers regarding the Role of Implementing MBI in the Decision Making Process due to the personal traits of the respondents (Age, Gender, Educational Attainment, Field of Specialization, Managerial level, Duty station, Department, Percentage of time allocated for outdoor work, Percentage of time allocated for smartphones against PCs/Laptops, Total years of Experience and Years of Experience in Jawwal).

Sub Hypothesis:

1. There is significant positive effect of MBI platforms' features at the level ($\alpha \leq 0.05$) on decision-making process in Jawwal Company.
2. There is significant positive effect of MBI functions at the level ($\alpha \leq 0.05$) on decision-making process in Jawwal Company.
3. There is significant positive effect of MBI applications at the level ($\alpha \leq 0.05$) on decision-making process in Jawwal Company.
4. There is significant positive effect of Jawwal maturity level of implementing MBI at the level ($\alpha \leq 0.05$) on using MBI in decision-making process in Jawwal Company.
5. There is significant positive effect of the level of business need for creating a MBI implementation at the level ($\alpha \leq 0.05$) on using MBI in decision-making process in Jawwal Company.

1.6 Research Significance

The proposed system is expected to help employees to communicate with all the company programs via their cellular phones. This means that they can access all applications even in the remotest locations where outdoor their offices or internet service might be unavailable, preventing them from accessing their tasks or needed information. Therefore developing a system helps employees to face these obstacles is being a must in case more than 80% of Jawwal employees spend more than two hours in outdoor tasks and more than 20% of them spend more than six hours in outdoor tasks.

By MBI system which is a fast and reliable system that gives the required data for decision making on real time and at any place, employees become time and place independent which give them more flexibility to perform their tasks and so achieve their goals which leads to achieve company goals also. Also several benefits can be achieved by applying this system, such as save time, save efforts; moreover such system will increase flexibility and enhance decision making process as well as action taking process.

1.7 Previous Studies

In this section, more lights will be shed on some of Local and International studies.

1.7.1 (Henschen, 2012) *"BI and Information Management Trends"*

This study aimed to examine adoption trends and strategies around business intelligence, analytics and information management. This study surveyed business technology decision-makers at North American companies. The survey was conducted online, and respondents were recruited via an email invitation containing an embedded link to the survey. The email invitation was sent to qualified InformationWeek subscribers. Number of Respondents was 542 companies at North America. This study found that that 63% of respondents were worry about data security in using SaaS/cloud-based BI/analytics and 47% foresee integration issues. 55% of survey respondents said lower overall cost drives interest in cloud-based BI/analytics. 40% of respondents were adding or planed to add process optimization to their BI/analytics mix. 32% of respondents said they had a significant interest in SaaS-based BI.

1.7.2 (McQuiggan, Coyle, Thorne, & Sabourin, 2012) *"BI at Your Fingertips: Creating Immersive Mobile Reports with SAS® Visual Analytics"*

This paper discussed the pervasiveness of mobile computing which has created a paradigm shift in how information is consumed. It has become increasingly evident that report consumers expect business intelligence to be readily available, timely, and easily accessible wherever they are located. This paper used secondary data and experimental approach. This paper found that the new BI pipeline from SAS facilitates the distribution of information to the fingertips of decision makers anywhere. In this paper, the researchers offered best practices, tips, and tricks for creating compelling, immersive reports for MBI users. Learn how to transform a Web report into a mobile report using the SAS® Visual Analytics designer interface and how to take advantage of features in the SAS® MBI application to delight and empower decision makers anywhere.

1.7.3 (Soneji & Sherekar, 2012) *"Exploring Competitive Intelligence By Extracting Frequent Pattern of Data Mining in Mobile Computing Environment"*

This paper explored Competitive Intelligence (CI) used for data discovery through data mining system. This paper explored how data was mined by mobile devices with various techniques which can improve competitive intelligence. It also focused on flaws in the technique for processing data through mobile nodes and analyzed data used for decision making. That can improve with fetching algorithm. This paper also highlighted on the design aspects of the mining technique along with mobile computing for decisions support by the server in competitive decision. Decision making for completion with other server to get more client and accessing rate was vitally explained here. Various attribute affecting the performances of the various algorithms used through Data Mining in the Mobile Computing environment. This paper concluded that data is mined from data warehouse based on knowledge discovery for further decision. As knowledge plays vital role for competitive intelligence during decision making. For this approach data should be fetched or cached through client who is mobile in state. As client sends the request and get response data which further analyzed for taking proper decision. Each client tries to keep itself in competitive state with other client for their work.

1.7.4 (Farrokhi and Pokorádi, 2012) *"The necessities for building a model to evaluate Business Intelligence projects"*

This paper proposed to present an overview of BI and necessities for evaluation of readiness. In this paper an attempt had been made to depict an overview of BI and the necessities for building a model to evaluate readiness of companies in implementing BI project. This paper used literature approach and found that in today's highly competitive world, using BI is vital and no business organization can deny the benefit of BI. BI technologies are applied by profit and non-profit firms and business users became increasingly proactive. Successful BI project is an important issue for both researchers and practitioners; however, not many studies have done on BI readiness. Although some guidelines for implementation exist, few have been subjected to model building. During prospective scientific research related to this study, the authors will work out models to evaluate readiness of companies in implementing BI projects.

1.7.5 (Dresner, 2011) *"Updated Mobile Business Intelligence Market Study"*

This study aimed to know the state that MBI was achieved and where are going. To understand the changes afoot regarding MBI, a select group of original respondents were re-surveyed and examined differences from the initial study data. Interviews with several of these organizations also were conducted to get a deeper sense of their plans and requirements.

As with the original study, the vendor community was invited to update their product profiles with their latest mobile features - and have included updated rankings based on mobile platform and BI feature support.

The result is a compelling set of findings, which highlights the rapidly changing landscape for MBI as follow:

1   A majority of user respondents continue to view MBI as critical or important.

2   iPad interest last year has translated into significant deployments, with a modest increase in the iPhone and decreased usage of BlackBerry and Windows phones as platforms for Mobile Business Intelligence. Growing interest is present for Android devices – especially tablets.

3   Overall MBI user penetration increased over June 2010.

4   70% of respondents expect a quarter and 25% expect half of their user-base to utilize BI exclusively, through mobile devices, within 2 years.

5   The demand for executive use of MBI further solidified its top spot (top priority within ~ 80% of organizations) – with a slight uptick in the requirement for customers and suppliers.

6   Vendor support for "Alerting" improved since June, but had been surprisingly limited. Advanced features such as "write back" and "dashboard assembly" would be uncommon during 2011

1.7.6 (Rogers, Pawar, & Tipi, 2011) *"Mobile intelligence for reporting of supply chain KPI's"*

This study explored how mobile devices can be used to assist with reporting of supply chain-related performance measures. The study's findings and reflections on the areas of mobile intelligence for reporting of supply chain KPIs, the study proposed the following research agenda:

1. Ongoing literature review of developments in MBI reporting

2. Design, development and launch of a large scale questionnaire (sample size 1000, target response rate >100) to address supply chain specific BI reporting requirements of managers. Responses will be sought from managers across the world, taking in a variety of industries.

3. Gain additional insights from supply chain managers to determine their firms' readiness assessment for MBI for SCM (Supply Chain Management). Responses were sought from online business forums and business networking sites.

4. Gain insights from business reporting software vendors to provide a view on the technical possibilities and limitations of BI reporting using mobile devices.

5. Design and development of an SCM-specific BI reporting application for mobile devices.

1.7.7 (TRIF & VIŞOIU, 2011) *"A Windows Phone 7 Oriented Secure Architecture for Business Intelligence Mobile Applications"*

This paper presented and implemented a Windows Phone 7 Oriented Secure Architecture for Business Intelligence Mobile Application. In the developing process was used a Windows Phone 7 application that interact with a Web Service and a database. The types of Business Intelligence Mobile Applications were presented. The Windows mobile devices security and restrictions were presented. The namespaces and security algorithms used in .NET Compact Framework for assuring the application security were presented. The proposed architecture was showed underlying the flows between the application and the web service. This paper used experimental approach and concluded that the proposed architecture was able to offer a reasonable protection for the data exchanged between the client application and the web service. Also, the data was secured both on the device and at application server level. The security level obtained was fit to protect data between application users. The proposed architecture was cheap to implement as it did not require a certificate issued by a known authority nor an unsigned certificate generated by the organization. The architecture was designed for Windows Phone 7, but many elements mghit be shared with other platforms.

1.7.8 (Berrada, Dousset, & El Haddadi, 2011) *"Establishment and application of Competitive Intelligence System in Mobile Devices"*

This study discussed the strategy concept which has changed dramatically: from a long range planning to strategic planning then to strategic responsiveness. This response implies moving from a concept of change to a concept of continuous evolution. In our context, the competitive intelligence system presented aims to improve decision-making in all aspects of business life, particularly for offensive and innovative decisions. By experimental approach this paper presented XPlor Every Where, a competitive intelligence system based on a multidimensional analysis model for mobile devices. The objective of this system is to capture the information environment in all dimensions of a decision problem, with the exploitation of information by analyzing the evolution of their interactions. Also this paper defined a model for relationship between knowledge extracted forms.

1.7.9 (Fong, 2011) "*Data Mining for Resource Planning and QoS Supports in GSM Networks*"

In this paper data mining is used to derive rules and extract traffic patterns that reveal critical information for setting values in resource planning. Also shows how data mining algorithms are being applied for predicting and managing the radio resource movement of cell. Cell usage and performance are mined from the history of operational data, and then the prediction rules are extracted from these patterns. Radio resource management and reconfiguration then follows by using these rules. In this way, the network resources can be dynamically adjusted to meet the every changing demands and most-updated usage from the population of mobile users on a daily basis. Empirical testing data are used in experiments at University of Macau that demonstrate the efficacy of the data mining techniques. In the literature, a lot of research works have been done on radio resource management in mobile networks in the context of predicting the traffic loads across different cells by tracking the movements of mobile phone users. The radio resource prediction is about predicting a cell next usage movement, where the cell is serving for different mobile users traveling in and out. In order to facilitate such dynamic resource allocation, a resource management system is proposed in this paper. It focused on increasing the numbers of stations to improve the quality of service.

1.7.10 (Bolbol, 2011) *"Evaluate the success of applying customer relationship management system in Jawwal to maintain customer loyalty" Case Study -"Gaza Strip"*

This study aimed to shed light on Customer Relation Management CRM system at Jawwal Company in order to achieve the main goal of the company which is to retain existing subscribers and attract new ones in a competitive environment.

The data was collected through two questionnaires designed for this purpose, (140) questionnaires were distributed to the staff with a recovery rate of 86%, as well as (400) were distributed to the subscribers with a recovery rate of 96%.

The study concluded that there is a strong influence 79.25% among the study areas of customer focus, CRM organization, knowledge management, technological solutions and the level of loyalty according to the Jawwal staff, as well as there were no statistically

significant differences to these factors (grade, career position, educational qualification, place of work, age), but there were differences attributable to those factors (gender, experience).

1.7.11 (Shaban, 2011) *"Intellectual capital and its role in achieving the competitive advantage of the Palestinian Cellular Communications Company – Jawwal"*

This study dealt with the intellectual capital and its role in achieving the competitive advantage of the Palestinian Cellular Communications Company - Jawwal, through identifying the availability of the intellectual capital.

The study population was composed of all the 120 employees in administrative positions (director, manager, section head, and showroom manager) in Jawwal. Due to the small volume of the population of study, the questionnaire was distributed to all of the population. The retrieved questionnaires were 105 with rate of 87.5%.

The results showed high level of competitive advantage of the company and there is a significant relationship between the availability of intellectual capital requirements in (its three components) and achieving the competitive advantage of Jawwal, mainly in the domain of superior quality.

1.7.12 (Bahloul, 2011) *"The role of marketing information system technology in the decision making process – case study the banking sector in Gaza strip"*

This study examined the role of Marketing Information System Technology in the decision making process of the working banks in Gaza Strip. The study population consists of all the banks'branches in Gaza Strip and the main management centers in Gaza Strip and the West Bank. The research targets the branch managers, the deputy managers, and the marketing managers of the banks.

The research used the descriptive analytical method and utilized both primary and secondary sources for data collection. The research retrieved 99 of the 117 distributed questionnaires, forming a recovery percentage of 84.6%.

The research results show that the managers rely on Marketing Information Systems (MkIS) in making their decisions and they trust these decisions, because the banks have reliable technology and Marketing Decision Support Systems (MDSS) that organizes the

information gathered from all sources and analyze the data to help the managers in making marketing decisions. Also the results show that there were no significant differences among the respondents' answers due to the personal traits.

1.7.13 (AIRINEI & HOMOCIANU, 2010) *"The Mobile Business Intelligence Challenge"*

This study aimed to discuss MBI approach and its advantages and challenges. The study use literature approach to find that the MBI approach is just another way of sustaining the competitive advantage. But it might generate an obvious difference between two high-rated competitors within an environment with equal access to capital, technology, market research, customer data and distribution facilities because of the people behavior and above all because of the quality and speed of the decisions they make. Moreover, the integration of all data channels can offer a broader analytical perspective on the business for any such competitor. Despite of all the optimistic arguments concerning the Mobile Business Intelligence field the reality is somehow different because there are still barriers to overcome and challenges to respond to.

1.7.14 (PIMIENTA, 2010) *"The value proposition of Mobile Business Intelligence in question"*

This Study is for Executive MBA at University of Cape Town in France. It aims to reveal the mechanisms influencing the level of added value of MBI. The study chose to adopt Post-Positivism and more particularly the Critical Realism as a study approach. The study chose to adopt the Qualitative approach and more specifically the Grounded Theory approach (GT as a research methodology and integrated GT with Soft Systems Methodology (SSM). The data collection process consists in an iterative collection of information through interviews, observations and readings. The information is then classified and organized to extract 'concepts'. The research extracted actionable knowledge from the study which could be used by the various stakeholders to improve the problem situation. The study found that high definition, large screen, multi-touch functionalities are essential characteristics for devices holding MBI solutions and very recent smartphones are proposing such functionalities. Also found that MBI at delivering key information to

business users in situations of mobility to improve decision-making and action taking. But limited remote access to operational systems deprives the mobile user of taking actions in situations of mobility. Additionally, none-pervasiveness of connectivity currently prevents real ubiquity of Mobile BI. Wireless connections are facing technological difficulties (limited wireless coverage as 3G or WiFi are mainly in cities), and commercial complexities related to operators' subscription plans.

1.7.15 (MicroStrategy, 2010) *"The New Era of Mobile Intelligence"*

This study aimed to present MBI system and its advantages. This study used secondary data in addtion to MicroStrategy Mobile Applications Survey which is an ongoing survey series intended to assess the current status and future plans that organizations have to deploy mobile enterprise applications. Over 2,400 completed responses were obtained from promoted to over 100,000 business and IT professionals. Survey Highlighted that:

- 83% of all respondents stated that their organizations will deploy or are investigating deployment of mobile apps within the next two years.
- 62% of respondents with existing or planned deployments are focused on using the Apple iPhone.
- 55% of respondents with existing or planned deployments are focused on using the Apple iPad, up from 40%in the June 2010 survey

This study found also that MBI is 400 Times More Powerful than Desktop Internet Intelligence in case:

- MBI Expands the User Population by a Factor of 10: The range and number of mobile devices is showing explosive growth and the boundaries between these devices is blurring.
- MBI Expands Information Opportunities by at Least a Factor of 10: From the moment they wake, they can use applications that not only enhance their personal lives but also make them more productive and effective at work.
- MBI Expands Personal Query Relevance by a Factor of 4: A natural user interface allows users to point at what they want, touch where they want to go, and move the device to indicate how they want to explore the information. Query speed and query

relevance are further enhanced with other rich capabilities such as visual inputs via a camera or audio inputs via a microphone. Technology is playing catch-up and already converts images into data inputs from barcodes, fingertips, fonts, and facial recognition.

1.7.16 (Hejazinia & Razzazi, 2010) *"Commercial Activities through Mobile Phone Distributed Processing Integrated With Mobile Agents"*

This study analyzed the mobile phone platform based commercial applications requirements together with mobile phone based mobile agents and proposed an architecture style to fill the gap, and excess the development of commercial applications integrated with mobile agents on mobile phones. The study also described the existing challenges on mobile phones and the opportunities that mobile agents can provide with this new commercial activity enabled middleware on mobile phones. Different challenges were described. The study provides solutions to these challenges in the form of software system including the architecture. By using the underlying society network, the study showed how commercial services could be provided. The study's architecture was based on mobile phone and the previous work on developing P2P computer supported collaborative work. The study's contribution was providing the required mechanism to have mobile commercial applications Integrated with mobile agents on mobile phones. The study's approach was a new break through to the new world of ubiquitous commercial services provided by mobile phones.

1.7.17 (Mustafa, et al., 2011) *"Secure mobile business information processing"*

This research was supported by the German Federal Ministry of Education and Research (BMBF) under the grant 01IS09032 (VOGUE project) and this research aimed to protect security-critical business applications; a trustworthy mobile phone platform is needed. Starting with typical attack scenarios, the research described security architecture for Android mobile phones based on the concepts of Trusted Computing. In particular, this architecture allows for a dynamic policy change to reflect the current environment the phone is being used in. the research used literature and experimental approaches. The contribution of this research is that it described solution architecture for the mobile business scenario based on Trusted Computing. This architecture is tailored towards the challenges

posed by the nomadic nature of mobile phones. In this sense, these requirements are different from the PC world with a usually fixed environment. To make the discussion more practical, this paper presumed that the MBI client runs Android, although its solution is not limited to one specific platform. The proposed architecture demonstrated a possible solution for the compliant use of a mobile device in different security environments, based on a new combination of currently available technologies. Switching security environments begins with launching a virtual environment and contacting the security gateway of the target network.

1.7.18 (Hernaus, Pejic, & Rebac, 2010) *"Using business intelligence in decision-making process an empirical analysis for Croatian companies"*

This study aims to prove that BI has become a very important aspect of decision-making, not only at the top, but at each particular hierarchical level. That is why it needs to be aligned with the business strategy in order to be capable to support analytical decision-making.

The data have been collected through questionnaires which were distributed to 200 randomly chosen during May 2008, from the database of The Institute for Business Research of the 500 most successful Croatian companies in 2006. The questionnaire was addressed and mostly fulfilled by CIOs or IT experts.

The study reveals that 82% of the companies have implemented standardized reports, 63% are using data warehouses, 51% of them have OLAP systems, while data mining and performance management is quite marginal in only 22% and 9% of cases. The empirical analysis also revealed that 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.

Empirical findings lead to a conclusion that significant part of the observed Croatian companies has already, at least partially, implemented BI system(s).

1.7.19 (El-Shikhdeeb, 2008) *"The Role of Business Communication in Decision Making Process – Case Study Palestinian Communication Company"*

This study aimed at investigating the effect of business communication on decision-making process in PalTel by examining the role of Modern Communication Technologies (MCTs), business communication methods, and employee's communication skills on decision-making process. The research population consisted of all PalTel's employees in the low level management, middle level management, and top level management (446 in number). Three hundred and forty employees were participated in a survey. A total of 279 questionnaires were returned for a response rate of 82.1%, and seven of them were not valid.

The results of this study revealed that there is a significant correlation between business communication and decision-making process. Also the results of this study also revealed that males responses are more agree than females for MCTs, Employee's communication skills, and all dimensions together. This study also found that that the respondents' Managerial Level has an effect on the respondents' agree to Communication methods, Employee's communication skills, and all dimensions together.

1.7.20 (McDowell, 2008) *"Business mobility: A changing ecosystem"*

This paper examines the evolution of the still-nascent business mobility ecosystem and its key drivers, such as consumer behavior, that shape the segment. It also explores the changing roles and relationships of the ecosystem's key players; projections for growth in business mobility; and the value or ROI of business mobility. It offers advice to businesses that are considering business mobility solutions. And it points out a number of changes that members of the business mobility ecosystem will need to make in order for business mobility to evolve to the point of fruition, where companies are willingly ready to purchase solutions as a strategic investment, and where the solutions are as solid but also as flexible and easy to buy and integrate in a heterogeneous, global market. Lastly, the paper takes a look at a few large companies that have made significant steps toward strategic and holistic adoption of business mobile.

The paper concluded that without a compelling, market-driven vision for business mobility, the mobility landscape will remain scattershot, individually-driven – possibly strategic, but not transparent and holistic. This new vision will require ecosystem members

to reposition themselves and realign with the understanding that they will cooperate with one another and compete against one another.

The paper recommended that investing to become "a knowledge bank" of business mobility services and solutions, Being prepared to provide a seal of approval for mobile applications, identifying partners to facilitate a go-to-market strategy and evaluating integrated channel partnerships similar to those formed between the wireless e-mail providers and carriers.

1.7.21 (GS1 Mobile Com, 2008); "*Mobile Commerce: opportunities and challenges"*

This paper demonstrated the reality of mobile commerce for businesses and consumers alike and the need for GS1 to contribute in a neutral way to establish relevant global standards for the benefit of all stakeholders. This white paper aimed to: understand different business needs relevant to mobile commerce; help businesses to define what benefits they could derive from mobile commerce; demonstrate how GS1 can support businesses and consumers in the adoption of mobile commerce; show where there are gaps and issues in technology that would create a barrier to adopting standards; and drive interoperable mobile commerce implementations based on a basic set of standards. This paper tied together three basic trends: Consumers are changing their behavior and expectations with regard to shopping

and brand loyalty; Businesses are changing the way they do business; and Mobile phones are enabling these changes to happen on a global scale. The methodology of this paper was the result of a combination of: physical meetings and conference calls of the GS1 Mobile Com work group (comprised of members of the target audience above); interviews conducted amongst experts in the field of mobile commerce; and desk research. This paper recommended the following: Use GS1 keys to identify objects; Encode GS1 keys in bar codes and RFID tags; Use existing bar codes on products as an entry point for product information; Mobile phones should be able to read GS1 standard 1D and 2D bar codes out of the box; Mobile phones should be able to read EPC RFID tags on products; and When building systems to support mobile technologies, companies should use existing infrastructure to link to product information and added value services.

1.7.22 (Kotorov, 2007): *"Mobile Business Intelligence Reporting A Roadmap for Success"*

This study explained how an organization approaches MBI will inevitably impact the health of the entire enterprise. This Study used secondary data and literature approaches. This study found that with more and more employees traveling and working remotely they are driving the trend and changing the face of business communications to be MBI. Organizations that meet the demand for MBI will benefit from maximized productivity by enabling users to get the information they need wherever they are, both while connected to enterprise resources and when wireless connections are unavailable. Organizations will also experience an increased return on investments in mobile devices and BI applications. It found also that Information Builders offers a unique, extensible solution that is:

- Compliant with emerging mobile technology trends

- Low cost since additional hardware is not required

- Customizable to meet the BI reporting needs of all users

- Easy to deploy by leveraging existing development and deployment skills

- Robust enough to continue to meet mobile reporting needs even as devices and browsers become more advanced

1.7.23 (Business Objects, 2006): *"MBI Viewer version 2 (aka "MBI v2")"*

This paper aimed to describe MBI, how to use its functions and determined its advantages and limitations. This paper used secondary data and experimental approaches and found that MBI works in "Pull-only" mode which means when there is no data network (3G, EDGE, GPRS) there is no access to BI content from the mobile device. Frequently users will encounter situations where data connectivity is partial, intermittent or somehow degraded in some way. The impact of degraded network connectivity is a loss of data packets. And MBI functional limitations were:

- MBI was tested only on Nokia, Blackberry and Motorola devices. There was a huge diversity of mobile device platforms in the marketplace so there was absolutely no guarantee that the three devices tested above provides enough device coverage to ensure that the MBI J2ME midlet will work on all Java-capable devices.

- MBI is a "pull only" by design and did not cache report data at all. No data network means no report access.

- MBI did not offer push updates within the application although regular email on the mobile device may be used for that purpose.

- MBI supported Web Intelligence and Desktop Intelligence report engines only.

- MBI did not support cascading prompts.

- MBI memory was constrained by the available memory on the mobile device. Although MBI is only 110K itself, but report data sets could be quite large and can theoretically saturate available device memory.

- While MBI report size was limited only by available device memory, in practice there were real limits to the size and complexity of reports that you could display on a small mobile device while maintaining any semblance of acceptable usability. By experience to date indicates that all BI graphics and data should not exceed 2X the physical screen width of the target devices. 20 column reports and/or 100 page reports would NOT be usable on a mobile device.

1.7.24 (Al-Buheisi, 2005) *"Information technology and its influence on the decision-making at business organizations: Exploring study of the Palestinian environment"*

This study aimed at explaining the advantages of using new technologies such as Internet, Intranet and Extranet by the Palestinian firms and the role that these technologies can play at the decision-making process. Moreover, the author of this study has tried to discover the level of using such technology by the Palestinian firms thorough an empirical study. The author has applied the analytical descriptive method. 126 employees from the Palestinian firms participate in a survey, 38% were commercial, 18% were industrial, 37% were services, and 7% were trading. 71 out of the participants responded with a response rate of 56.3 percent.

The results of this study show us that only a small part of the Palestinian firms use (partially) this technology, also it indicates us that the firm size, mangers qualifications, training courses obtained by them and their English level are key words in using this technology in these firms.

1.7.25 (Bhappu, 1999) *"Diversity, teams, and technology"*

This research tried to understand how demographic diversity affects individuals in teams by examining the team decision-making process in depth. The research studied the intervening process variables of conflict and miscommunication, as well as the outcome variables of team identity and decision quality. It also examined how communication media affect individuals in these same teams. A field experiment was conducted. Subjects were assigned to conditions based on their actual roles in an organization. Using a balanced 2*2 design, this research constructed demographically diverse and homogenous work teams along the dimensions of organizational function, racial-ethnic minority status, and sex. Teams communicated face-to-face or using computer-mediated communication technology. This research found that demographic diversity has both a positive and negative effects on the ability of individuals to identify with their team and to negotiate higher quality decisions. Moreover, the results of this research showed that when teams communication was computer mediated, individuals in these teams had weaker team identity and lower decision quality.

1.8 Research Distinction

Those studies used different types of methodologies, some of them applied the analytical descriptive method, and another part of them carried laboratories experiments, while others used proposed modules. Moreover these studies were conducted on different types of organizations including the governmental institutions, public security establishments, and private sector's firms. These studies conducted on different countries with different societies, environments and cultures in the period between 1999 and 2012. The applied samples vary in their types. Part of the results that were found throughout this study come on line with the previous researches and other findings were the privilege of this study.

The main difference of this research from the previously mentioned studies is that it is the first research which link between MBI system and decision making process. And the first research studies the effect of implementing MBI system in Middle East area. Also it is the first research study all management levels at Jawwal Company in Gaza and West Bank.

CHAPTER TWO
THEORETICAL FRAMEWORK

This chapter consists of the following sections:

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    2.1.2 Definitions
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2.2 Decision Making
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2.1 Mobile Business Intelligence (MBI)

2.1.1 Introduction

Businesses must accelerate the flow of information, analysis and decision making in order to be more responsive to fast-moving events. This business requirement will drive the augmentation of schedule-based technologies with event-based technologies - i.e., event based business intelligence (Lawton, 2006). Business intelligence solutions typically offer the ability to analyze quantitative data and produce information that monitors business performance. The analyses may be summaries or drill downs that present details on subsets of data (Stefanescu, 2008).

While data creation, production, storage and availability have increased, everyone's ability to make sense out of that data has obviously decreased. That is why many enterprises are dealing with many difficulties when trying to consolidate decision-making data from multiple sources. That explains the born of Business Intelligence (BI). Although relatively new as concept, nowadays BI has got a great advance mainly because of the latest technologies which offer the power to pull-out the specific knowledge hide into the business environment. But beyond technology this advance resides in BI extensions due to its growing usage area. Such an extension is the MBI that becomes more and more important as today businesses are often relying on Internet and mobile technologies for daily operations (Airinei & Homocianu, 2010).

Mobile devices that access data wirelessly can be found in the pockets, purses and briefcases of ever-increasing numbers of avid consumers of new technology. Computer users first became untethered with the wireless laptop, which continues to appear frequently in conference rooms and coffee shops, but the smart phone has proven to be a game-changer. Smaller than wireless laptops and more capable than standard mobile phones, smart phones created a connected economy and a degree of near-real-time social networking not before seen (Ventana Research, 2011). Initial evidence of this convergence is the large volume of e-mails sent from BlackBerrys and other mobile Windows-enabled smart phones, as well as the proliferation of customer relation management (CRM) mobile applications. Also, phones have an advantage over laptops because they can be carried anywhere and used anytime – 24 hours a day, seven days a week. They don't require mobile hot spots or other Internet connections and with Bluetooth they can be easily connected to printers and other peripherals making almost the entire office portable (Kotorov, 2007).

Traditional desk-bound BI solutions will take a company only so far. Beyond that, the expanding scope and rapid pace of business can outstrip the supply line that mobile executives need most the two-way flow of timely information to guide decision-making, provide feedback, and monitor business performance. Once they move out of range of

business intelligence, front-line personnel can be blindsided by problems, overlook developing trends, miss opportunities. Securely transmitting on-site observations, updates, and analysis has to wait for a convenient place and time, while colleagues back at the office just wait (Microsoft Corporation, 2006). Gartner predicted that by 2012 35% of Fortune 5000 companies will "regularly fail to make insightful decisions" because of BI failures (Horan, 2011). Mobile is here. It is getting bigger and more widespread from the kindergartner in the classroom to the traveling CEO thousands of miles from an office. Information consumption is no longer a task primarily reserved for the desktop or laptop computer, but a ubiquitous task that can be performed anywhere, anytime. With the addition of tablets to mobile lineups, MBI has ignited to take advantage of the real estate and storage capacity these devices offer to provide critical information in the form of reports and dashboards at the fingertips of decision makers (McQuiggan, Coyle, Thorne, & Sabourin, 2012). In addition to CEO's business users are bringing their own personal devices, including tablet computers, into the office for business purposes. So, naturally they want to use business applications on them, and they also want them to run as quickly and as smoothly as their personal and consumer applications. Even though many no longer travel with notebook computers, they still want access to the same trusted information when they are away from the office (IBM SoftwareCognos, 2011).

In fact, the boom in mobile business may be a real advantage when properly transmitted and absorbed by data warehousing and BI solutions that provide at least report and analyze support (Airinei & Homocianu, 2010).

2.1.2 Definitions

2.1.2.1 BI Definition

Business Intelligence (BI) which is the activity of intelligently gathering, integrating, storing, processing and analyzing business data in order to find out pertinent and meaningful information to improve business decision making (Diallo, Badard, Hubert, & Daniel, 2010). In other words BI is the process of transforming raw data into meaningful information to enable more effective business insight and decision-making (MicroStrategy, 2011).

BI is the combination of processes, disciplines, organizational capabilities and technologies associated with the collection and integration of business performance data; providing access, visualization and delivery of actionable information via Key Performance Indicators (KPIs) (Aberdeen Group, 2011).

2.1.2.2 Business Mobility Definition

The Mobility word has been around for the past few years, typically used in connection with cellular or mobile phones, and more recently with mobile email. Mobility

is the freedom to collaborate and transact business outside traditional work places and times. The overwhelming use of mobile phones and other wireless devices indicates that today more than ever workers are staying connected while they are on the go. So business mobility basically refers to the ability for business employees to collaborate and conduct business transactions outside traditional business places and time. Mobility enhances business-wide processes and infrastructure, enabling workers to move freely yet sustain and/or increase their productivity see (Figure 2.1) (McDowell, What Is a Mobilized Business?, 2006).
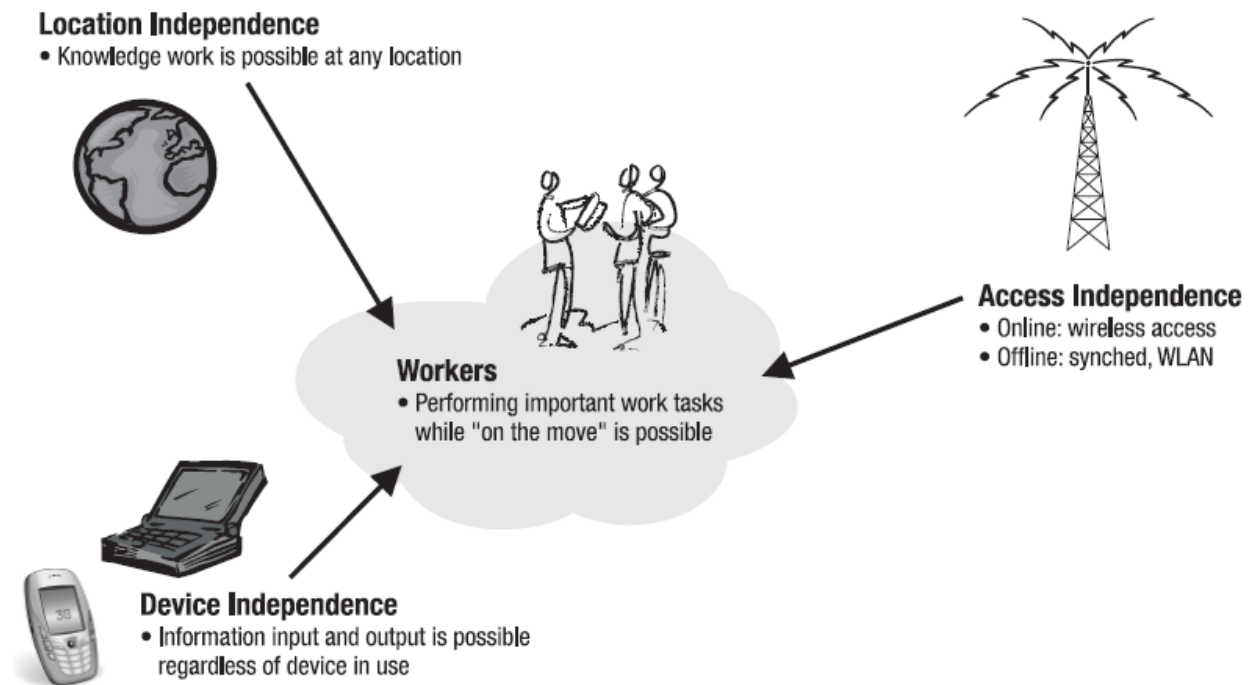
Figure 2.1: Mobility means access, device, and location independence [Source: (McDowell, What Is a Mobilized Business?, 2006)]

Mobility can be described according to the following aspects:

- **The activity**: According to (Kristoffersen & Ljungberg, 1999), professional mobility can be partly explained by
  1. The emergence of service-based jobs in a post-industrial society;
  2. The strengthening of intra and inter-organizational Cooperation;
  3. The popularization of mobile devices.
- **The distance:** (Kristoffersen & Ljungberg, 1999) proposed a classification of mobility into three instances:
  1. Traveling, i.e. moving from one place (e.g. a city) to another one using transportation (car, train, plane, etc...);

2. Visiting, i.e. spending some time in a place before moving to another one, such as a mobile worker who spends a week working in a city;

3. Wandering, a local mobility which consists of patrolling, touring or walking within a building or a small space.

- **Interactions:** mobility is not then only a geographical and temporal displacement, but also concerns how the person who moves interacts with his environment and other persons (Wiberg & Ljungberg, 1999). In this context, (Kakihara & Sørensen, 2002) provided a classification of mobility into three dimensions:

  1. Spatial mobility ("where?"),
  2. Temporal mobility ("when?")
  3. Circumstantial mobility ("in which way?", "under what circumstances?", "in interaction with which actors?").

- **Decision Making:** (Diallo, Badard, Hubert, & Daniel, 2010) proposed two perceptions of mobility:

  1. Mobility as remoteness and remote access to a resource (IT side): mobile devices have long been used to remotely access to persons or data. Even today, they continue to be used for such a purpose. As (Figure 2.2) shows, distance is put forward in this perception of mobility, and what matters is to stay connected to the business data of the organization (such as dashboards) , no matters where the user is or his surrounding environment.

  2. Mobility as movement and dynamic change of environment (user side): on the move, not only the worker position changes. His workspace changes too, so that mobility can also be perceived as a dynamic change of environment (Figure 2.3). In this perception of mobility, the mobile worker is primarily an active entity that moves, changes his position, his work environment, before being an entity that works remotely.

Healthy business depends on the regular receipt of critical data from the field and its input into back-end financial and human resources systems. It is vital that these processes run smoothly and efficiently, all the time. The Mobile technologies offer opportunities and benefits to business through some devices (cell phones, personal digital assistant (PDA), pocket PC, laptops, digital projectors, IRV/voice portals, smart phones) which support a variety of interfaces and specific accessories. The increased use of the mobile technology led to the growth of mobile solutions demand and to their integration into the business processes (Stefanescu, 2008).
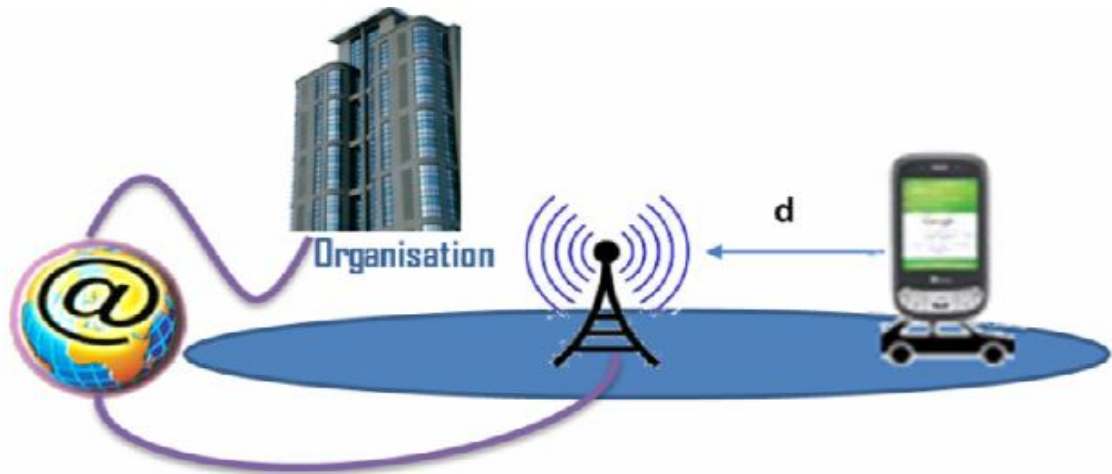
E.g. : A mobile decision maker who remotely consults his office dashboards
via a website : → Business Intelligence Systems
                 → Remote access to a resource (data, web server)
                 → No need to know the user geo-localized position

Figure 2.2: Mobility as distancing, remoteness vs. fixed point [Source: (Diallo, Badard, Hubert, & Daniel, 2010)]

Ex : A mobile decision maker who wants to know where he is, the state of his
business and the spatiotemporal factors that influence his business in this
location : → Business Intelligence Systems
            → Remote access to a resource (data, web server)
            → Exploitation of the user mobile context

Figure 2.3: Mobility as changed of contexts, dynamic change of position and environment (Diallo, Badard, Hubert, & Daniel, 2010)

2.1.2.3 MBI Definition

Mobile Business Intelligence (Mobile BI or Mobile Intelligence) refers to the distribution of business data to mobile devices such as smart phones and tablet computers (Wikipedia , 2012) which delivering BI applications on mobile devices so that decisions can be made when and where business situations call for them (Evelson, 2009).

MBI is the capability of the organization to deliver relevant and timely data to anyone, whenever they need it, wherever they are, regardless of the device used to access that data. On the one hand, there is the mobile worker who is physically mobile, and requires remote access to information assets. This is the traditional definition of MBI. However, there is a fast emerging group who are device mobile. These users regularly switch between laptop, desktop and smart phone, but are not necessarily out in the field. This modern definition of MBI includes the concept of device independence. This is a critical distinction, as it has a fundamental impact on how organizations should think about their MBI strategy (Yellowfin, 2010).

MBI is software that extends traditional desktop BI applications for use on a mobile device. At the heart of MBI is the ability for users of smart phones, tablets, and other mobile devices to access and interact with business data by generating reports and performing analyses (McGrath, 2011).

MBI is a client-side application enabling mobile devices to access business intelligence content via the Services Oriented Architecture of a Business Objects Enterprise server. MBI is a small Java application designed specifically to meet the constrained screen size and simple interactivity requirements of mobile devices. BI content can be accessed virtually any time with one click and users can easily and intuitively interact with BI content from the mobile device (Business Objects Labs, 2006).

MBI is user-driven business intelligence that helps people make decisions based on multiple sources of insight: data, people, and the environment. Users can create and share knowledge and analysis in groups and across organizations. MBI platforms help people ask and answer their own questions and follow their own path to insight. MBI platforms deliver insight everywhere, an application model, mobility and reassembly, and a social and collaborative experience (QlikView, 2011).

2.1.2.4 MBI Life Cycle

Geoffrey Moore's theory (Moore, 1991) offered a particular insight on the traditional product life cycle. He proposed a new vision of the cycle for IT products where innovation is a strong market driver. He actually proposed to fine tune the traditional cycle to reflect the adoption pace of these technologies underlining the extremely tricky first phase of product life. Moore represented the first part of the cycle crossed by a Chasm as the principal hurdle the product will have to overcome. Moore added an interesting

dimension to his approach: the product life cycle does not only depend on the product itself but additionally on the user. He proposed a typology of users:

- Innovators and Technology Enthusiasts drive the initial market and are focused on new technologies,
- Early Adopters are visionaries. They know technologies and can anticipate future successes or failures. They have a rational approach and know how to wait and observe,
- Then, Pragmatists and Conservatives are prudent and they expect reliability, convenience and value from the technologies.

The first phase involves consumers that represent a small share of the market. The biggest part is represented by Pragmatists and Conservatives. The chasm is between the early and late adopters and requires a different marketing and communication strategy. MBI could actually be stuck in the first part of this cycle unable to bridge the chasm until it has proven its value to the pragmatists (Figure 2.4).
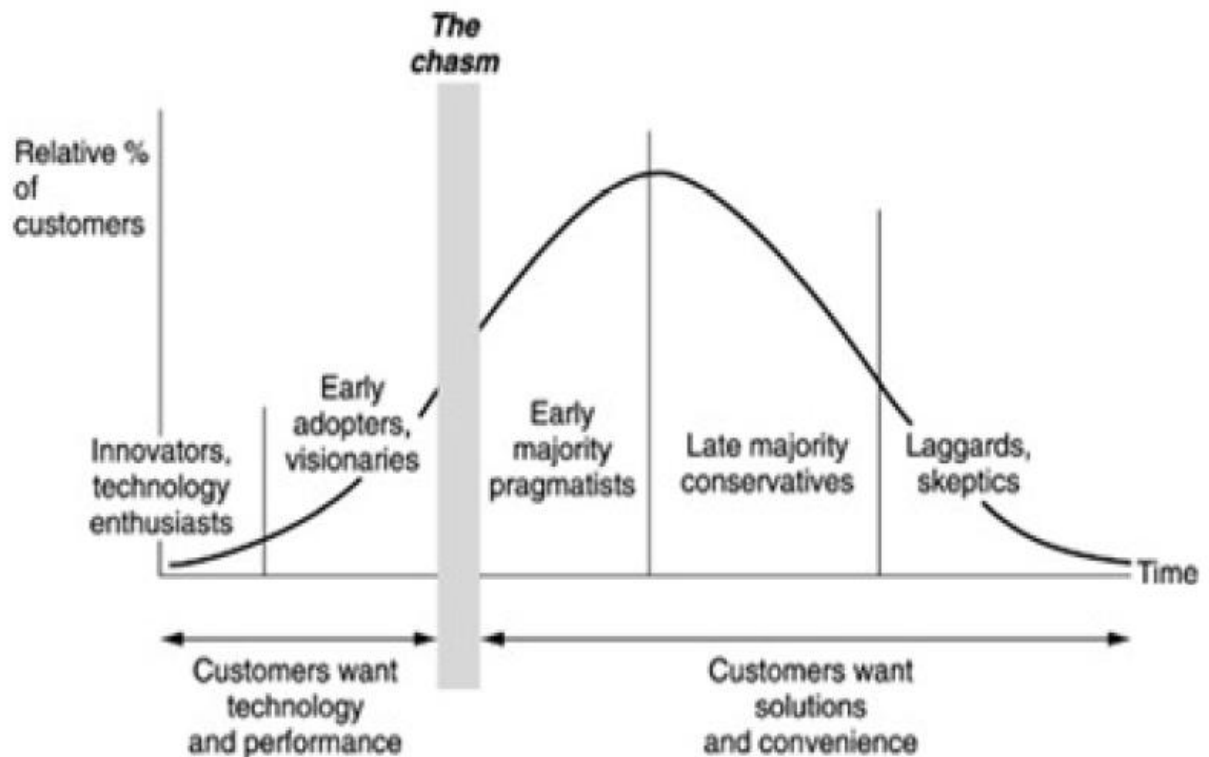
Figure 2.4: IT product life cycle [Source: (Norman, 1999)]

MBI, while not a new idea, is more or less starting from scratch, but it quickly went to the center of the BI hype. That is why the technology is positioned at the Peak of Inflated Expectations on Gartner's "Hype Cycle for Business Intelligence, 2011" (Figure 2.5). Adoption is expected to be relatively sluggish, however. Although mobile devices are "flying off the shelves," and every knowledge worker has at least one mobile device, sending potentially sensitive data to a mobile phone halfway around the world will not become mainstream anytime soon (Bitterer & Sood, 2011).
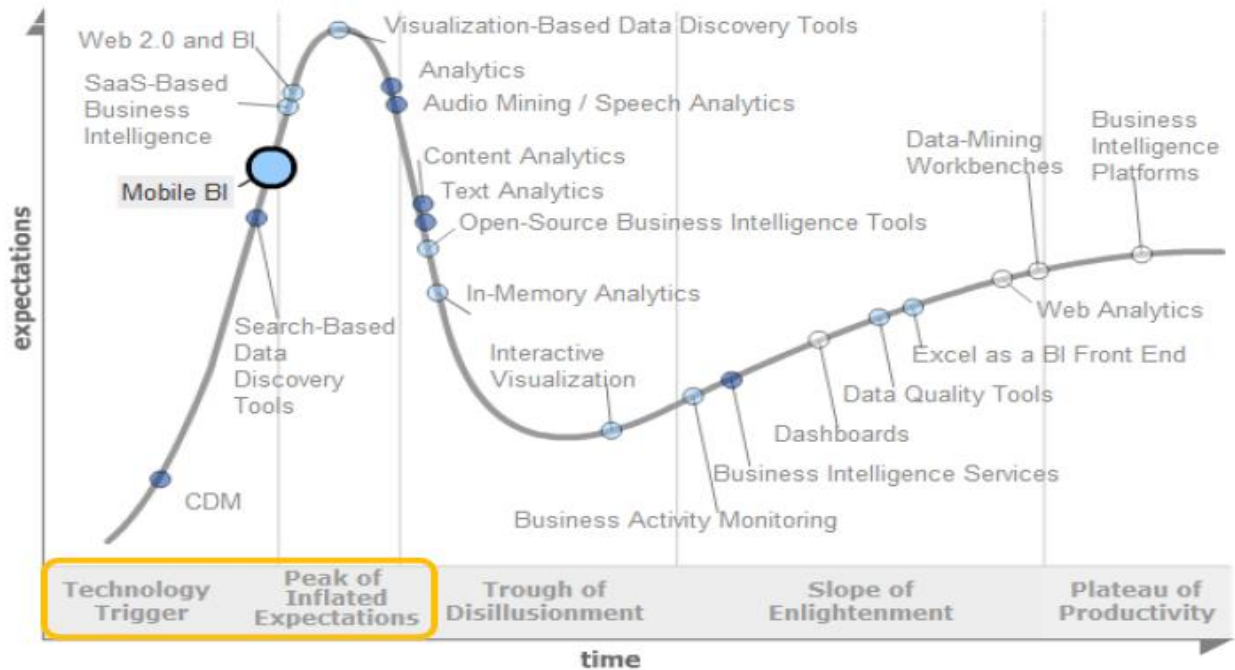
Figure 2.5: MBI Hype Cycle [Source: (Gartner, 2011)]

2.1.3 MBI History

The history of computing has evolved in four major steps, each being dependent up on the former: mainframes, minicomputers, workstations, personal computers and now mobile computing (Figure 2.6) (Scalable Systems, 2011); in the early years, if you wanted to make decisions away from your office and needed data, such as sales figures, production reports or customer details, you had to bring it on paper. Even with the arrival of the laptop, in approximately 1990, the limited attempts at reporting were largely affected by the PC platform's lack of disk space, memory, CPU speed and graphical capabilities. But as users could take their laptops on the road, this resembled the first phase of MBI. However, this kind of BI approach was not much fun. Everything had to be copied to the laptop while still in the office, unless users were ready to connect via a 28.8 Kbps modem with rather unreliable connectivity. Download times were measured in hours, not seconds (Bitterer & Sood, 2011).

The new achievements in mobile device technologies opened the way for new applications designed to run on mobile devices. In the beginning, mobile devices offered very limited functionality due to small memory, computing power and difficult interaction. Nowadays, mobile devices become more and more popular, available memory grew considerably, being comparable with some desktop computers, mobile processors have improved performance, and interaction is becoming more users friendly. These characteristics allow the development of complex applications that make use of available hardware capabilities (Visoiu & Trif, 2011).

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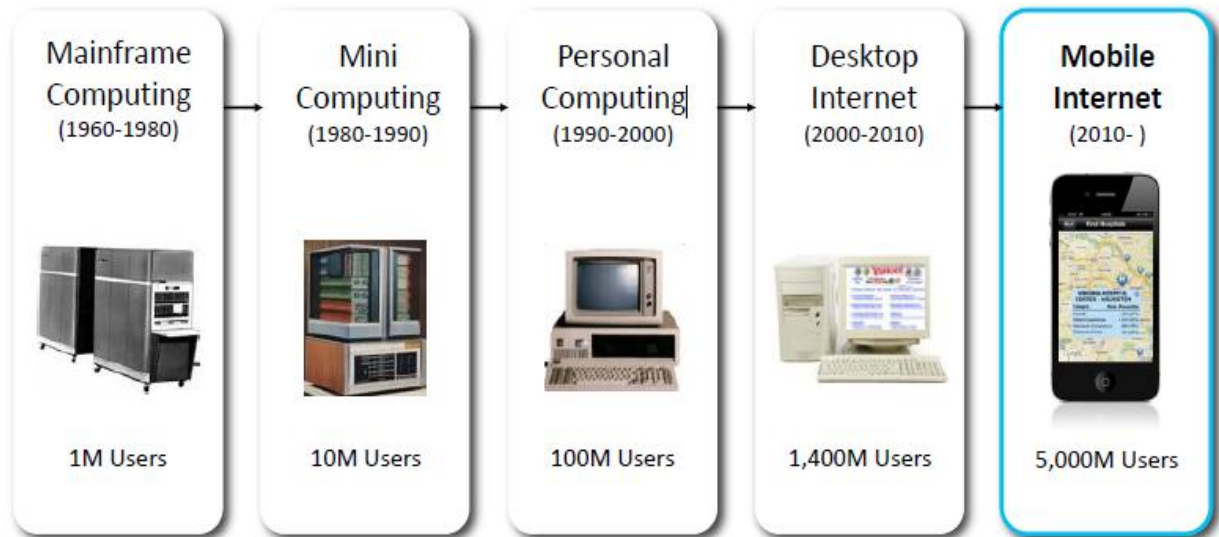
Figure 2.6: The Fifth Wave of Information Technology Will Dwarf All Previous Waves [source: (Stanley, 2011)]

The mid- to late-1990s saw the growing trend toward wider corporate distribution of mobile phones to employees or the decision to support a wider range of models, with the aim of improving productivity and efficiency. This opportunistic adoption may be considered the first phase of business mobility. At the time, analysts and academic researchers predicted enormous growth in years to come (Li & Whalley, 2002). Peppard and Rylander predicted that in the future, handheld mobile devices connected to telecommunications networks will be a critical way to gain access to content in digital format (Peppard & Rylander, 2006). Mobile devices will continue to be the vehicle for communicating in a number of methods and accessing a variety of business and personal services and capabilities. These devices will likely continue to become even more highly intuitive with interfaces that support a wide array of services as well as productivity and personal applications and tools (e-mail, calendars, cameras, music players, etc.) (McDowell, 2008).

Other forms of mobile BI have been around since about 2006, when the ability to access the Internet from cellular phones was first introduced. This was MBI in its most primitive form, with users leveraging their mobile browsers to connect to web-based reporting and analysis applications. This presented many challenges, however, as the browsers were somewhat rudimentary and unable to support more advanced functionality. The graphs, charts, and tabular reports displayed by those environments were also difficult to view and interpret on the small screens (McGrath, 2011). The major drawback of using smart phones for BI was that the limited screen size prevented smart phones from delivering functionality such as full-featured dashboards or interactive reports (Ventana Research, 2011).

In 2002, Research in Motion released the first BlackBerry Smartphone optimized for wireless email use. Wireless e-mail proved to be the "killer app" that accelerated the popularity of the Smartphone market. By the mid-2000s, Research in Motion's BlackBerry had solidified its hold on the Smartphone market with both corporate and governmental organizations. The BlackBerry smartphones eliminated the obstacles to mobile business intelligence. The BlackBerry offered a consistent treatment of data across its many models, provided a much larger screen for viewing data, and allowed user interactivity via the thumbwheel and keyboard. BI vendors re-entered the market with offerings spanning different mobile operating systems (BlackBerry, Windows, Symbian) and data access methods (Henschen, 2008).

In 2009 Cegedin Dentrite released its Customer Relationship Management (CRM) suite; MBI for BlackBerry smartphones. In this instance the MBI enabled delivery of accurate route planning, customer profiles, daily organizers, and pre- and post-call functionality with the potential to improve productivity and reduce administrative tasks. As reported by the CEO these new mobile applications enable the commercial team to carry only one device to communicate with their key stakeholders, organize their schedule and access key information stored in their Mobile Intelligence CRM system (Vecchione, 2009).

In April 2010, Apple released the iPad. Shortly after, it became the center of attention, not only because of the millions of consumers buying it, but also because the BI vendor community saw the iPad (no other similarly equipped tablet was available) as the ideal BI consumption device. A year earlier, MeLLmo had announced Roambi for the iPhone, essentially leveraging the same concept of a highly interactive device with touch screen and gesture navigation. The first large BI vendor that announced an iPad version of its BI platform was MicroStrategy, which demonstrated its MBI application capabilities at a European conference in June 2010. Other vendors followed quickly. The end-user community saw the gesture-driven tablet as the ideal device to bring highly interactive BI applications to the front line. Although the original focus of organizations was firmly on the Apple products, Android and Microsoft will be alternative platforms (Bitterer & Sood, 2011).

Microsoft has announced their MBI strategy. Microsoft plans to support browser-based applications such as Reporting Services and Performance Point on Internetwork Operating System (IOS) in the first half of 2012 and touch-based applications on IOS and Android by the second half of 2012. Despite popular perception that Microsoft only acknowledges its own existence, recent moves suggest the company is aware that it is not the only player in the technology ecosystem. Instead of attempting to squelch competition or suggesting new technology developments were ridiculous the company has instead decided to make its technology accessible to a wider audience (Rigsby, 2011).

The web browsers in today's mobile devices are quite powerful and full-featured, eliminating the need for any software to be installed on the device itself. There are a few world-class MBI solutions, such as Information Builders' WebFOCUS BI platform, that take full advantage of these browsers. These platforms are truly device-independent, providing support for any type of mobile appliance by delivering BI content – in the form of reports, dashboards, and applications – directly to the device's browser (Quinn, 2011). One potential solution will be the wider adoption of HTML5 on mobile devices which main advantage is that it is an industry standard supported by all mobile vendors. Building an HTML5-based interface guarantees that it will be accessible not only by the current breed of mobile products, but also by future generations of mobile devices. HTML5 is quickly growing in popularity because it allows developers to build interfaces once and use them on any device. However, the feature set of HTML5 is in its infancy and is evolving very slowly due to the fact that it is driven by a consortium of competitors with unaligned interests (ComponentArt Corporation, 2012). According to (Dresner, 2011) the importance of MBI was sharp change from June 2010 leading up to October 2011 (Figure 2.7).
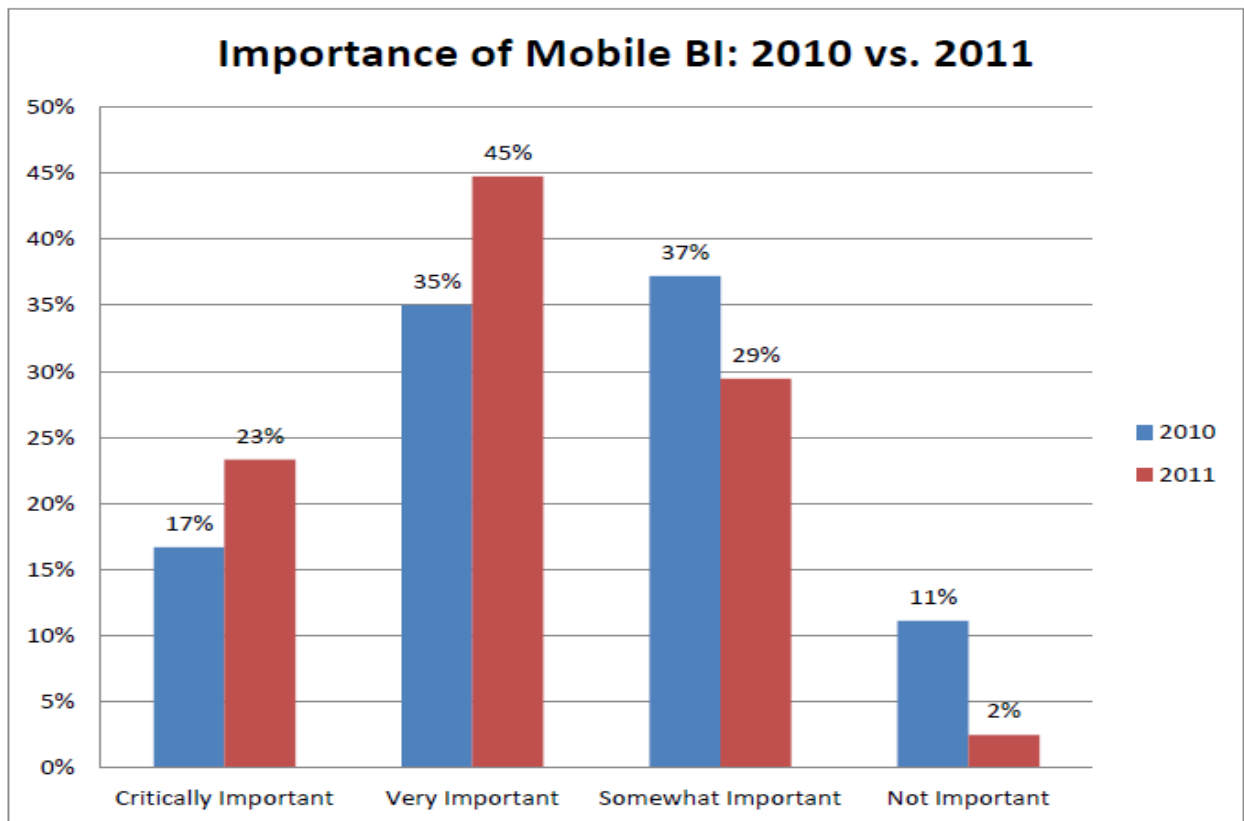
Figure 2.7: Importance of Mobile Business Intelligence 2010 vs. 2011[Source: (Dresner, 2011)]

2.1.4 Challenges and Opportunities

MBI is an integral part of any business intelligence strategy. The key for maximizing BI is in having quality analysis available when and where is requested with the decision maker which is consider the next platform that will reduce lag time and eliminates the desk bound constraint for receiving information. New research shows that MBI access can reduce "time to information" and shorter "time to decisions resulting in increased profitability and agility (Scalable Systems, 2011). Hardware and software vendors need to focus on core benefits more than on technological feat. According to two surveys carried among 2,500 electronic purchasers in the United States "two-thirds of consumers were more interested in core benefits and attractive prices than in often-unused bells and whistles (Hersch, Dua, & Sivanandam, 2009).

2.1.4.1 Opportunities of MBI

2.1.4.1.1 New Social Paradigms

Mobile became part of our day to day lives and its use has considerably expanded (McDowell, 2008). It is the special relationship mobile users have with their devices that are so powerful. People feel naked when they've left their mobile at home and hardly ever turn off their "link" to the outside world (Birckner & Reddig, 2009).

There are more mobile people in the world than ever before. Whether it is an executive traveling all over the world, a sales representative who is only in the office occasionally or a middle manager who needs to access information in a meeting down the hall, all need secure and reliable information at their fingertips (IBM SoftwareCognos, 2011). Making analytical tools and performance data accessible on smartphones allows companies to interact with their customers and business partners in real time, thereby improving services and boosting productivity (Fitzgerald, 2010).

Because social media is shaping the way people and organizations interact with each other and outside entities, BI applications must mimic these uses to maintain and increase the value they provide to organizations. One way this is done is through MBI. MBI applications enable organizations and decision makers to share information regularly, no matter the physical location, and interact in a way that is conducive to social networking. As solutions and use matures, MBI will become an extension of an organization's current BI use (Wise, 2009). Many workers are now used to interacting on social networking sites through their smartphones, and wise employers already are exploring how to harness this propensity for business purposes. Social networking model has conditioned workers to a kind of free-flowing collaboration that has implications for business productivity. MBI should include collaborative capabilities to support the decision-making process, including workflow and approval processes as well as tracking communications. Collaborative capabilities must be available on smartphones and tablets, and linked to BI analytics and

information sharing for decision support regardless of where the collaborators may be (Ventana Research, 2011).

2.1.4.1.2 New Work Styles

MBI is one of the most effective ways for organizations to coordinate and share information internally, as well as with the third parties they do business with, such as supply chain partners via not only desktops and laptops, but also through mobile devices (McGrath, 2011).

As showed by several studies, mobility in business is a fundamental evolution. In Economist Intelligence Unit survey (EIU), more than 75% of the participants were considering human factors such as the ability to attract best talent or to improve customer services as the main argument for deploying mobility in their organization. And nearly 40 percent of executives surveyed said that at least one in five of their company's workforce could be considered a mobile worker, spending an average of one day per working week away from the office (Economist Intelligence Unit, 2007).

Mobile technologies can symbolize a pervasive "hierarchical chain" or a "digital traceability" to increase the control over the workers even after work and out of the office. The use of mobile technologies can also be disruptive and increase the stress related to the culture of speed and immediacy of information. The mix of personal and business activities, resulting in a phenomenon known as "blurred boundaries" challenges work life balance and can also generate stress and frustration (Cousins & Varshney, 2009). Organizations would have to take specific initiatives to ensure the smoothest integration of mobile technologies to support mobile workers. But today, too many organizations are addressing the mobile strategy opportunistically rather than strategically or holistically (McDowell, 2008). Technology can also provide help in this domain. The principles of context awareness can build virtual bridges to help the user make the transition between, work and life: let the users manage their accessibility (choose their preferred media) and let the tool setup the accessibility depending on the location of the user (Cousins & Varshney, 2009). So the most obvious benefit is that mobile devices are mobile. Users don't have to go back to an office for their data. Decision making becomes location independent (Bitterer & Sood, 2011).

2.1.4.1.3 Ability to React on the Go

MBI could extract value from these principles mainly in the context of operational intervention where the BI solution would present information to the user based on his identity and his physical location for instance while walking in the stocks of a warehouse or visiting a customer (Pimienta, 2010). The differentiation at the device level is based on a combination of elements. While integrating more advanced technologies such as dual-mode (cellular and wireless LAN, for example) is one obvious path for remaining competitive,

the look and feel of the device is as important as what is under the cover (McDowell, 2008).

MBI systems utilize devices such as mobile phones and tablet computers (smartphones, iPad, Playbook, etc.) as handheld workstations for users to access and analyze real time information. Essentially they allow managers to access performance information quickly and in an easy to communicate visual way (e.g. bar charts, pie charts etc.). MBI in a supply chain management reporting context allows users to access supply chain-related information anywhere and make quick, informed decisions. Supply chain specific examples include delivery performance tracking and alerts for low inventory levels. Mobile phone applications can now offer managers more opportunities to connect and share information than, for example, a laptop due to the level of connectivity and network coverage around the world (Rogers, Pawar, & Tipi, 2011). Thus the executive management stuff are also adapting especially through not being limited to their desks and office-based PCs. Together with the ubiquitous remote access, this reason makes the traditional executive workspace obsolete – now the whole world tends to becomes an office (Laurent, 2009).

(Ventana Research, 2011) finds that mature and innovative companies are more likely to understand that these devices enable employees to do productive work while on the go and that ultimately this will help improve organizational performance and competitiveness.

2.1.4.1.4 Be Operational on the Go

An intensely global competition obliges business organizations to react faster to environment changes and thus to improve their decisional and operational processes. They naturally focused their Business Intelligence systems on day to day operations to extract more value from their IT systems. The concept of "Right-time BI" refers to the principle of delivering the right information to the right people at the right time. Right-time BI optimizes flows, processes and architectures to shorten latency between the data generated from the operation systems to the dashboard of the final user and consequently to the action taking. Operational BI intends to close the gap between analytical applications and operational applications. To do so, "organizations need to select underlying technology that will support the basic requirements of the environment: speed, scalability, flexibility, low operating cost, and fast backup and recovery" (Dreyer, 2006). Companies are using MBI to increase the efficiency and effectiveness of their sales forces by allowing them to instantly access critical information about customers, orders, inventory, and more, directly from their mobile devices (McGrath, 2011).

According to (Microsoft Corporation, 2006) MBI powered solutions can help provide:
- Improve decision-making company-wide. Help mobile executives and operations managers to access, collect, and analyze information in depth when and where required.

- Increase responsiveness. Act fast in time-critical situations by taking advantage of communication options to help capitalize on business opportunities or contain costly threats.
- Increase the value of customer visits. Have "big picture" and detailed account information to evaluate profitability, spending patterns, potential problems, and opportunities.
- Improve predictability and control of financial and operational performance. Combine powerful BI tools with the dynamics of mobile capabilities.
- Improve productivity of high-value executives and managers. Help allow more time for decision making and action. Help reduce non-productive downtime as well as time spent on manual and paper-based processes.
- Improve critical communications. Help eliminated lays by transmitting contact reports, meeting notes, data updates, action memos, and other information at the point of contact.

MBI allow you to monitor your organization's performance in the palm of your hand, review all business items requiring your action, interact with that information to approve or deny requests based on information presented or reassess ongoing requests by asking the requestor for more information, submit orders, change plans, capture information and do actions at the moment of insight (MicroStrategy, 2011). In addition, for BlackBerry and Android smartphone users, "location-aware" intelligence enables them to receive reports that are dynamically filtered with location-specific information, so that their analysis and decision-making is relevant to where they are (IBM SoftwareCognos, 2011).

Beyond the access to many collections of KPIs about corporate performance regardless of geographic location, time of day, and content delivery platform, the big advantages of the MBI are the business agility, the possibility to make dynamic and quality decisions based on real-time data (Vitt, Luckevich, & Misner, 2002).

2.1.4.1.5 MBI Competitive Advantage

Mobile business is already changing our lives. It is often thought of as the business opportunity that has been brought about by the convergence of electronic business with wireless technologies (Mobile Business = Business Process + Electronic Business + Wireless Communications). Now business can be conducted anytime and anyplace in order to meet the informational and transactional demands of end users, remove former process and technology bottlenecks, and hence increase customer satisfaction, revenues and productivity, and reduce costs (Evans, 2002). A mobile phone makes us available to others, be they businesses or individuals, 24 hours a day, 7 days a week. These days it's more likely that you'll forget your keys than your mobile phone when you leave home in the morning (GS1 Mobile Com, 2008).

However, ever-increasing business dynamics and increased competition means businesses now require a much higher level of value from their MBI investments. MBI must now help drive profitable growth, change, and many other operational and financial performance goals. Not only does BI need to deliver significant Return on Investment (ROI), but it also needs to be deployed in a manner that minimizes Total Cost of Ownership (TCO) (Oracle, 2011). The ease-of-use MBI solution facilitates truly pervasive BI and therefore delivers outstanding ROI for end-users. The rate of end-user adoption is the best method for measuring the success of any BI solution. It's simple. The more people within a business who have access to the benefits of quality BI, the better equipped any organization will be to respond to, and take advantage of, opportunities and shifts in their business environment. The benefits of implementing a MBI project are enormous. Successful MBI execution will lead to sustained competitive advantage, increased productivity, enhanced profitability through improved customer satisfaction ratings, as well as an exceptional and definable ROI (Yellowfin, 2010). More companies are making corporate information available to customers in the form of self service BI applications. To be successful, these applications must be as intuitive and convenient as possible. By extending reporting and analysis capabilities to mobile devices, companies can achieve substantial increases in customer satisfaction, loyalty, and retention (McGrath, 2011).

MBI provides technological advantages over traditional BI application development, resulting in significant ROI: reduced development costs; accelerated deployment that means faster results for customer; and leverage existing investments (Alfradique & Abreu, 2010). An industry study conducted by the EIU, a leading global research and advisory firm, polled senior-level decision makers at global 1,000 companies to find out how their organizations were using business mobility. The survey revealed that far from being deployed in "bleeding-edge" technology firms or relegated to niche or vertical industries, business mobility is now broadly applicable to companies across industries. The survey shows that executives are coming to grips with other dimensions of the organization that might benefit from greater mobility. In addition to driving bottom-line results, the EIU survey shows that organizations are increasingly focusing on new and sometimes non-financial measures of ROI (Economist Intelligence Unit, 2007).

Gains in productivity outweigh the expense of mobile devices and applications – an estimated fixed cost of $2,500 per mobile user. A low-cost MBI solution that does not require additional infrastructural investments such as WebFOCUS Mobile Favorites from Information Builders drives up the per-user return on investment (ROI). Furthermore, as mobile computing spreads through the ranks to all employees, the ROI increases exponentially (Kotorov, 2007). After implementing MBI in DE HYPOTHEEKSHOP, the results are: 30% average increase in customer conversion rates, 90% of regulatory compliance inquiries answered in one day, 10% reduction in operating costs, 50% reduction in reporting time, and 15% reduction in marketing spend (QlikView, 2011). World-class

retailers are increasingly focused on understanding and leveraging all customer touch points, from granular in-store transactional data to online store and web search information to mobile data, in order to most effectively target customers to maximize profits and customer loyalty. MBI helps them to know what is happening in the supply chain real-time, enabling you to make rapid decisions to optimize performance and to strengthen your negotiations on price and quality and gives them the right information to take the right action at the right time. (MicroStrategy, 2011).

The MBI approach is just another way of sustaining the competitive advantage. But it might generate an obvious difference between two high-rated competitors within an environment with equal access to capital, technology, market research, customer data and distribution facilities because of the people behavior and above all because of the quality and speed of the decisions they make. Moreover, the integration of all data channels can offer a broader analytical perspective on the business for any such competitor (Airinei & Homocianu, 2010). In addition, MBI can customize BI experience by adding individual reports or dashboards to a Favorites list or Welcome screen so users can get their most important information fast and take advantage of device-specific gestures and collaborative exchange (users can share their perspectives with others by highlighting an area for discussion and then sending an email with comments, insights and actions to the appropriate people). So MBI helps users take timely action no more trips back to the office or waiting for a call to get the reports they need to make important decisions (IBM SoftwareCognos, 2011).

Rapid decision-making is a key to accelerating the profitability of business. In today's fast-changing, competitive business environment, it is imperative to provide immediate answers to both internal and external customers. With MBI, decision makers now have the power to make these decisions immediately. Mobile Intelligence is 400 Times More Powerful than Desktop Internet Intelligence in case: (MicroStrategy, 2010)

- MBI Expands the User Population by a Factor of 10: The range and number of mobile devices is showing explosive growth and the boundaries between these devices is blurring.
- MBI Expands Information Opportunities by at Least a Factor of 10: From the moment they wake, they can use applications that not only enhance their personal lives but also make them more productive and effective at work.
- MBI Expands Personal Query Relevance by a Factor of 4: A natural user interface allows users to point at what they want, touch where they want to go, and move the device to indicate how they want to explore the information. Query speed and query relevance are further enhanced with other rich capabilities such as visual inputs via a camera or audio inputs via a microphone. Technology is playing catch-up and already converts images into data inputs from barcodes, fingertips, fonts, and facial recognition.

2.1.4.1.6 MBI Security

The use of BI tools on mobile devices (e.g., mobile phones, net books, and smart phones) requires to securely adapting to different physical and networking environments due to a changing work context. In order to protect security-critical business applications, a trustworthy mobile phone platform is needed. The example illustrated in (Figure 2.8) shows different security policies an external service employee is affected by when using a mobile device to securely connect to the BI platform of the customer company (Mustafa, et al., 2011).
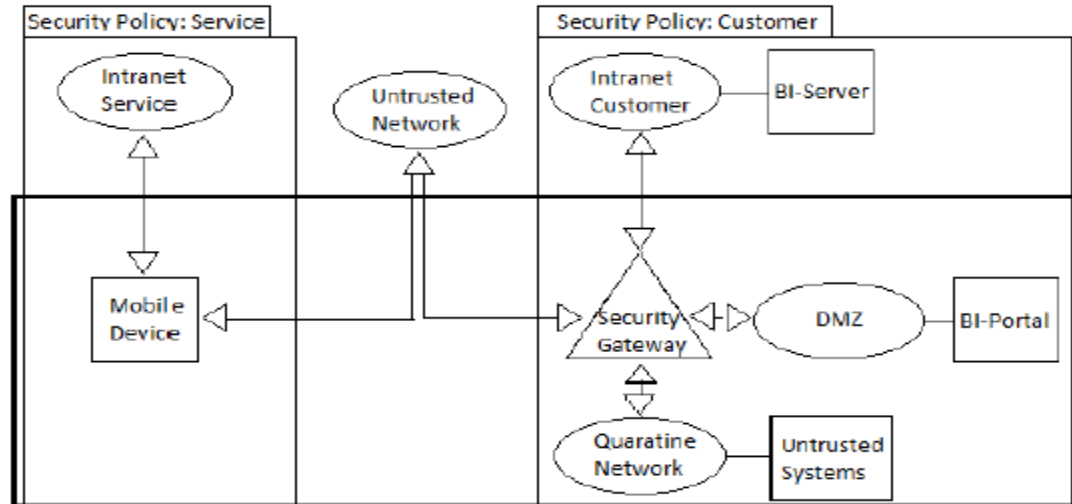
Figure 2.8: Different security policies in mobile business intelligence infrastructures [Source: (Mustafa, et al., 2011)]

When using MBI applications the user accesses sensitive data from the inside of its organization. Also, the obtained results under the form of reports are sensitive information that must be protected. In this scenario, security becomes an important aspect that has to be considered. Each type of mobile application has particular characteristics and security is implemented in specific ways. Also mobile applications' security aspect has an important role in software developing process. Using a secure component the application is more reliable, because there are identified, taken into accounts and treated all the possible errors that can occur. Using the security, mobile applications tend to become more and more reliable. Genetic algorithms are a solution that can be used on mobile devices to solve optimization problems like training a neural network. The obtained solutions are good and the resources used to obtain the solution are reasonable compared to classic training methods (Trif, 2011).

In the mobile applications development process are taken into account the following concepts: sandbox, isolated storage, the cryptographic elements and the permissions. The sandboxing model for applications on the phone means that third party applications are not allowed to run in the background, applications can only access their own isolated storage and they cannot directly interact with user data and phone functionality. Isolated Storage

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provides safe client-side storage for partial trust applications; it enables managed applications to create and maintain local storage. Isolated storage is a space assigned to every application where this can read or write files (Visoiu & Trif, 2011).

In Visual Studio 2010 Express for Windows Phone, is available the namespace System Security Cryptography for assuring the mobile application security issues. The Cryptography namespace provides cryptographic services, including secure encoding and decoding of data, hashing operations, random number generations and message authentication (Graupe, 2007). Windows Phone security model also includes the concept of isolated storage which is a space assigned to every application where this can read or write files. Other applications do not have access to another isolated storage than its own. However, encryption is still a solution because an attacker may change the application such way it makes visible sensitive information (Trif, 2011).

For developers there is special Application Programming Interface (API) in the .NET Compact Framework to address security elements, found in the namespaces (Clark, Dwivedi, & Thiel, 2010):

- System Security Cryptography provides cryptographic services related to encrypting and decrypting of data and related operations;
- System Security Permissions defines classes that control access to operations and resources based on policy;
- System Security Principal defines a principal object that represents the security context under which code is running, related to role-based security.

According to (Visoiu & Trif, 2011) there are numerous mobile platforms, each of them having specific characteristics, specific functionality and specific API that may be used to develop secured applications. Of these, the windows phone 7 platform is chosen to develop secured MBI Applications. An inventory is performed to discover the elements that contribute to secured application development.

According to (Mustafa, et al., 2011) following steps initiate a mobile device communication as depicted in (Figure 2.9):

1. A Virtual Private Network (VPN) connection is established.
2. The management server initializes an integrity check.
3. The mobile device collects integrity measurement (IM) information using the local Integrity Measurement Clients (IMC) on the mobile device.
4. The management server forwards the IM information for a check to the integrity measurement verifier (IMV).
5. The IMV checks the IMs and sends the results with a recommendation to the management server.

6. The management server takes the access decision and forwards this information to the VPN gateway/ policy enforcement point (PEP) and the mobile device/access requester (AR).
7. The VPN gateway (PEP) allows or does not allow the access to the network for the mobile device (AR).
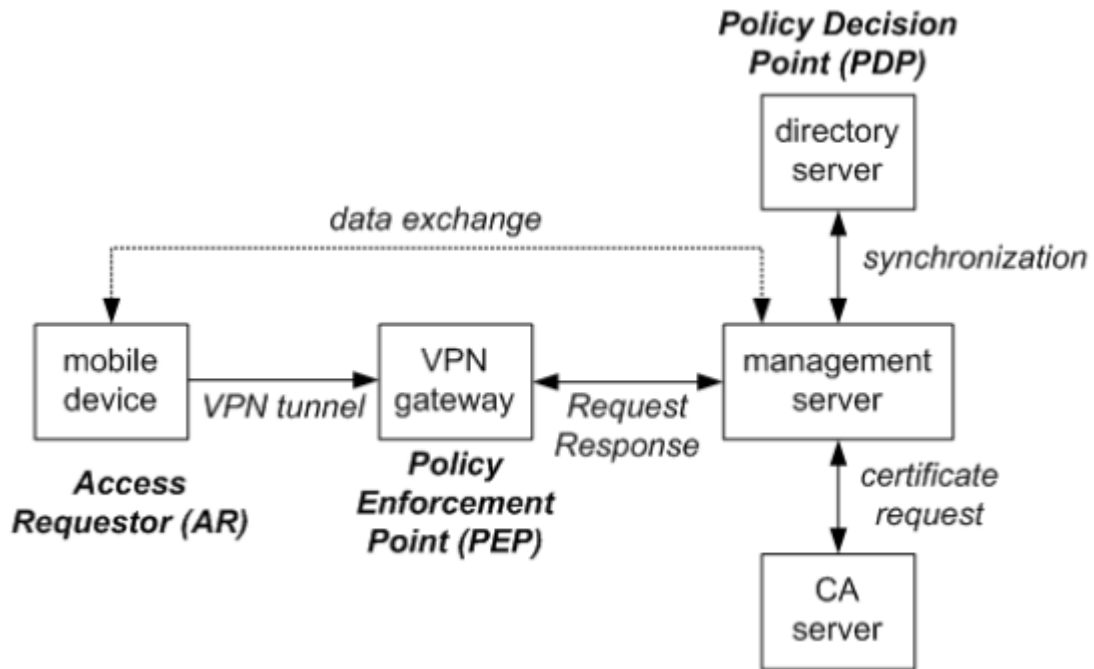
Figure 2.9: Platform security process overview [source: (Mustafa, et al., 2011)]

Client-based mobile reporting has a security by requiring users to log in each time they access the application. However, since the data is stored on the device, if the authentication is broken the data can be fully accessed. Information Builders' solutions offer an additional layer of security through encrypted Active Reports. The user will be required to enter their credentials and, once authenticated, the data will be decrypted within the browser. The browser-based decryption prevents unauthorized access if the report is accidentally forwarded or the device is stolen see (Figure 2.10). Web-based applications, on the other hand, do a better job at minimizing this risk. An administrator can change or deny access to an application immediately upon notification that the device is missing. Since the data is not stored on the device it cannot be compromised (Kotorov, 2007).

Figure 2.10: Information Builders' solutions offer an additional layer of security through encrypted [Source: (Kotorov, 2007)]

According to (Business Objects, 2008) the full trust and reliability the mobile environment which means that 24x7 uptime, fault tolerance, semantic reconciliation, data quality, and the ability to audit, are all inherent to your MBI deployment. You can transmit all content over the wireless network securely and efficiently. Traffic is first compressed and then encrypted using standards-based cryptography as well as any platform specific encryption that's already in place. This ensures a strong, uniform security implementation across all supported client platforms while also leveraging platform specific capabilities. Additional levels of security are in place to protect your organization and users from information reaching the wrong hands which include:

- Enterprise network and Lightweight Directory Access Protocol (LDAP) authentication
- Encrypting login credentials before transmission
- Not storing passwords on mobile devices
- Over-the-air security with encrypted messages between client and server, using symmetric keys with a limited valid period, and a cryptographic checksum at the end of each message; encryption strength is configurable (up to 2048 bits)
- Offline security includes encrypted local store on mobile devices, and having a lease key to access client application and data with configurable validity period.

MBI applications benefit from a 'build once deploy anywhere' approach that reduces the burden associated with maintaining multiple versions of applications for native clients. And organizations reduce risk by keeping data inside the firewall and maintaining independence from third-party application stores (QlikView, 2011). According to (IBM SoftwareCognos, 2011) MBI security is derived from a combination of the following sources:

- Vendor security like IBM,
- Mobile device operating system and
- Enterprise authentication IT department security.

A 100 percent Web-based MBI service means that no data is stored on the mobile device. For mobile devices with offline mode capabilities - where data can be stored (cached) on the device itself - it is imperative that application access safeguarded. A users' session should timeout, or the application should 'lock', after a period of significant inactivity. Attempted reconnection should be guarded by username and password authentication. In mobile application, it is critical that authentication (such as password management) is managed centrally, preferably through a LDAP directory, so that a lost device does not result in unauthorized access to the MBI server. Finally, highly sensitive report data transferred from the server to mobile devices should be able to be encrypted (Yellowfin, 2010).

According to (Dresner, 2011) 40% indicated that data would only be stored on secured servers and not on mobile devices but the great majority of respondents expect data to reside on both - devices and servers see (Figure 2.11).

In case that one of the keys factors in the success of a MBI initiative is user adoption, Security should not become a deterrent for enabling BI applications on mobile devices and not make it more difficult for users to access reports than it would be to access information in e-mails received on the mobile device. Some devices automatically put the user behind the firewall while others require connections via a virtual protocol network (VPN). In both cases it is important to provide an easy login process. (Kotorov, 2007).
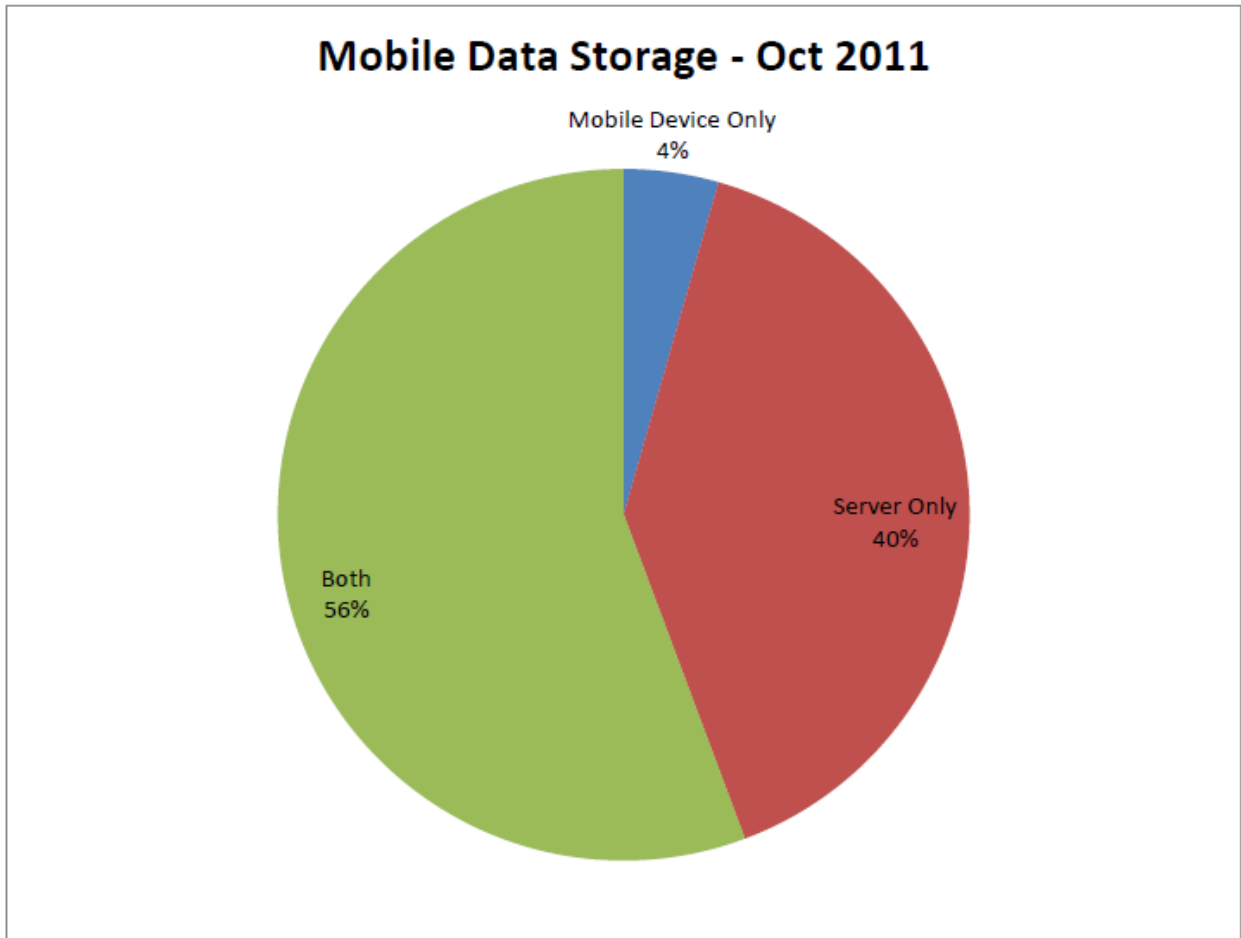
Figure 2.11: Data Storage: Device vs. Server [Source: (Dresner, 2011)]

2.1.4.2 Challenges of MBI

Despite the strong forces that are driving adoption of MBI, it also faces considerable challenges. There are two main types of challenges to adoption: business barriers (strategy, maturity level and ROI measures) and technology barriers (diverse standards for applications and networks, spotty coverage, low bandwidth, perceived lack of security, diversity of devices, slow response times, primitive user interfaces, and numerous other factors). Some other factors that could induce limits and advantages refer to cultural aspects, geographic aspects, political and regulatory aspects, pricing factors for Internet access, and the penetration rate of the wired Internet within different countries (Evans, 2002).

When organizations first started giving mobile devices to their employees, most believed only specialized workers at technology companies would benefit from having such tools. Mobilizing a workforce was perceived to be costly, complex and a security nightmare. However, the EIU survey suggests that these beliefs are largely becoming relics of the past, putting to rest some of the old myths that once called into question the promise of a mobilized workforce, namely, that (McDowell, 2008):

- Mobilized workers were a specialized subgroup of employees who represented a small fraction of any organization's overall workforce;
- Mobilizing an organization's workforce was always a costly endeavor that might not be offset by the savings from resulting efficiencies and benefits; and
- Employees using mobile solutions could not securely connect to the company network to access corporate data, making them a threat to the integrity of a company's most critical information.

According to (Bitterer & Sood, 2011) there are a few challenges need to be resolved concerning MBI and the mobility concept in general:
- Safety: tracking mobile devices to pinpoint whereabouts.
- Security: loss or theft of devices with confidential or classified information.
- Privacy: surveillance of mobile workers beyond working hours.
- Ethics: data collection about non-work-related topics.

In the process of developing mobile applications, there are limits given by the device for which the product is made for, as: memory, processing power, display, low to moderate complexity, small to medium applications, low to medium assignment speed (Trif, 2011). According to (Business Objects Labs, 2006) the functional limitations of MBI are:
- MBI is a "pull only" by design and does not cache report data at all. No data network means, no report access. "Data network" means GPRS, 3G or EDGE.
- MBI does not offer push updates within the application although regular email on the mobile device may be used for that purpose.
- MBI supports Web Intelligence and Desktop Intelligence report engines only.
- MBI does not support cascading prompts.
- MBI memory is constrained by the available memory on the mobile device.

According to industry analysts and vendors, the mobile applications market is being held back by small screen sizes and limitations in storage, memory and computing power. In the same article Brodkin mentioned that if a transaction is put on a mobile phone it must have some sense of time-criticality, as most users do not want their smartphone to simply act as a second computer (Brodkin, 2008).

(Airinei & Homocianu, 2010) Point out that many limitations of the MBI applications are related to the physical features of the mobile devices (Tiny screens, Low memory and Low processing power) and also to the architecture of the mobile operating systems (MOS) they are running on, together with a lack of compatibility with the corresponding operating systems on personal computers (some Excel 2007 sheets conceived as BI reports are not completely readable even on the newest Microsoft mobile platforms). Poor editing facilities were also mentioned (many mobile devices have a tiny and hardly functional physical keyboard) in addition, the multitude of mobile browsers (Internet Explorer, Opera, Safari,

etc.) and their lacks about flash support, configuring, plug-ins and codec's makes it very difficult to manage the web browsing.. They conclude that all of these issues overcomplicate the idea of having a reliable mobile system useful to remotely connect in order to input data, find-out critical information, take real-time decisions and communicate them effectively.

Additional practical and strategic limitations to MBI are highlighted by (Ericson, 2011) with security, being a major area of concern to users. This is especially true when personal devices are misplaced or lost, as commercially-sensitive information can be involved. Business challenges also arise from the fact that many companies use a 'patchwork' of performance measures, rather than a consistent and integrated performance measurement system. This makes selecting and extracting the business performance reports in a unified and comparable manner for executives to use on their mobile devices, an extremely difficult and often impossible task.

While most devices do offer a variety of security features to prevent data from being breached as it is transmitted, there is no way to protect data stored on the device if it is lost or stolen. Remote management capabilities must be incorporated, so the contents of the device can be deleted in such an instance. Information can be captured by hackers and other unauthorized users as it is being transmitted to and from the MBI environment. Effective techniques can include data encryption, SSL, and virtual private network (VPN) connections. Also the exact information access rights must be customized. MBI platforms must also extend their own authentications and controls to scenarios where mobile access is required in a way that does not create additional administration or maintenance burdens (McGrath, 2011). On the other hand, powered by the constantly increasing amounts of RAM, the in-memory databases are promising a lot although this technology is at the very starting point. The secret is to store information in the main memory of the system instead of on disk. That provides a performance boost and leads to completely new applications in areas such as predictive analytics, users being able to conduct multi-step queries in less than one second (Kanaracus, 2010).

Mobile phones for their capacity constraint need optimized applications. But if we look globally, there are many mobile phones that do not use their infinite capacities. With this approach there wouldn't be any limitations on mobile phone platforms. Moreover, we should use some optimization algorithms with the required time, available battery power, and estimated level of breakdown, network, processing, and memory power usage, to find out whether we should do this sub process locally or send it to other mobile phones (Hejazinia & Razzazi, 2010). Mobile phones are on most of the time, while PCs are sometimes off. Mobile phones are most of the time in the proximity of each other in a social network, but PCs are connected to each other through the network infrastructure. The main point is that, most mobile phones do not support WLAN and 3G due to being

expensive for people. Thus, it is not easy to connect to PCs to assign jobs too. With these specifications, the solution is to use other mobile phones' processing power and memory capacity, which are always free, and wasted (Hu & Zhong, 2006). The value of instant access to information outweighs other inconveniences such as screen and keyboard size. Decision-makers know this and are inclined to maximize use of the device and application. The frequency of business travel among executives and other front-end users, for example, makes them appreciative of access to information and more tolerant of device shortcomings. Mobile reporting is in users' self-interest and they are willing to make tradeoffs to get the information they need, when they need it. In the case of moving applications to mobile phones, information consumers are driving the trend. Users are already accustomed to very advanced phones, which means that a technology adoption barrier to MBI is practically nonexistent (Kotorov, 2007).

The researcher point view is that the modern smartphones and tablets overcome all MBI challenges either mobiles features challenges by (touch screens, large memories and high performance) or network challenges by dual mode connection (WLAN and EDGE/3G) and off-line capabilities (data can be stored (cached) on the device itself).

2.1.5 MBI Features/Functions

Unlike traditional BI solutions, which address the need for mobile solutions by delivering static reports and dashboards to mobile devices, MBI platforms provide an intuitive interface and an application infrastructure that is tailor-made for users to explore data and draw associations and insights wherever they happen to be working (Figure 2.12). Users can ask what they need to ask, and explore up, down, and sideways rather than only drilling down in predetermined ways (QlikView, 2011).

According to (Dresner, 2011)"Viewing" features (i.e., View Charts/Reports, Alerts, KPI Monitoring) remain the focus of most users – with "KPI Monitoring" seeing the greatest increase in demand, followed by "Alerts" (the number one MBI feature). "Interactive" MBI capabilities – such "Drag and Drop", "Drill Down" and "Data Selection and Filtering" increased slightly – as more sophisticated users/organizations mature in their use and requirements for MBI. "Advanced" MBI features this year, respondents indicated greater importance for "Real-time data refresh", followed by "Off-line" and, lastly "Write-back" (Figures 2.13 and 2.14).
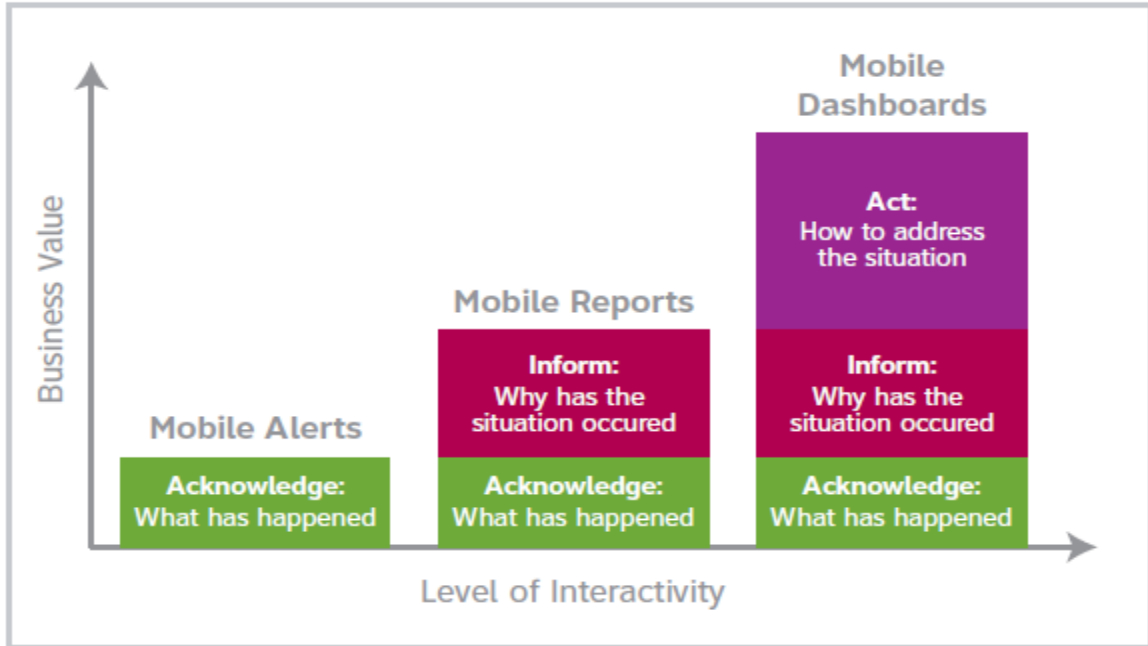
Figure 2.12: Mobile: Stepping up the Value of Your Business Intelligence [Source: (Vaultus Mobile Technologies, Inc., 2009)]
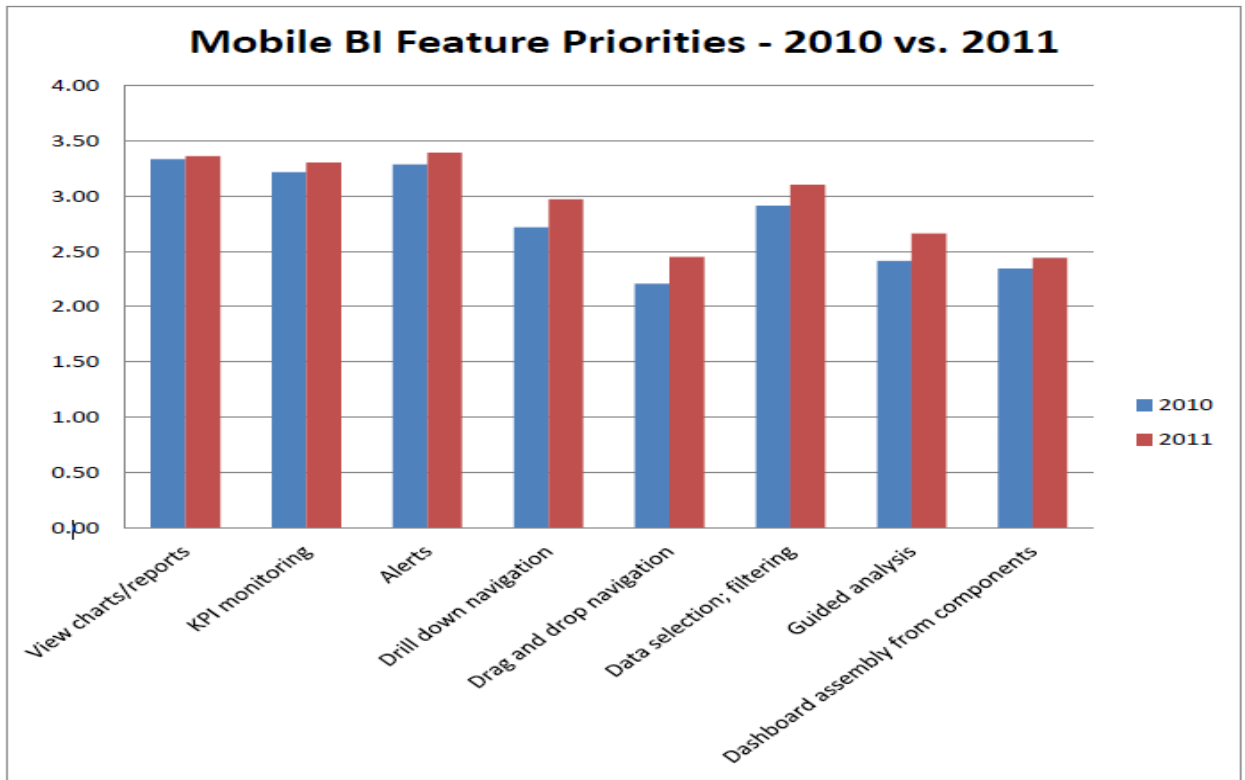
Figure 2.13: MBI Features/Functions [Source: (Dresner, 2011)]
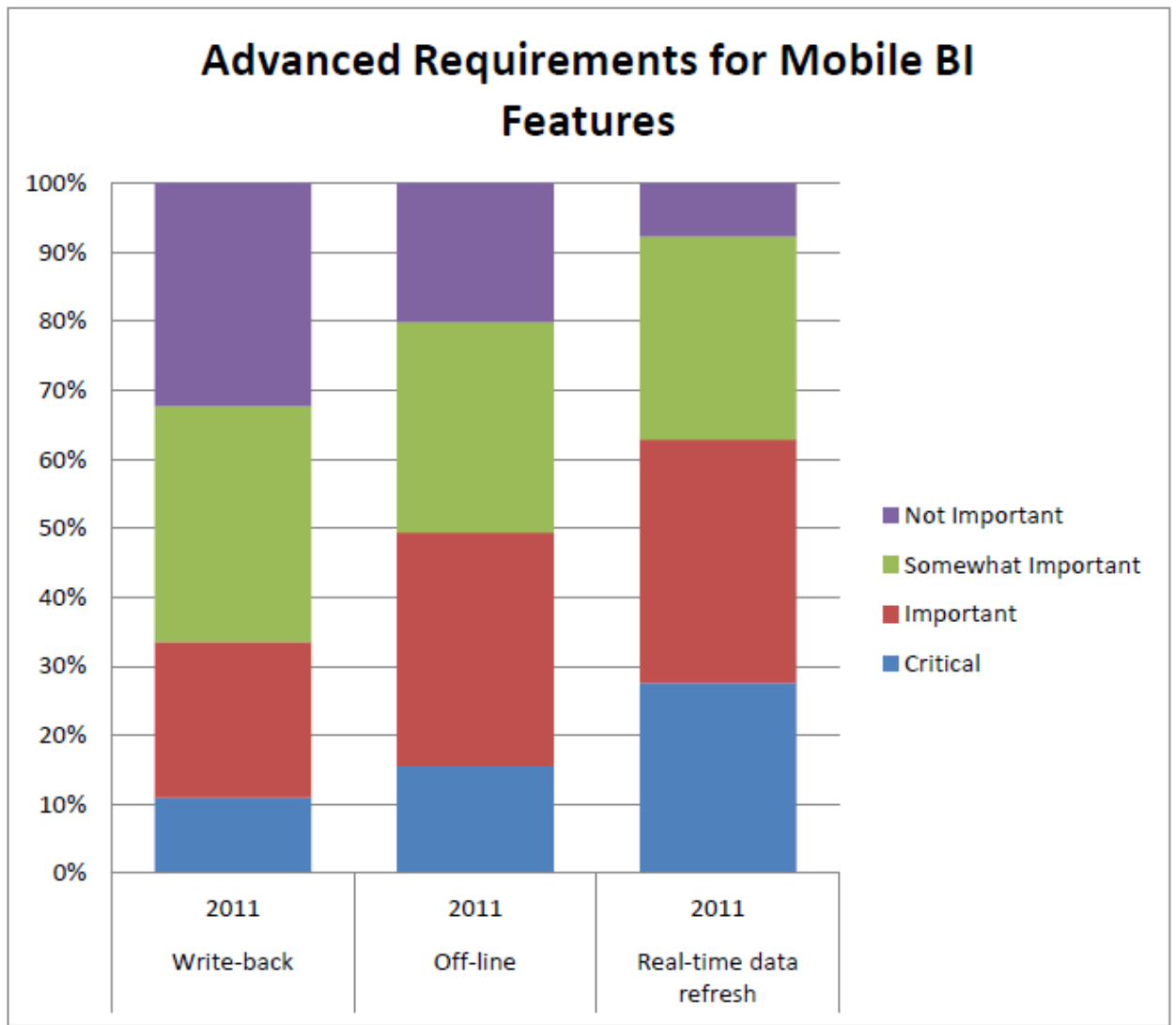
Figure 2.14: Advanced Requirements for MBI Features and Functions [Source: (Dresner, 2011)]

2.1.5.1 System Architecture

According to (Kotorov, 2007) there are currently two predominant architectures that support MBI deployments: the thin-client and thick-client approaches. To determine which better aligns with strategic and tactical goals, consider the following overviews:

- Thick-Client Deployments: requires IT to install software on each mobile device and maintain separate servers to manage the interactions with the device and/or the conversion of content. It gives IT control over the content display, and is good for organizations that have standardized on a relatively small number of mobile devices.

- Thin-Client Deployments: pure browser-based – architectures rely entirely on Web technologies to deliver mobile applications. No additional technology investment is required and there is no risk of client-side software becoming obsolete.

For organizations averse to undue technology risks, conscious of costs, and sensitive to users' preferences, a pure browser-based approach is more appropriate than a thick-client approach (Figure 2.15).

Figure 2.15: Any device with Web access can be used [Source: (Kotorov, 2007)]

Strategic analysis and surveillance are the basic methodology of the process of Information Fusion in the Xplor MBI platform. The architecture of our platform consists of four main services as shown in (Figure 2.16):

- Monitoring Service: A request is generated on a data source like a scientific database, patents database, RSS and blogs to collect data depending on client's needs. The collected data from the corpus.

- Homogenization and structuring Service: Diversity of data sources leads to heterogeneous data; format and language must be restructured. At the end, this service defines a unified view of documents in the corpus (Berrada, Dousset, & El Haddadi, 2011).

- Reporting Service: Reporting is the service responsible for presenting the analysis results to the decision-makers according to the push strategy with IPhone Service, SMS Service, and E-mail Service or pull strategy with Web Site Services (Loubier, Berrada, Dousset, & El Haddadi, 2010).

- Security Administration Service: Orthogonal to all three mentioned services, this Service controls data access and ensures the preservation of privacy during the treatments (Hatim, El haddadi, El bakkali, & Berrada, 2010).
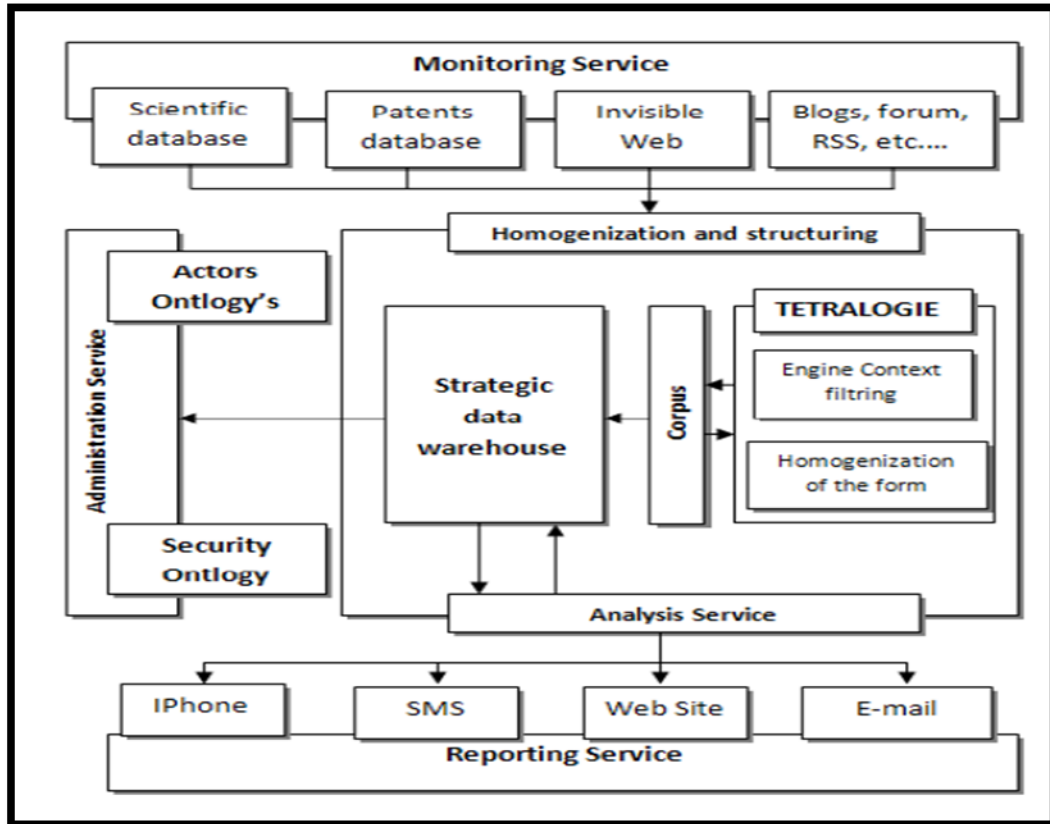
Figure 2.16: Xplor Everywhere Architecture [Source: (Berrada, Dousset, & El Haddadi, 2011)]

2.1.5.2 MBI Event-Based Alerts

MBI Event-Based Alerts - one of MBI functions (Table 2.1) - is the ability to proactively monitor business information; identify patterns to determine whether specific problems are occurring; filter the data based on data and time-based rules; alert users via multiple channels such as email, dashboards, and text messages through mobile devices ; allow users to take action in response to the alerts they have received; and dynamically determines recipients and personalized content to reach the right users at the right time with the right information. Some of the features of MBI Alerts are:

- Create and Subscribe to Proactive Alerts: allows business users to create, publish, and subscribe to proactive alerts and conditions. Users can select and schedule published requests to be executed and then delivered to them via a multitude of devices. Users can define alert conditions on data driven thresholds on specific analytic measures and on time driven conditions.

- Intelligent Agents: MBI Delivers provides the ability for any user (not just administrators) to define their own processes, called Agents and can take action based on a pre-defined decision tree. For example: "If supplies of Product A drop below 10,000 units send an e-mail to me, the warehouse, and the supplier."

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- Composite/Complex Conditions: allows users to create Agents that watch for very complex conditions combining data-driven and time-based conditions on real-time and historical data. Like other catalog objects like Custom Groups or Calculations, a condition can be saved as an object for re-use, collaboration and sharing.
- Multiple Delivery Channels and Profiles: Users can personalize how they wish to be notified (e-mail, pager, iPhone, phone call) at various times of day and week. Delivery profiles can be matched to individual alerts to which a user subscribes (Oracle, 2011).

Table 2.1: MBI Functions Comparison [Source: (Vaultus Mobile Technologies, Inc., 2009)]

Approach	Event-Based Alerts	Static Mobile Reports	MBI Dashboards
Description	Alert/Notification (text message, email or voice mail) sent to workers from an agent that identifies a pre-specified condition has been met. (e.g., Sales in store XYZ have declined more than 5% versus year ago	Static snapshots generated by the backend BI system, possibly with some formatting to fit the mobile device screen size, and delivered as an email attachment	• A mobile application connected to the backend BI system accesses and presents metrics in near real-time • User can manipulate and interact with data, and display comparisons graphically • Specially formatted and designed for a mobile device. Multiple levels of data drill down. Ex: Region, Store, Department, Category
Advantage	• Requires little, if any, additional infrastructure to detect an event • Proactively makes users aware of an event or change that may require attention	• Reports are likely already created and available for desktop users • Users can access more details behind event (getting some context of why something happened)	• Does not require a packaged BI system and can easily link directly to a data warehouse or database • Application is constantly updated with granular data directly from the backend source giving users access to the most current data available • Easier to use since data is optimized for a mobile device and dashboards are designed to make usage of data as simple and intuitive as possible • Ability to manipulate data allows users to spot trends and opportunities more quickly and take proactive action
Disadvantage	• Reactionary: Alerts received only after an event has happened • Lack of context and details that led to the alert means the user has little information to determine the best course of action	• Reports are static snapshots that provide some context and detail but lack the interaction necessary to maximize decision making • Users cannot manipulate, sort, or drill into the data • Even if formatted for a mobile screen, the data is not optimized for mobile usage (requires a great deal of scrolling and searching)	• Requires additional tools and infrastructure to roll out and support

2.1.5.3 MBI Reporting Service

The reporting is the last, important service to be accomplished in the MBI process (Table 2.2). In order to ease the navigability of the strategic information, specific visualization techniques are integrated to each type of request like evolutionary histograms, geographical charts, social networks, profile networks, semantic networks and international networks (Figure 2.17). It is possible to navigate among three different types of networks. The social networks are based on relationships among the different authors, inventors, research teams, companies and the evolution of their relations. The semantic networks contain relationships among keywords in a domain and the evolution of research topics. The international networks are built on international collaboration between countries (Berrada, Dousset, & El Haddadi, 2011).

Figure 2.17: Reporting service of Xplor Everywhere [Source: (Berrada, Dousset, & El Haddadi, 2011)]

According to (Kotorov, 2007) the following considerations are required in MBI reports:

- Use Post-it Notes as a template – if the report fits on a Post-it, it will fit on any device; single-screen reports eliminate navigation;
- Long is better than wide – vertical scrolling is easier for the end user since context is lost in horizontal scrolling;
- If you are delivering wider reports to browsers with zooming capabilities, color-code distinct information areas;
- Drill-downs are better than surfing – present the information in small chunks instead of on large pages that don't display on a small screen;
- Parameterize reports to deliver only the information that is needed – selecting a few parameters is easier than navigating a large report;
- Scorecard charts are loaded with information – packing a lot of information in a small space and displaying beautifully color-coded symbols, they can present multiple variables on the same chart and tell a full story that otherwise would require three or four charts.

Table 2.2: The MBI reports models [Source: (Airinei & Homocianu, 2010)]

Exceptions & Alerts	Some proactive alerts about events that fall outside predefined norms are received by users. As example, a purchasing agent could be alerted when the inventory of a critical part fell to a level that threatened to interrupt the assembly line; a sales executive would be alerted about a delayed shipment, so he or she could intervene to expedite the process or proactively contact the customer about the delay.
Push Reporting	Some role specific predefined reports, such as key performance indicators (KPIs), are pushed to executives (regardless of their location or their device) on a regular schedule. As example, each Friday afternoon, a report on the week's sales could be distributed to sales and marketing executives, while the chief financial officer might receive a report on critical financial metrics.
Pull Reporting	Workers specify the information they want, using what input method is appropriate for the available device. The user could access almost any type of information available from a centralized server-based system. As example, a salesman could ask the application to identify the current top 10 customers, or to provide detailed background about a specific client. The model supports advanced data visualization with interactive charts, graphs, and maps.

2.1.5.4 MBI Dashboards

"MBI dashboard is a reporting tool that graphically represents KPIs on a single screen, utilizing basic visual tools such as charts, graphs, tables and gauges" (Aberdeen Group, 2011). "The sheer volume of information available, however, means users risk information overload. Dashboards have emerged as a concise way to visualize information (Figure 2.18). Instead of analyzing multiple reports and the relationships between them, a dashboard offers an analytical perspective. All relationships and associated measures are presented in a single, prepackaged view" (Kotorov, 2007). "MBI dashboards connect directly to the backend BI system and allow the user to dynamically access and interact with the data in tables or graphic formats. This approach provides the mobile worker with the ability to analyze current data and determine the best action to take in response to a situation" (Vaultus Mobile Technologies, Inc., 2009).

Interactive Dashboards makes it easy for business users to access pre-created, consumer-based Business Intelligence information. MBI Interactive Dashboards run within a pure Web architecture and provides users with a rich, interactive experience where information is filtered and personalized to a user's identity or role. This helps to make business information intuitive and easy to understand and guide users in their decision

making. Much of the content on the Dashboards is created from within MBI Analysis & Reporting. Some of the important features of Interactive Dashboard are:

- Power of Analytics: MBI Interactive Dashboard provides a powerful interactive analytic environment for business users precluding the need for them to navigate to query and analysis mode to perform complex calculations.
- Sharing Information Online: MBI Interactive Dashboards can be published as online work centers enabling groups of users to share information with each other.
- Personalization: MBI Interactive Dashboards can be personalized to automatically display data based on the user's identity or role.
- Data Filtering: MBI Interactive Dashboards can show analyses pre-filtered by data and data threshold values set by the user. Data-level security is always maintained as well.
- Sharing Information Offline: MBI Interactive Dashboards can be saved and distributed for offline use as Briefing Books or Reports. Dashboard content and data can be downloaded to Excel or PowerPoint, or more direct data formats.
- Saved Customizations: Users can modify analyses, layouts, filters, etc. on MBI Interactive Dashboards and save these modified dashboards for their personal or shared use. Snapshots of Dashboards can also be saved or shared as a handy URL link.
- Custom Styles: MBI Interactive Dashboards utilize cascading style sheet standards. Corporate standards can be adopted and styles can also be driven by personal preference or user group membership (Oracle, 2011).
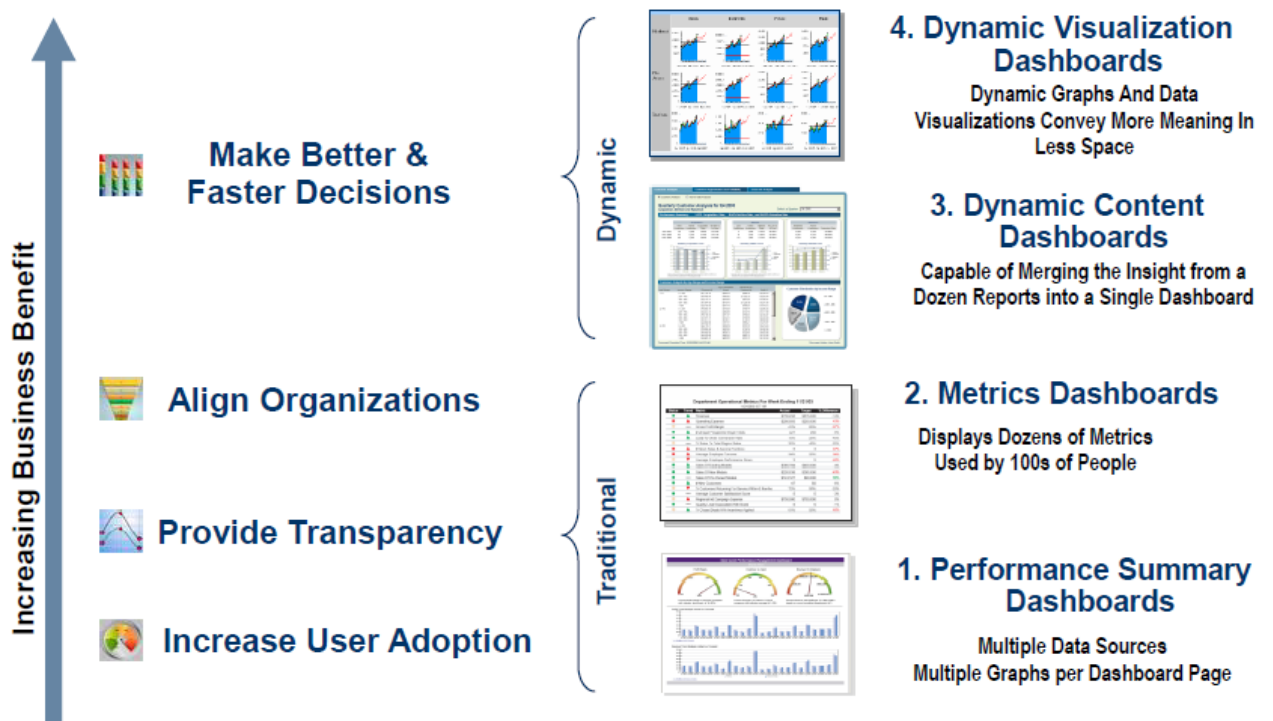
Figure 2.18: Dashboards Types [Source: (Vaultus Mobile Technologies, Inc., 2009)]

According to (Fields, 2011) there are some tips for publishing content in the constrained space of a tablet (Figure 2.19):

- Put your most important view at the top left. It's where your users' eyes will naturally start.
- Limit your dashboard to 2-4 main views. Overcrowding the screen will make the dashboard much less usable on the go.
- Be stingy with legends and filters. Eliminate all but the most necessary filters.
- Bigger is better. Use large marks to make sure people can select them with their fingers. Use large font sizes so that people can read explanations and titles.
- Allow drill-down: your dashboards should be launching-off points for getting more specific data.
- Provide content search: Getting the right information in a dashboard is important, Make it easy for users to search for different content by project, publisher, date, name and other facets.

Figure 2.19: MBI Dashboard example [Source: (Fields, 2011)]

2.1.6 MBI Applications

A mobile application is defined as a computational entity that uses more mobile applications services. A mobile application service is defined as a computational entity that uses at least one model functional component over specified interfaces. There are two types of mobile applications:

- The one developed by the user for a specific purpose;
- Generic user agents, the one which are preinstalled on the mobile device (Klemettinen, 2007).

In fact, many MBI applications developers have learned that in a changing world not so many users can easily and precisely identify what data they will need and when. So the developers have created many set of KPI's and various types of reports, dashboards, tables, or charts for the wireless devices and for their small screens. Consequently, nowadays the BI applications running on mobile devices (Figure 2.20) use different kinds of dashboards usually depending on the provider (Airinei & Homocianu, 2010).
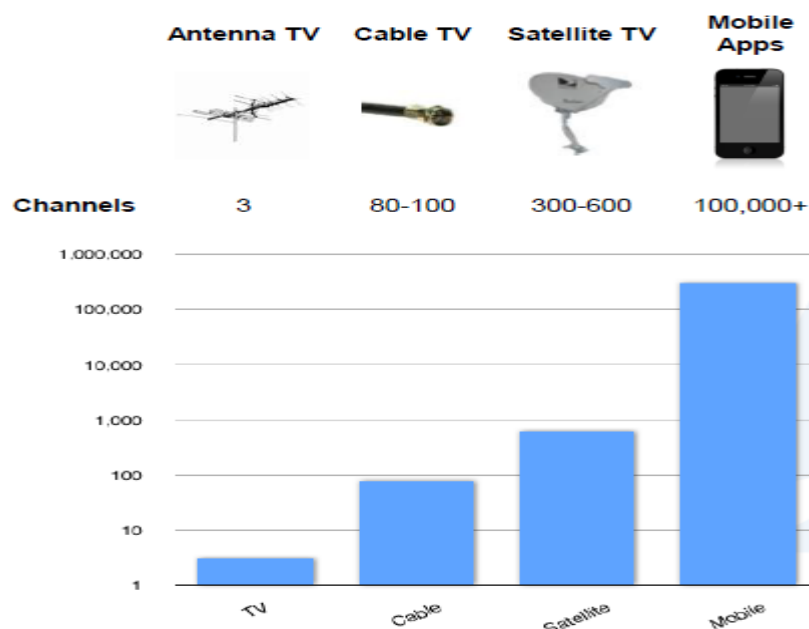
Figure 2.20: MBI Applications are the Next Generation "TV" Channel [Source: (MicroStrategy, 2011)]

According to (Visoiu & Trif, 2011) MBI applications take several forms (Figure 2.21):

- standalone Applications; These run entirely on the mobile device and do not depend on an external entity to realize their functionality; such applications offer independence to the user as they do not need network access; a disadvantage is represented by the difficulty to feed data to the application and the lack of processing power compared to a PC or an application server; standalone applications are recommended for solving small size problems or obtain a skeleton for solving bigger problems;

- network applications; these applications have distributed components; some components reside on the mobile device and other components reside on external systems; a network application may obtain the data to be processed from a server or a web service and may store the results on the external system; also, data and results may be obtained and stored from the device itself as a standalone application; the problems solved are of medium complexity;
- web applications; these applications only render the interface on the mobile device; all the application logic takes place on external application servers; these applications are totally dependent on the network access but the complexity of the solved problem is high as all the processing is done on powerful machines.

Criteria	Native Application	Browser-Based Application
Context awareness	●●●●	●●
Cross-platform	●	●●●●
Distribution	●●	●●●●
Gestures	●●●●	●●
Maintenance	●●	●●●●
Offline	●●●●	●
Performance	●●●●	●●●

● = Minimum Score
●●●● = Maximum Score

Figure 2.21: Native Application vs. Browser-Based Application (Gartner, 2011)

Another option is to run BI reports through a virtual desktop for example, Citrix Receiver. In this case, the mobile device acts as a screen grab, while the application is running on the back-office PC servers (Bitterer & Sood, 2011). DivePulse is a hybrid approach that combines disconnected access with web-enabled MBI. It has the following features (Figure 2.22):

1. Disconnected mode: View/Monitor key metrics, Sorting and Ability to access detail.
2. Connected mode: you can Access web pages, View embedded DivePort views and Touch-actions‟ available.
3. DivePulse-Security: Follows the same security protocols as the core Diver platform, Uses the same DiveLine administration tools to handle security, Role-based security is enabled and Communication with the device is encrypted (McCollem & Zanarotti, 2011).
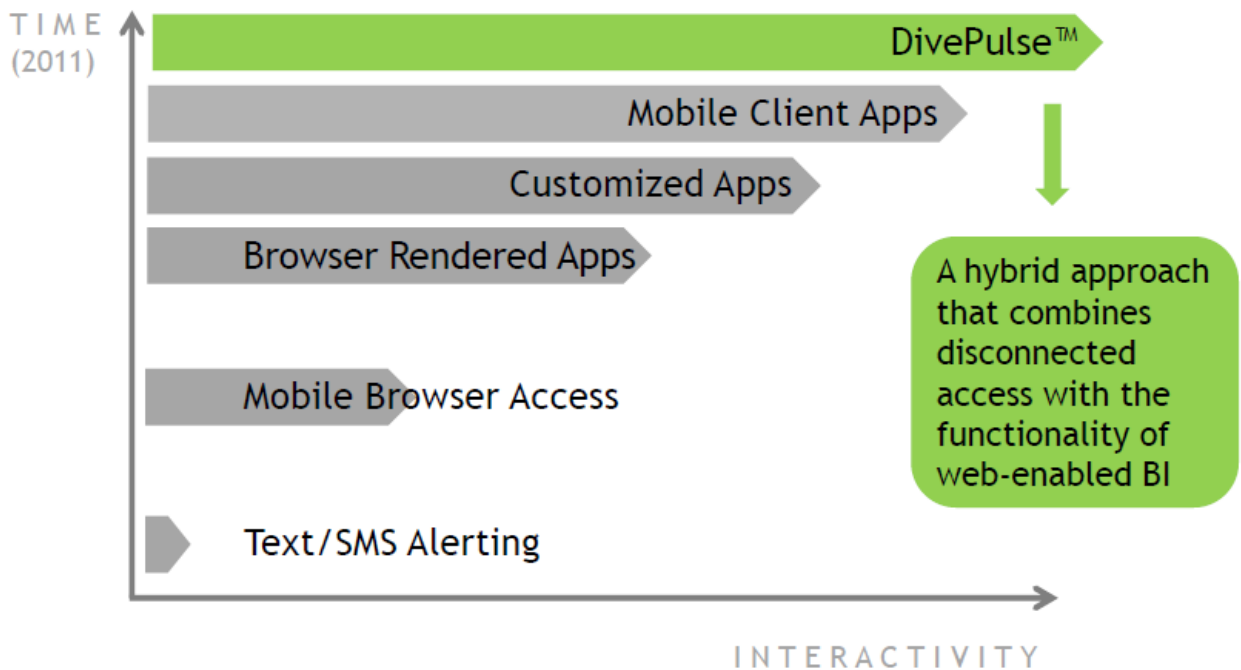
Figure 2.22: MBI–DivePulse's Approach (McCollem & Zanarotti, 2011)

MBI application is a two-way application that empowers more users than PCs to affect changes on the server, such as modifying a report's underlying data in response to changing events all the times and everywhere (Figure 2.23) (Business Objects, 2008).
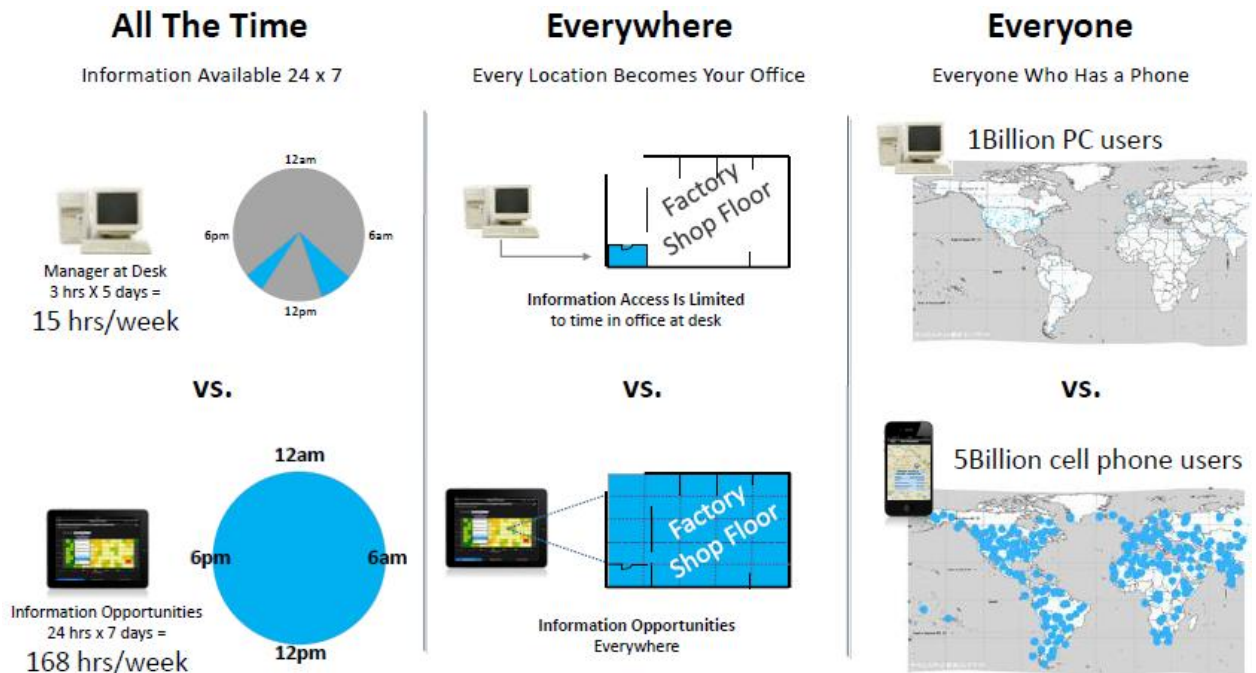
Figure 2.23: Mobile Apps are better than Web and Desktop Apps [Source: (MicroStrategy, 2011)]

According to (MicroStrategy, 2010) there are six reasons distinguishing MBI Applications from previous Web-based BI Applications:

1. Integrated Mapping: Integrating Google Mapping directly into your reports which by GPS can visualize location-specific data, trends, and analysis on maps (Figure 2.24).
2. Multi-touch: Supporting native Apple multi-touch gestures (Tap to drill and explore, Pinch to zoom, Swipe↑↓ to scroll, Swipe←→ to turn page, Tap through workflows, Rotate to visualize, Tap & hold for tooltips, Tap to link and Shake to refresh) (Figure 2.25).
3. BI-specific Gestures: Including new, BI-specific, multi-touch gestures and enabling designers to create Apps with unique visual personalities (Figure 2.26).
4. App Integration: Directly linking to/from other mobile Apps and supporting interconnections with other Apps and data sources. As link to e-mail system, embedding addresses and content into the message (Figure 2.27).
5. Sensor-based Query: Prompt input directly from mobile sensors which integrating with sensors and inputs to provide context to App (Figure 2.28).
6. Mobile Information Capture: Remotely capturing data and initiating transactions, making information come alive to the user through sight, touch, and sound and providing Apps with finely-crafted information flow (Figure 2.29).

Figure 2.24: Providing integrated Mapping Visualizations [Source: (MicroStrategy, 2010)]
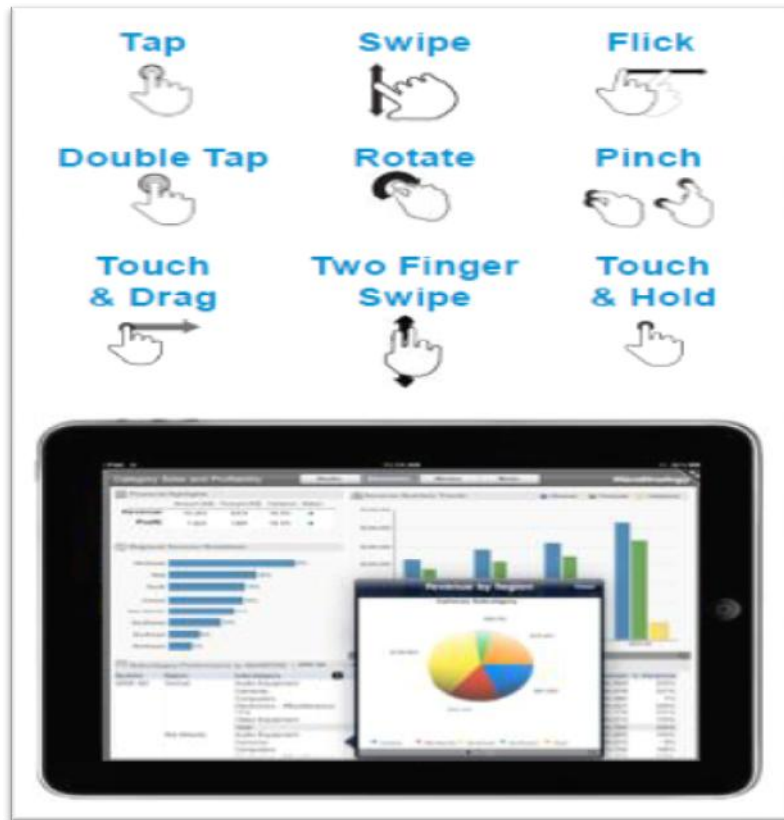
Figure 2.25: Using standard Apple Multi-touch Gestures [Source: (MicroStrategy, 2010)]
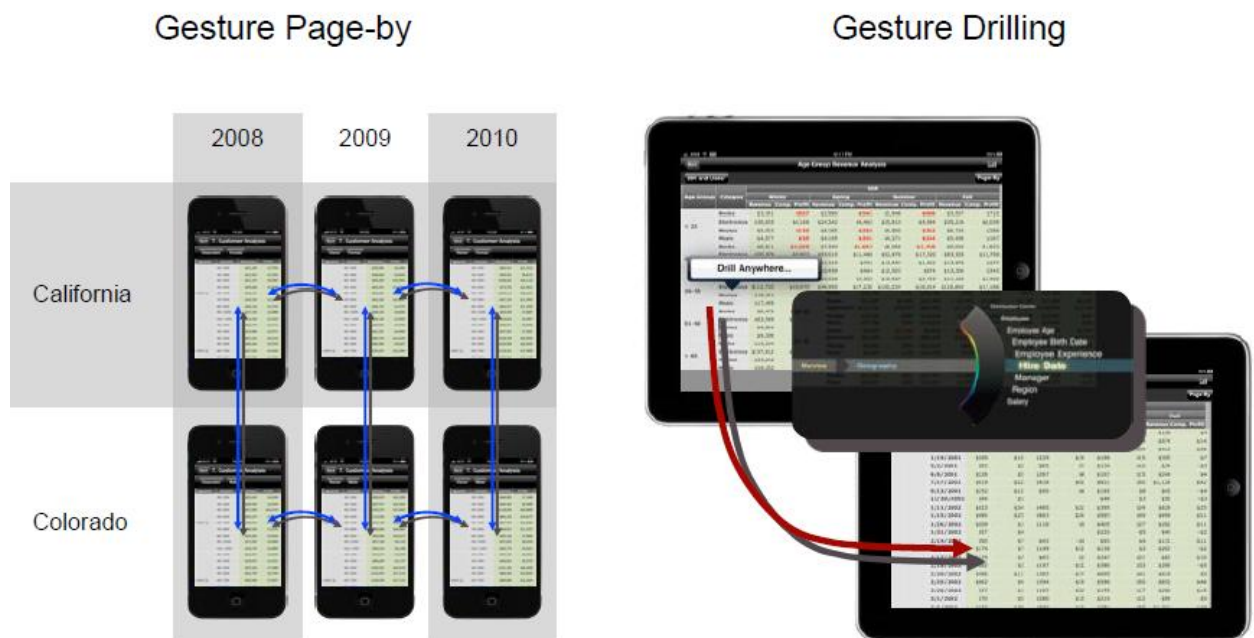
Figure 2.26: New Proprietary Gestures invented specifically for information analysis [Source: (MicroStrategy, 2010)]
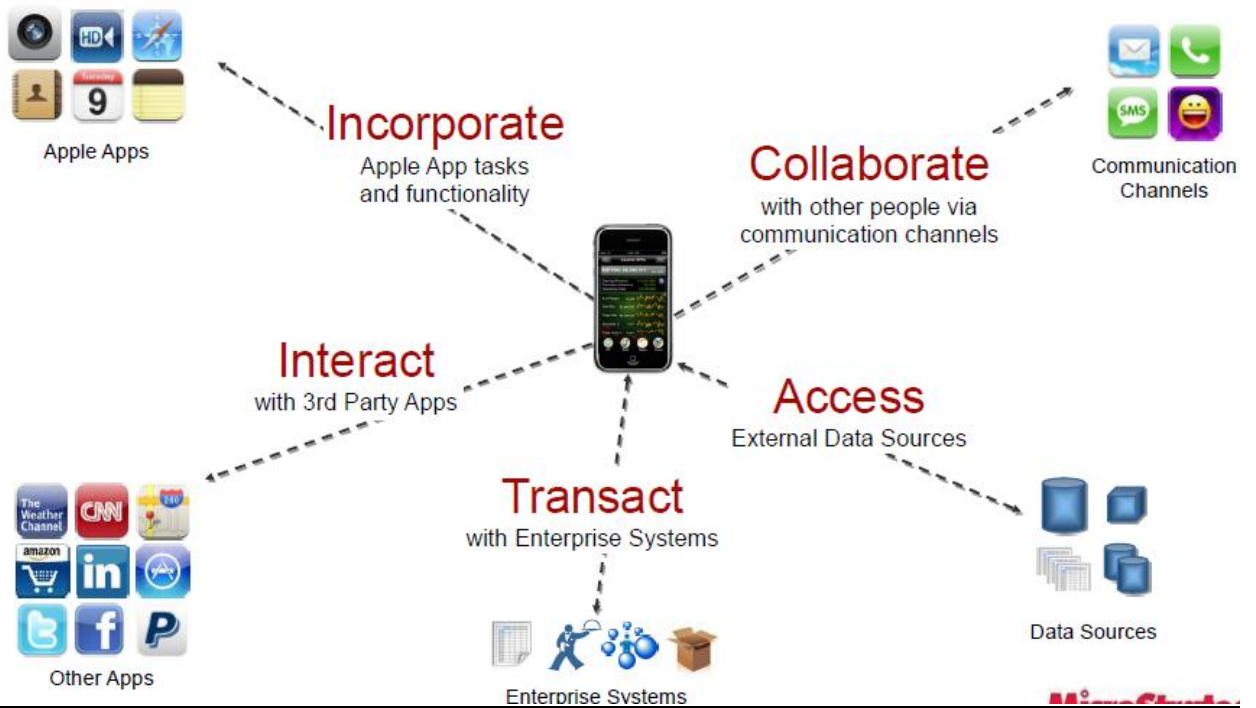
Figure 2.27: MBI Application can interact with other Applications, communication channels, and data sources [Source: (MicroStrategy, 2010)]

Figure 2.28: Automatic Sensor Input [Source: (MicroStrategy, 2010)]

Figure 2.29: Mobile Info Capture [Source: (MicroStrategy, 2010)]

2.1.7 Infrastructure

Infrastructure can be divided to network and mobile infrastructure as follow:

2.1.7.1 Network Infrastructure

In order for MBI to access a standard web services interfaces must be accessible via the mobile operator network for mobile device connection. There are a variety ways to do this, both secured and not secured. Below is an example of how Business Objects Labs has set up this external access for its own mobile solution (Note that Blackberry devices implemented on a Blackberry Enterprise server will have their own solution for secure data transport - Figure 2.30) (Business Objects, 2008).
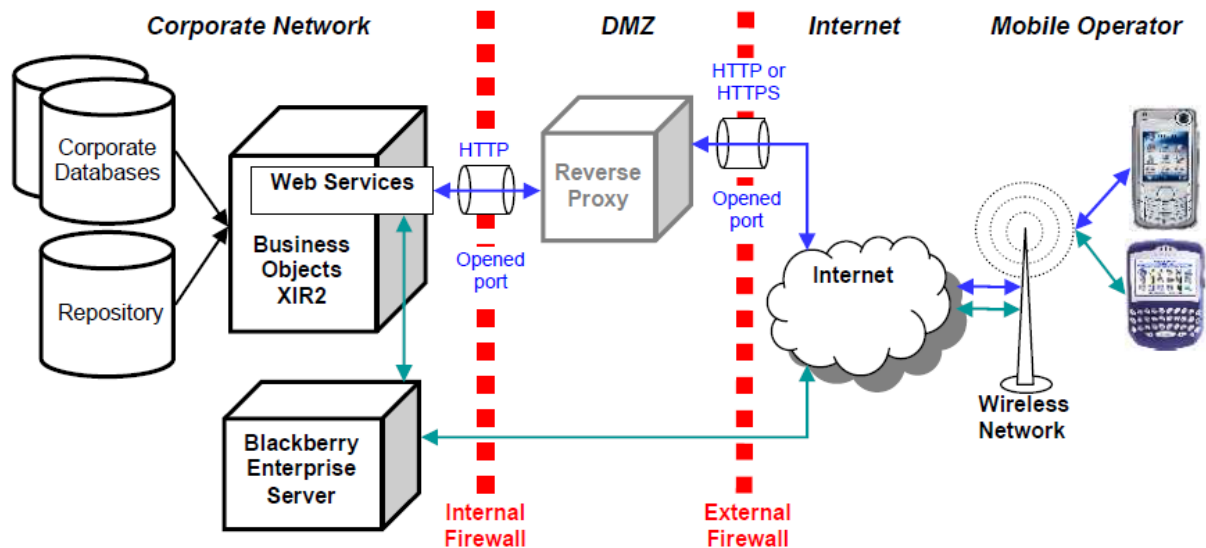
Figure 2.30: MBI Network model [Source: (Business Objects, 2008)]

Nowadays, mobile applications are in a continuous developing process. As the PC applications use neural networks, these are used also in mobile applications development, for predictions, figure recognitions, pattern recognitions and not only. Artificial neural networks are computational networks which simulate the networks of nerve cell (neurons), simulating the properties of the neurons and the interaction between them. These networks help in solving the problems, general problems, not specific ones; the neural network using supervised learning, input datasets, learn and then it think by itself, as a real biological brain. It uses simple operations, as additions, subtraction, multiplicity and fundamental logic elements to perform complex problems (Trif, 2011).

Neural networks have an important role in the applications developing process, having the following advantages (Haykin, 2009):

- mapping inputs signals to desired response - supervised learning; it involves the modification of the synaptic weights of a neural network by applying a set of training examples; each training example consist of a unique input signal and a corresponding

target response; the difference between the actual response and the desired response should be minimized;

- adaptively - adapt weights to environment and retrained easily; the neural network can be retrained and used in different cases, not only in a specific case;
- nonlinearly - inherently nonlinear signals; the neurons of a network can be linear or nonlinear; the network formed by the interconnection between the nonlinear neurons is a nonlinear one;
- evidential response - confidence level improves classification;
- not need to know the relation between the dependent and independent variables.

Artificial neural network are composed of interconnecting artificial neurons (which simulates the biologically neurons). Artificial neural networks are like nonlinear models to estimate levels of a dependent variable depending of a number of independent variables (Vișoiu, 2009). The results obtained using neural networks are often better than those obtained by applying traditional methods. This ability is manifest especially in data sets containing complex and difficult to identify links between independent and dependent variables. Neural networks have an important role in the business intelligence mobile application developing process; using these networks, the decisions are taken easier and at a higher level of confidence (Trif, 2011).

Mobile ad hoc networks (MANETs) are multi hop wireless networks without fixed infrastructure, formed by mobile nodes. The connection between knowledge generation and mobile ad hoc networks will be symbiotic knowledge generation which will utilize the wireless ad hoc networking to perform their communication needs, and MANETs will utilize knowledge generation to enhance their network services. Current mobile devices, which go together with us anywhere and at anytime, are the most convenient tools to help us in ubiquitous computing, that is, to intermediate between us and our surroundings in an unobtrusive fashion. In other terms, the data processing and communication go to the background and must adjust to the user's personality. Some of the decisions related to communication have to be completely made at run time by learning the users' mobility patterns based on personal actions, roles, and social networks. MANETs concept for "anytime and anywhere" is supposed to support network services independent on the application scenarios (Lekova, 2012).

There are four options available for providing a middleware, over mobile phones: Bluetooth, SMS, WLAN, and GPRS/EDGE. GPRS/EDGE is based on GSM. In the middle of these two technologies is the improved version of GSM, which cellular operators enhance their systems, to improve to GPRS/EDGE, and SMS is built over GSM, it is simple, fast highly flexible, scalable, wide spread and user friendly. The specification of each of these infrastructures could be seen in (Table 2.3) (Hejazinia & Razzazi, 2010).

Table 2.3: Network Medium Comparison [Source: (Hejazinia & Razzazi, 2010)]

	Bluetooth	WLAN	GPRS/EDGE
Bandwidth	1 Mbps	11 Mbps	115-117 kbps
Power	1-10mw	50-70mw	200-800mw
Range	10-100m	100-200m	1KM
Cost	None	Low	High
Frequency	2.4GHz	2.4GHz	900/1800MHz

To overcome the shortcomings of each of these options there is a solution, which is a software layer over them for roaming transparently, so that the application over them wouldn't be notified that the underlying layer has changed the network medium. Thus, the first underlying layer searches for the mobile phones in the proximity to check whether they have the special service. If they do not, the software layer under it does the roaming and goes to WLAN or SMS according to the user preference between cost and time. In addition, if it is not found, then automatically it connects via GPRS/EDGE to another mobile phone, or sends an SMS to a default mobile phone that it contains the required service (Chen, Chen, Ko, Lee, & Chen, 2008).

The drivers for adoption of mobile business within the enterprise and with consumers are numerous (Figure 2.31). They include the following: the increasing mobility of today's workforce; the convergence of telecommunications and software industries; the increasing need for information and transactions anytime and anywhere; the new breed of wireless handsets coming on the market; the revenue opportunities created via location-based services and M-Commerce; the productivity improvements to be gained via wireless extensions to enterprise applications and processes; the improvements in bandwidth brought about by the migration from 2G to 2.5G and 3G networks; and the adoption of wireless standards such as WAP and Bluetooth, together with the cultural and regulatory drivers in various countries (Evans, 2002). The percentage of the population covered by a 2G mobile-cellular network is twice as high as the population covered by a 3G network. 3G population coverage reached 45% in 2011. 3G networks able to carry large amounts of data at high speed as broadband connections do for computers (ICT Indicators database, 2011).
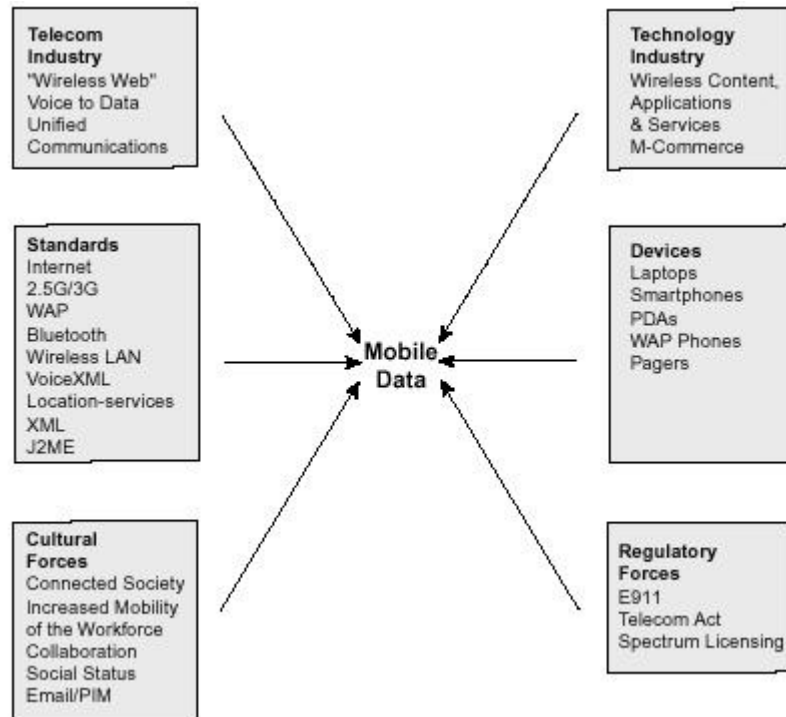
Figure 2.31: Drivers for Adoption of Mobile Data [Source: (Evans, 2002)]

Many value-added services such as Web surfing, multimedia functions, mobile commerce and a wide variety of users' applications (e.g. Apple's iPhone Applications) ride on the data transmission services in GSM networks. In addition to providing quality service for voice services, telecommunication operators increasingly invest large sums into data transmission service provision that has a huge consumers market and it is still in the bloom. From the technical perspective of network management, it is therefore essential to minimize the occurrence of packet losses and delay, and to improve the quality of packet transmission services (QoS) in the network. As more value-added services are being supported, including mobile commerce, the demand of data increases as well as fluctuates over different times and over different locations. Also, the new generation network 3G and 4G will also occupy the usage of GSM network since there is internal roaming from 3G/4G to 2G network, and vice-versa due to coverage issue. Both value-added services (VAS) and 3G/4G traffic increase the loading in the part of the data resource (Fong, 2011). The challenge for operators (Figure 2.32) is to develop and deliver new VAS that will help them differentiate their brands and maintain revenue growth (Informa Telecoms & Media, 2011).
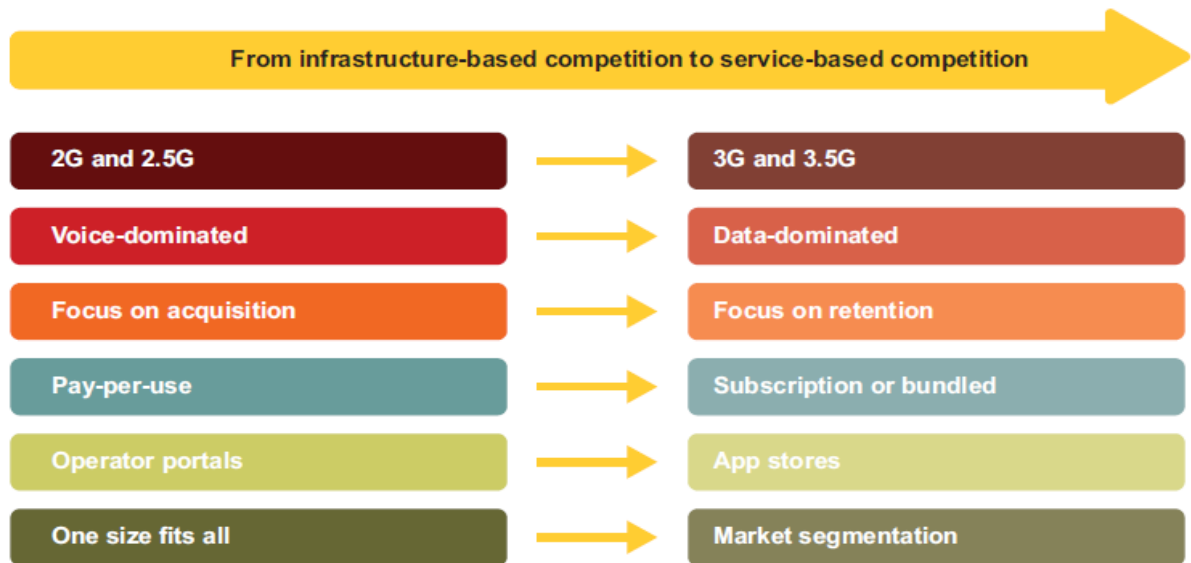
Figure 2.32: Mobile VAS market development [Source: (Informa Telecoms & Media, 2011)]

2.1.7.2 Mobile Infrastructure

With the new generation of devices, there are many different ways to leverage BI. In pull mode, either the user or the device itself initiates a report request from the server. The location awareness of the device could act as the trigger. In push mode, the server initiates the report submission. This could be triggered by a certain rule firing on the server, an exception handler or a subscription to a report that is sent on a specific schedule. The mobile device should be seen not just as the endpoint of an information flow, it can equally be considered a data-generation point (Bitterer & Sood, 2011). Mobile phone manufacturers have developed mobile devices that can serve many functions beyond voice communication. Mobile phones are now equipped with cameras with the potential to turn them into portable bar code scanners. Handset manufacturers are developing Radio Frequency Identification (RFID) chips that can turn mobile phones into mobile wallets able to carry and exchange electronic money securely and engage in other transactions (payment, ticketing, coupons, etc.) with RFID readers in the physical world. Mobile phones have the following characteristic:

- A communicative device: by dual mode (WLAN & 3G) Mobile beyond voice, instant massages, emails and browsers.
- A connective device: Mobile phones enable people to connect to other sources of data anytime, anywhere by dual mode (WLAN & 3G).
- An intelligent device: Mobile phones are a place where multiple applications can meet and fuse. Mobile devices that integrate a phone, a camera, a location finder (GPS) and a connection to the internet make it possible for a user to request context-dependent information (GS1 Mobile Com, 2008).

BI data can be consumed anywhere in the world on any wireless-enabled device including (Figure 2.33): Cell phones, Blackberry's, iPhones, various types of PDAs and pocket PCs (Laurent, 2009). Today a number of new platforms have been announced and/or shipped. These include an updated Apple iPad 2.0, a myriad of Android tablets (e.g., Samsung Galaxy, Motorola Xoom), Windows 7 Phone, and RIM's Playbook Tablet. In addition, HP released and then (in the midst of our data collection) subsequently withdrew its WebOS-based TouchPad platform priority. There is a dramatic increase in interest for the Apple iPad as a MBI platform and continued strong interest in the iPhone (Figure 2.34). Google Android (phones and tablets), continues to grow in importance and is emerging as the next significant growth platform after Apple's iPad and iPhone (Dresner, 2011). 9.7 million Tablets were shipped globally at fourth quarter in 2010: iPad 7.3 million (75%), Android 2.1 million (21%) and the others (Blackberry, windows, etc…) 0.3 million (3%) (McCollem & Zanarotti, 2011). Analysts at UBS estimate Apple will ship nearly 38 million iPads in 2011 and command a 63 percent share of the market. Tablet computers broaden the boundaries even farther, as their larger screens, processing power and storage capacity make them a viable alternative to the office desktop, and even the laptop, for many uses. The form factor of the tablet plus its instant-on capability and easy wireless connectivity make it easy to carry around and use; as a result, tablets now show up in many of the same places as laptops do, in even greater numbers (Ventana Research, 2011). In Q211 alone, Apple sold a staggering 20 million iPhones and 9 million iPads and Google is activating more than 600 thousand Android devices daily. Sales of tablets could reach a whopping 100 million by 2012 (Accenture, 2012).
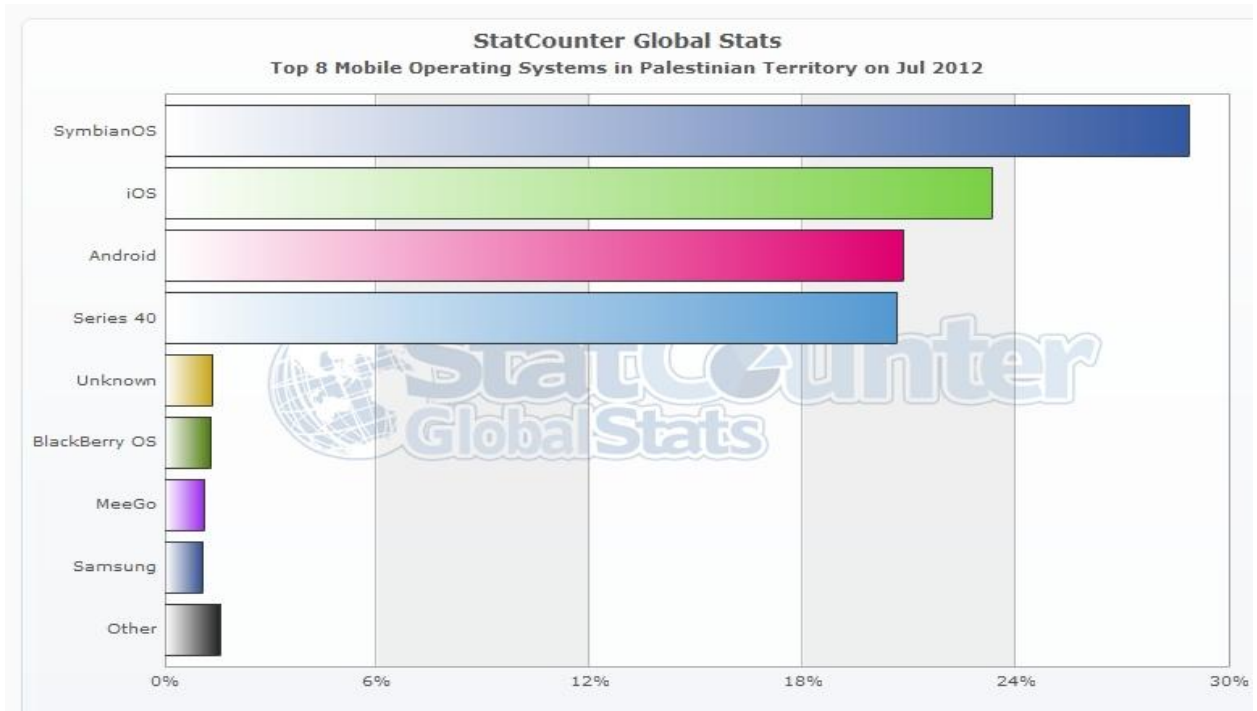
Figure 2.33: Top 8 Mobile Operating Systems in Operating System in Palestine on Jul 2012 [Source: (StatCounter, 2012)]
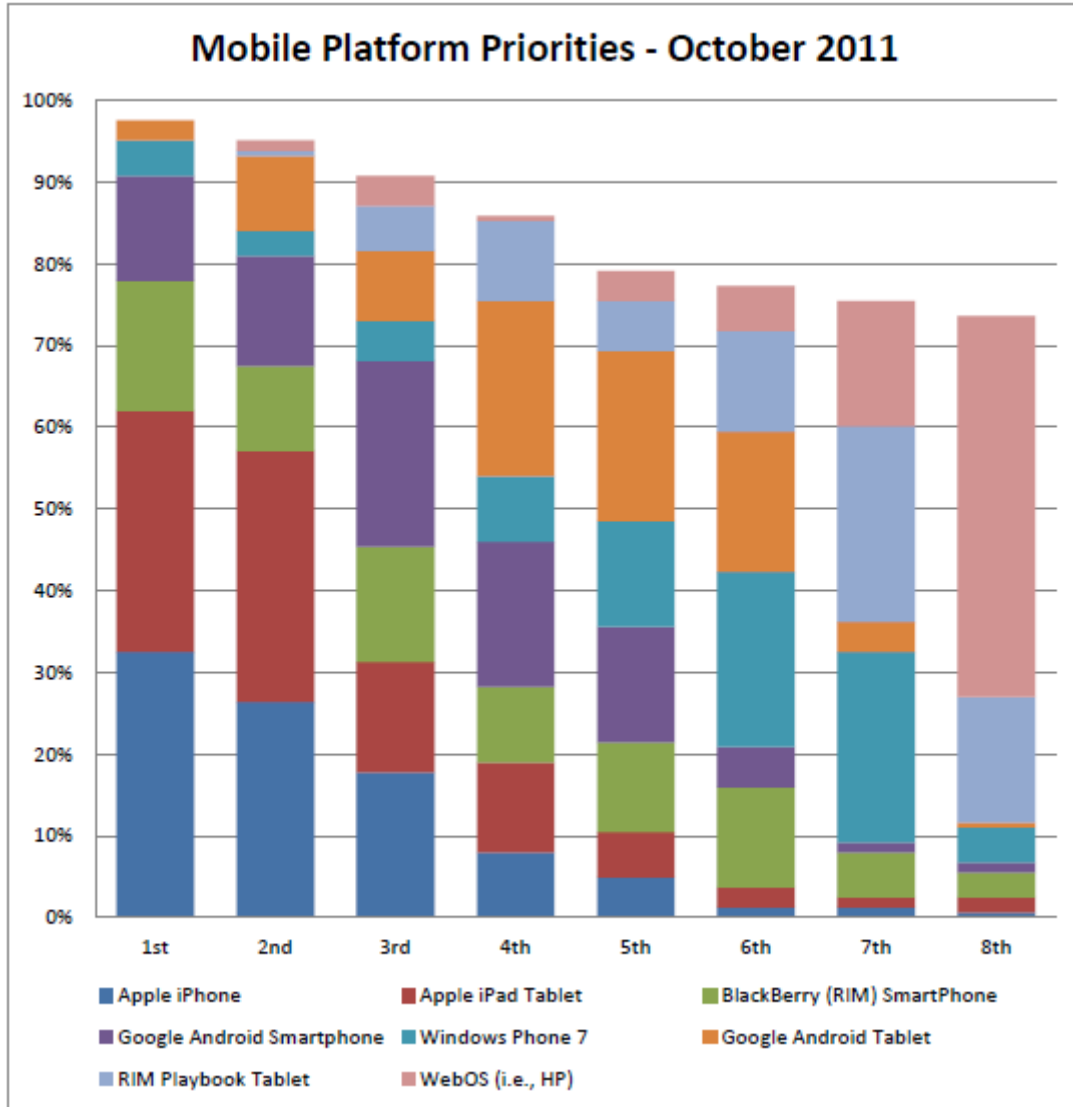
Figure 2.34: Mobile Platform Priorities [Source: (Dresner, 2011)]

2.1.8 MBI Vendors

Virtually all the players in the BI platform market are coming out with mobile versions of their products. However, next to the big household names in BI (for example, IBM, SAP, MicroStrategy and Oracle), a few almost unknown vendors have entered the arena. DSPanel works closely with the Microsoft BI environment. Engineering, Jaspersoft and Jedox are all offering mobile extensions to their open-source products. PushBI and Yellowfin are newcomers without much traction yet. Most vendors offer their MBI products free of charge, positioned as parts of the license of the respective BI server product. This makes sense, as tablet or smartphone applications don't really add much beyond visualization capabilities. Interestingly, Actuate, provider of open-source software, charges for its MBI applications through iTunes (Bitterer & Sood, 2011). The leaders of MBI vendors are the following (Figure 2.35):

- IBM: In 2007, International Business Machines Corp. (IBM) did away with the limitations of BI with the introduction of IBM Cognos Mobile, which has recently been enhanced to provide a rich user experience on tablet computers and on even more smart phones. Cognos was acquired by IBM in February 2008. IBM is the world leader in business intelligence and performance management solutions. It provides world-class enterprise planning and BI software and services to help companies plan, understand and manage financial and operational performance. IBM Enable users to interact with, analyze and share IBM Cognos Business Intelligence content wherever they are, provide users with a rich and visual experience whether offline or online for uninterrupted productivity and keep up with the demands of users on varied devices with a single administrative environment and the ability to reuse BI content.

- Informa Telecoms & Media is the leading provider of business intelligence and strategic marketing solutions to global telecoms and media markets. Driven by constant first-hand contact with the industry, our 60 analysts and researchers produce a range of intelligence services including news and analytical products, in-depth market reports and datasets focused on technology, strategy and content (Informa Telecoms & Media, 2011).

- Information Builders: Information Builders' WebFOCUS business intelligence and iWay Software integration technologies provide an end-to-end information management strategy, combining performance management, data governance, business intelligence, and analytics to help organizations make smarter decisions. It enables users to access any reports in their Mobile Favorites folder and easily navigate to BI content. And organizations to share reports across devices (Information Builders, 2011). Information Builders' suite of powerful and extensible mobile BI solutions, WebFOCUS Mobile, is device independent – yet device exploitive, and fully leverages existing WebFOCUS investments. WebFOCUS Mobile is a suite of device independent, device exploitive solutions that empower mobile users to access, analyze, and display enterprise data via BI applications that are developed and deployed once, for consumption anywhere, at any time, from any device. It offers mobile technologies which make advanced capabilities readily available to any smartphone and tablet computer. With pure thin client architecture, organizations can deliver applications and content to mobile devices without changing their underlying architecture (McGrath, 2011).

- Microsoft: its vision is to deliver highly interactive and immersive BI experiences across different devices to all users wherever they are. By Web based solutions run across all platforms, Touch-based data exploration and Visualization and Immersive experience of the Microsoft BI platform on Windows 8 slates (Underwood, 2012).

- MicroStrategy: MicroStrategy, Incorporated was founded in 1989. Its revenues are $454M in 2010. It has twenty-year focus perfecting software for very large-scale data

analysis and selected by Gartner for "Leader Quadrant" for Business Intelligence Platforms. It is leading independent business intelligence software vendor. It has over 1 million business users at over 3,000 organizations which are direct operations in 42 cities in 23 countries around the world. It has over 70 patents pending or issued (MicroStrategy, 2011) and provides MBI which has (MicroStrategy, 2010):

1. Native App Experience: Purpose-built, workflow-driven Apps that quickly and easily guide users through their data to discovery, analysis, or decision. Apps fully leverage mobile device capabilities, including the multi-touch interface, sensors (GPS, camera, etc.), communications (voice, email, text), and more.

2. Enterprise Grade: Designed to deliver the higher levels of performance and scalability demanded by mobile Apps. MicroStrategy delivers in-memory, multi-level caching, ROLAP analytics, robust security, easy extensibility and comprehensive administration features designed for enterprise deployments.

3. Fast to Develop: Fast, code-free App development via MicroStrategy"s metadata-driven, point-and-click paradigm. Build rich, interactive BI Apps in just days. Speed deployment by building once and deploying across platform to iPhone, iPad, BlackBerry, browsers, Microsoft Office, or portals.

4. Highly secure - used by government agencies and financial institutions i.e. HTTPS is just the start. You also need advanced on-device encryption and secure-certificate driven remote wipe.

5. Extensive experiences in delivering Information Solutions for over 22 years i.e. Mobile vendors don't have the experience to deliver information-driven applications.

6. Innovation across Big Data, Mobile, Social and Cloud.

- Oracle BI Foundation Suite is designed to meet the requirements for a new class of enterprise business intelligence solutions. It consists of a broad set of capabilities including ad-hoc query and analysis, interactive dashboards, scorecards, reporting, proactive intelligence and alerts, mobile analytics, and more. Oracle BI Foundation Suite provides access to all BI Dashboard content via mobile devices and optimizes content for mobile consumption on those devices. Oracle's approach exploits not only the rock-solid Oracle BI foundation but also the proven value of existing BI application content as leveraged on mobile devices. This strategy provides an augmented but familiar user experience which can be immediately employed by users with little to no training (Oracle, 2011).

- QlikView: it is QlikTich powerfull, accessible business intelligence solution which enables organizations to make better and faster decisions. QlikView product delivers enterprise-class analytics and search with the simplicity and ease of ude of office productivity software (Borg & White, 2010). One of QlikView's primary differentiators is the associative experience it delivers to users. Business users conduct searches and

interact with dynamic dashboards and analytics from any device. It delivers answers as fast as users can think up questions. And it illuminates the power of gray the value of seeing not just the data that is associated with the user's selections, but the data that is not associated. QlikView is known as a pioneer in in-memory BIwhich is important for BI, for performance reasons. The QlikView MBI platform has an inference engine that calculates associations in the data automatically. It calculates aggregations on the fly as needed. And it caches data in memory, compresses data down to 10% of its original size, and optimizes the power of the processor for a super-fast user experience. QlikView offers a unified architecture for delivering cross-platform Business Discovery on mobile. QlikView Server recognizes mobile browsers and delivers touch-enabled apps to those browsers as needed. With QlikView, mobile access is no different than access to QlikView Server from any other client. The same apps are delivered with the same functionality on any platform. There are no additional stack layers, data transfers, report customizations, or duplicate security models required (QlikView, 2011).

- SAP/SYBASE: Is a pioneered Relational Database, Column-based Analytics and Enterprise Mobility Platform which serves 40,000 customers. The top 50 global banks use Sybase and reach 4.5 billion mobile phone subscribers through 900 operators. It is ranked as a leader in 3 Gartner Magic Quadrants and 3 Forrester Wave Reports. Sybase was acquired by SAP in July 2010. The Unwired Enterprise Sybase leads SAP's mobility business with 110,000 customers Industry leading EIS solutions provider (Horan, 2011). Mobile from Business Objects, an SAP company, allows your organization to immediately access information from any mobile device. Management and information workers stay up-to-date and make decisions using the latest information. Sales and field service staff provide the right customer, product, and work-order information where and when it's needed – helping shorten sales cycles and increase customer satisfaction. Remote users can have their favorite business intelligence (BI) reports, metrics, and real-time data delivered directly onto their wireless device. The same BI content users work with every day on their desktops is automatically rendered and optimized for their compact mobile devices (Business Objects, 2008).

- SAS: it is the leader in business analytics software and services, and the largest independent vendor in the business intelligence market. New features available in SAS MBI will allow users to view, save, comment and share dashboards. The users can attach pictures, video or leave voice comments all while accessing data on or offline through data caching. Through innovative solutions delivered within an integrated framework, SAS helps customers at more than 50,000 sites improve performance and deliver value by making better decisions faster. Since 1976 SAS has been giving customers around the world THE POWER TO KNOW (Borg & White, 2010).

- Tableau Software, a privately held company in Seattle WA, builds software that delivers fast analytics and visualization to everyday businesspeople. Its mission is simple: help people see and understand data. Tableau's award-winning products integrate data exploration and visualization to make analytics fast, easy and fun. They include Tableau Desktop, Tableau Server and Tableau Public. Tableau understands the needs of businesspeople, non-technical and technical alike, when it comes to retrieving and analyzing large volumes of data. As a result, Tableau has already attracted over 65,000 licensed users in companies from one-person businesses to the world's largest organizations (Fields, 2011).

- Windows Mobile: provides a rich, flexible, cost-effective platform for deploying and managing a wide choice of mobile business intelligence solutions that help organizations improve business performance and employee productivity while reducing operating costs. By using industry-standard software and devices with support for Web standards, Windows Mobile powered solutions work well with Microsoft technologies and line-of-business applications developed by our partners. It has the differences:
    1. Familiarity. Make use of users' experience with the Windows® operating system, minimizing the need for training. In-house developers can apply their .NET expertise to creating and extending mobile field sales solutions.
    2. Flexibility. Windows Mobile provides one platform for end-to-end enterprise solutions, with a broad choice of peripherals, devices, and connectivity options.
    3. Built-in security functionality. Mirroring the security categories on business desktop PCs, Windows Mobile software extends the range of security and systems management options within the Windows Server System.
    4. Powerful applications. Choose from a broad array of mobile field sales programs to meet your specific needs, while taking advantage of built-in Web standards support.
    5. Cost-effective, financially compelling. Make use of investments in your existing Microsoft infrastructure, such as Windows Server, Exchange Server, and SQL Server. Use existing client and server software licenses (Microsoft Corporation, 2006).

- Yellowfin: is making Mobile BI easy Yellowfin's Mobile Business Intelligence (BI) applications for the iPhone, iPad and Android devices provide business professionals with the flexibility and security they require to access business critical information, wherever they are, and wherever they need it. Yellowfin's flexible, fast, secure (The Yellowfin applications for the iPhone, iPad and Android devices use exactly the same security infrastructure as your Yellowfin report server. Security of your business critical data is assured. Yellowfin's multi-tiered security model gives you the confidence necessary to implement widespread Mobile BI reporting and analytics) and easy-to-use

Mobile BI applications offer a cost-effective means to keep people of all business backgrounds and technical capabilities within an organization in touch and up-to-date. This ensures that actions and decisions are effectively aligned with organizational strategy. You can also download Yellowfin for iPhone, iPad or Android device for free right now from Apple's App Store or Android Market (Yellowfin, 2010).
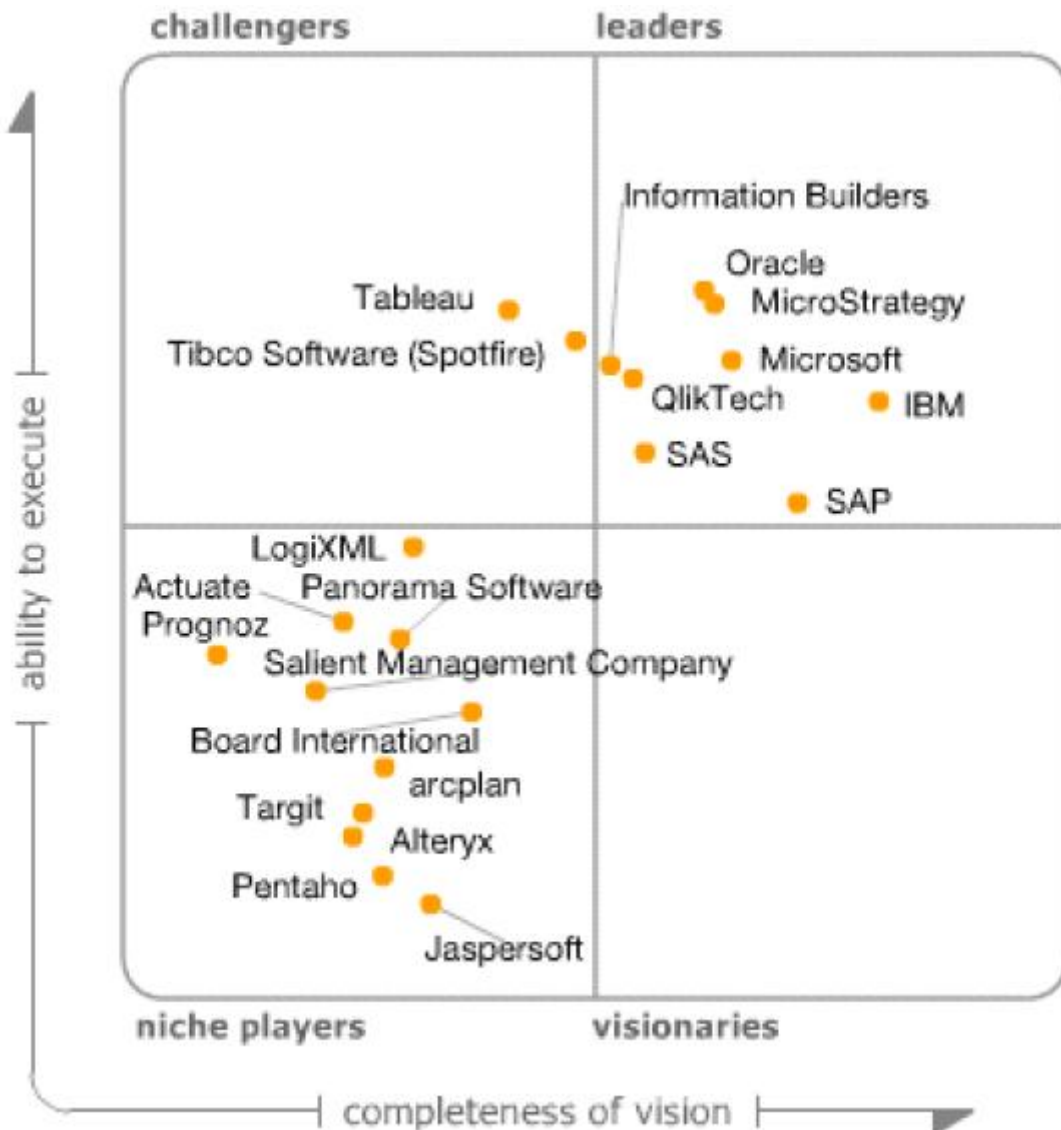
Figure 2.35: MBI Venders Classification [Source: (Hagerty, Sallam, & Richardson, 2012)]

Table 2.4: MBI/Analytics Vendors (Henschen, 2012 BI and Information Management Trends, 2012)

Vendor	Currently using	Planning to use	Evaluated, but not selected for use	Currently evaluating
Microsoft	46%	7%	8%	15%
SAP BusinessObjects	32%	6%	10%	6%
Oracle (including Hyperion and Siebel)	29%	5%	11%	10%
IBM Cognos (including TM1)	25%	6%	8%	15%
SAS	21%	2%	12%	7%
SAP BusinessObjects On-Demand (Crystalreports.com)	18%	6%	8%	7%
IBM SPSS	16%	4%	8%	6%
MicroStrategy	10%	5%	7%	6%
Tableau	8%	3%	8%	9%
Actuate	6%	3%	7%	3%
Information Builders	5%	1%	8%	8%
QlikTech	5%	2%	7%	7%
Tibco Spotfire	3%	2%	6%	4%
Adaptive Planning	3%	2%	5%	2%
Cloud9 Analytics	3%	2%	5%	5%
Host Analytics	2%	1%	5%	4%
Indicee	2%	0%	4%	2%
Arcplan	2%	3%	4%	0%
Deloitte/Oco	2%	3%	5%	3%
Birst	2%	2%	6%	4%
myDials	2%	2%	3%	2%
Pentaho	2%	2%	3%	4%
Jaspersoft	1%	1%	6%	4%
PivotLink	1%	1%	5%	1%
Panorama	0%	2%	5%	3%

2.1.9 Implementing MBI

Adoption of operational BI is taking off, according to a BeyeNETWORK report, "Operational Business Intelligence: The State of the Art." The 2009 survey of 168 BI users found that more than 80% (138) were evaluating, deploying or planning operational BI or had an initiative in production. Of those 138, about half were in the production stage, indicating a high level of adoption (Figure 2.36). At the heart of this trend are various techniques that make possible the expanding acceptance of operational BI (Davis, Imhoff, & White, 2009). (Hagerty, Sallam, & Richardson, 2012) Survey indicated that more than 20% of respondents are already using MBI. 33% plan to deploy MBI in 2012.By the end of 2012; a majority of organizations should have some MBI solutions.
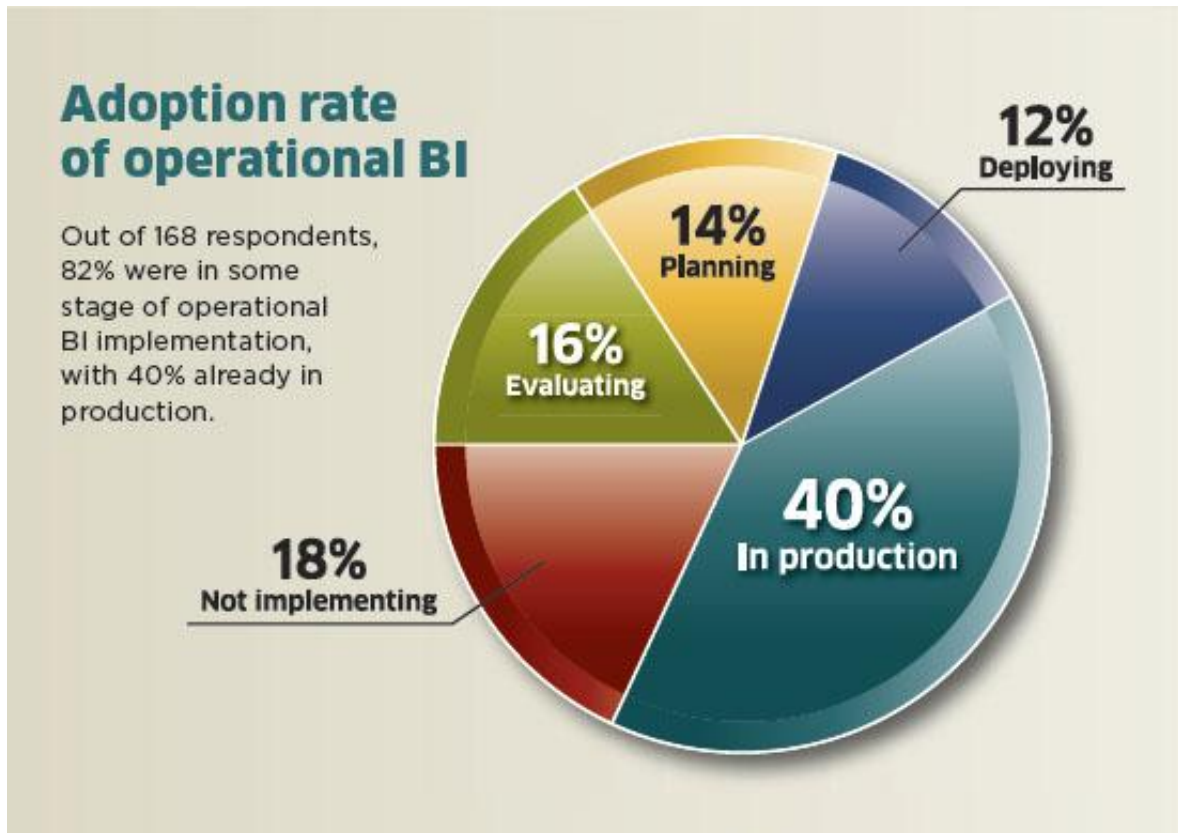
Figure 2.36: Adoption rate of operational BI [Source: (Davis, Imhoff, & White, 2009)]

BI is a natural fit for mobile devices. More organizations are considering MBI not just for executives, but for a variety of workers who need access to data when not at their seats. The technology and devices have evolved to make MBI cost-effective to deploy better smartphones, new tablets and faster networks have all changed the game for mobile programs (Eckerson, 2011). Implementing MBI can bring significant advantages for early movers utilizing the latest technology to gain an overall operational advantage which will lead to increase productivity, profits, better decision making and ultimately end up leaving the competition struggling to catch up (Scalable Systems, 2011).

Many organizations are surprised to discover that implementing MBI may be easier than expected. With Mobile Favorites, for example, you can rapidly create a pilot program simply by setting existing reports to be delivered as mobile reports. Reuse of existing report-design and development techniques – with no additional learning required – is the easiest way for developers to accommodate MBI initiatives. Early adopters of mobile technologies have become role models. The first mobile devices – most notably BlackBerrys – were given to decision-makers in important managerial roles and have become highly coveted, status-bolstering tools. (Kotorov, 2007). The iPhone has become the most well established platform with the iPad quickly gaining ground. Android also appears to be growing substantially, with Android tablets in wide and growing use (Figure

2.37). In contrast, data indicates decreased use and plans for both RIM Blackberry and Windows phones (Dresner, 2011).
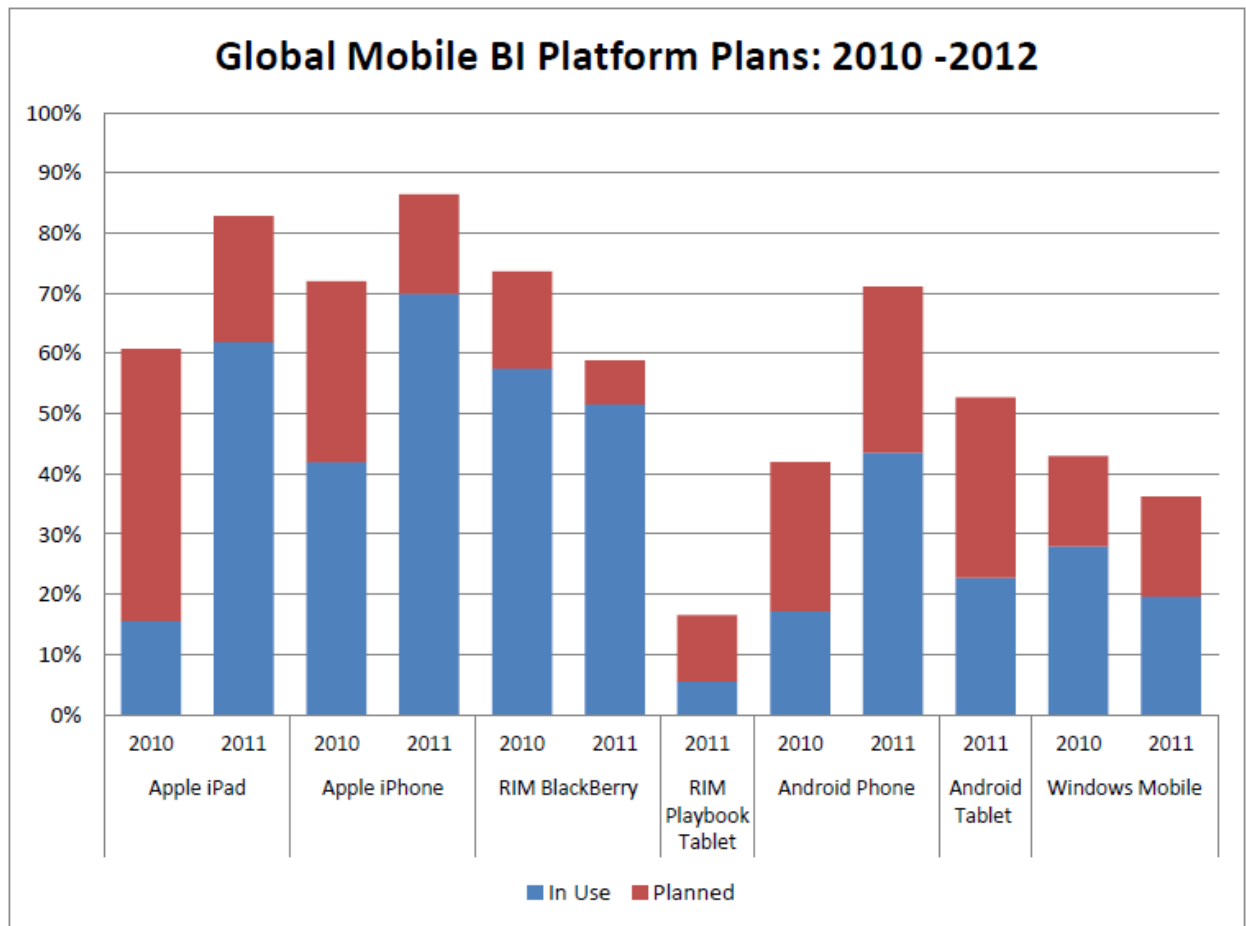
Figure 2.37: Mobile BI Platform Plans: 2010 through 2012 [Source: (Dresner, 2011)]

According to (Fields, 2011) MBI best practices include:
- Author once, distribute everywhere
- Write to a smaller form factor: to fit the display size of tablets
- Know your audience is on the go
- Account for new scenarios enabled by mobile technology
- Take advantage of the collaborative nature of mobile technology

Michael Saucier, President of Transpara considers that MBI should focus on operational data rather than future planning data. If strategic decisions are required, which employ complex data evaluation, managers will need the time, space and computer capabilities to allow for these analyses. He therefore considers that these types of scenarios will not be suitable for mobile phone reporting. He also points out that mobile phones should focus on "here and now" metrics. Developing this theme further, the ideal MBI solution should include a combination of multiple data sources to generate a real-time solution, therefore

implying that it should not just be a front end version of traditional BI applications (Saucier, 2010).

According to (Oracle, 2011) MBI needs the following principles:

- Unified Enterprise View of Information: enables organizations to define a single, consistent, and logical view of enterprise information across these heterogeneous systems such as data warehouses, multidimensional sources, and operational transaction systems. It provides the business with a unified, enterprise view of their information.
- Unified Semantic View of Information: allows an organization to model the complex information sources of their business as a simple, semantically unified, logical business model. It defines an enterprise semantic layer that spans across the unified enterprise view of information.
- End User Self Service: provides business users with the ability to access the information they need without for the need for assistance from professional analysts. Business users only need to understand a single, business-oriented view of their information.
- Real-time Information Access: allows users to combine historical and real-time information to get an up-to-the-minute view of their business and combine data from real-time systems with data in the Data Warehouse to give unparalleled insight into the business.
- Insight-driven Action: The proactive intelligence facilities and the Guided Analytics facilities of the Interactive Dashboards are designed to help business users navigate information quickly and to effectively troubleshoot problems and take action proactively in response to business events.
- Unified Platform: MBI is an integrated suite sharing a service-oriented architecture; integrated data access services; integrated analytic and calculation infrastructure; integrated metadata management services; a common semantic business model; an integrated security model and user preferences; and integrated administration tools which improve access to information and lower operational costs.

Many companies expand their existing BI platforms with the ability to display fixed-form business data, such as charts or tables, through a BI client installed on a mobile device. While this approach eliminates the need for additional infrastructure to support the MBI application, it is extremely limiting from an end-user perspective. For example, mobile users can only access pre-existing reports and data visualizations; they have little or no customization or analytic capabilities (McGrath, 2011). According to a study from BeyeNetwork, the state of the art of BI would need to meet the following requirements. Firstly, Operational BI must be able to seamlessly collect information from the operational systems without compromising their performance. Secondly, it must be flexible enough to support frequent changes in order to meet business changes. Thirdly, it must be able to support event driven analytics to tend towards real-time. Fourthly, Operational BI must be

able to provide sound environment to offer scalability, high performance, security and high availability. Lastly, Operational BI must be supported by processes and management practices in line with the new challenges: flexibility, dynamism and agility (Davis, Imhoff, & White, 2009).

Moreover the mobile access to business data tends to become a rule rather than an exception. The idea of convergence between BI and mobility is obvious within this context when more and more professionals start using smart phones and other mobile devices to keep up to date with business information (McGauchie, 2010). One of the best methods for MBI implementation is to use the drag-and-drop development environment offered within a full-featured BI platform to build a new mobile reporting application. The benefits of doing so include: accelerated development that requires no custom coding, simplified maintenance and modification, the ability to make advanced data visualization and analysis functionality available to mobile users and a single architecture to support both desktop and MBI across the enterprise (McGrath, 2011).

The technology recommendation on the assumption of successful MBI solutions according to (ComponentArt Corporation, 2012) need to be able to fulfill the following requirements:
1. Leverage the existing BI infrastructure. Organizations that have BI technology infrastructure in place (data warehouses, relational databases, administration tools, collaboration portals, security & authentication systems, reports, KPI definitions, etc.) will want to leverage their existing investment and build a mobile solution on top of it.
2. Connect to any data source. Having a standard and clean API for connecting to any existing or future data source is essential for the long term success of your MBI solution.
3. Reach any mobile device. Even those organizations that currently standardize on a particular mobile platform would be wise to build a device-agnostic MBI solution, capable of reaching any modern mobile device through an industry-standard interface even the mobile device market is notoriously fast-changing.
4. Deliver mobile dashboards securely. Enterprise data needs to be delivered through secure mechanisms at all times. Utilizing a unified security and authentication infrastructure is paramount when delivering mobile applications.
5. Deliver rich, interactive, touch-centric and screen form factor-friendly user interface (UI). Truly effective and engaging MBI dashboards are designed for mobile devices from their inception and built using mobile presentation technology.
6. Build once, deploy anywhere. In order to maximize development ROI and ensure ease of maintainability of your mobile solution, your development technology must be able to target multiple mobile platforms with a single codebase.

Planning MBI Roadmap need to make MBI part of Overall Information Strategy, develop mobile standards / Guidelines and Strategy, align MBI to organizational objectives,

leverage Hybrid (Native + Web-Browser) Applications to cater for differing requirements, consider the maturity of technology and your company's need / ability to manage risk and account for unique considerations required for its implementation specially Security (Gupta, 2011). According to (Vaultus Mobile Technologies, Inc., 2009) the Key Considerations in Selecting a Mobile Technology are:

- UI and User Experience: The right data needs to be in a usable format that can be easily manipulated, regardless of location or environment. Additionally, gaining full advantage from a MBI solution requires complex interactions with the data that let the user drill into, sort and refine the data. This often requires a mobile application rather than a browser-based approach since many mobile browsers do not yet effectively provide the rendering and processing capabilities needed to support interactions.

- Access to Multiple Back-End Databases: Mobilizing your BI resources requires that the chosen mobile solution be able to access the data in the BI system. The BI vendor point solutions provide excellent access to the data that is already in the BI system. Mobile middleware platforms often provide access to BI data as well as other corporate data that exists in a number of other backend databases. When choosing a BI mobilization solution, you should consider your long-term data access needs in addition to the short-term ones.

- Ability to Drive the Business Process: A successful MBI deployment results in processes and applications that enable business managers to make more informed decisions. When choosing a MBI solution, ensure that your solution presents the right information in a format that is useful for decision making. Decisions on which data to mobilize should be driven by the needs of the business user, rather than which data is easiest to mobilize.

- Ability to Enable Real-Time Collaboration: The goal of the MBI effort is to close the gaps between your mobile workforce and their connections to people, applications and data. In MBI the remote data analysis and decision making is taking place in the context of a phone call or conference call with other people. Therefore, your mobile solution should plan for BI and other application usage that can occur simultaneously with a voice conversation, or even a video sharing session on a mobile handset. Speakerphones and headsets can make this sort of activity feel as normal as speaking on the phone while on a desktop computer.

- Support for Multiple Mobile Device Types: The chosen carrier network and BI solution should be capable of supporting a variety of devices and mobile platforms such as BlackBerry, Windows Mobile, and iPhone. Even if your business can standardize on a particular device type (e.g., BlackBerry), there are a still a number of variations in that device class with a variety of screen sizes and interface types (keyboard vs. touch screen).

There are several recommendations for MBI members. These recommendations include (Dawson & E-Mail, 2007):

- Investing to become "a knowledge bank" of business mobility services and solutions: more papers, articles, analyst reports and industry recommendations will appear in coming months;
- Being prepared to provide a seal of approval for mobile applications: the solution provider landscape is crowded and confusing for enterprise buyers – a laundry list of possible partners is even less helpful than providing no direction at all;
- Identifying partners to facilitate a go-to-market strategy: reach out to other value-chain participants to gain greater customer visibility and improve product positioning; and
- Evaluating integrated channel partnerships similar to those formed between the wireless e-mail providers and carriers.

According to (McQuiggan, Coyle, Thorne, & Sabourin, 2012) the following principles are considered for constructing reports:

- Highlight the primary task: (Figure 2.38) overlays Few's regions of visual emphasis on an iPad. In the application itself visual emphasis is used to support main workflow.
- Suitable chart size for touch: One particular point that is reiterated is the standard of reserving a minimum of 44 x 44 points to handle touch events from a user (Figure 2.39). Note that 1 point is equivalent to 1 pixel on the iPad 1 and iPad 2. On the new iPad, 1 point is equivalent to 4 pixels (2 x 2). Thus, buttons should be at least 44 x 44 points to make it easy for users to interact with the button (Apple, Inc., 2011).
- Navigation: Navigation is a key design principle for application developers, making it easy for users to find content and pertinent information quickly is critical to user experience. In the application, this principle is evident in the navigation from My Portfolio where a single tap selects a report, and a tap on a bar reveals a tooltip with specific data (Figure 2.40). The guideline here is to make navigation easy and predictable by drilling down in the level of detail revealed to the user (Apple, Inc., 2011).
- User control: Instead of creating multiple reports to serve a number of user populations, you can simplify report creation and empower users by using filters and prompts (Figure 2.41).
- Terminology: reports should be designed to include titles, labels, and descriptions (Figure 2.42).
- Color coordination: Experts have written extensively about the use of color in graphs for the goal of conveying information (Tufte, 2001). For example, color can be used to distinguish between categories in a grouped-by chart or as one of four variable assignments in a bubble plot (x, y, size, and color) (Figure 2.43).
- Simplicity: Designing reports that are simple makes report consumption an easier task for users, enabling them to quickly find the pertinent information to make decisions. Charts and graphs should use reference lines, fit lines, unique markers (Figure 2.44)

only when they are truly necessary and because these items carry important information that the user requires to understand the content.
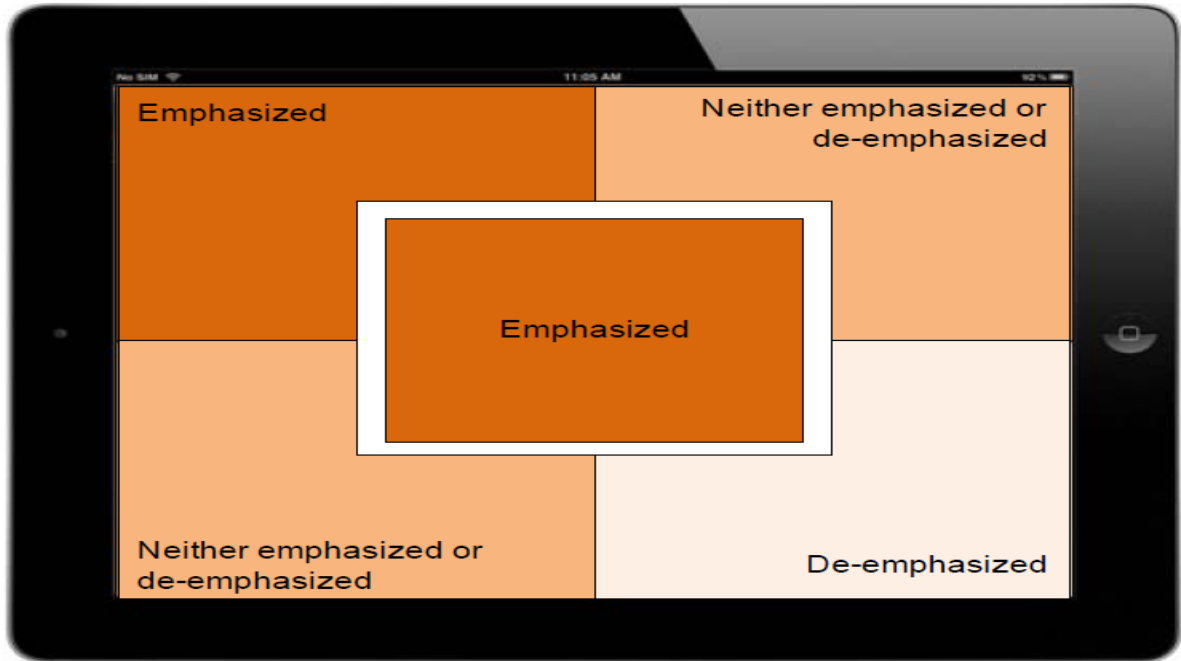
Figure 2.38: Few's Regions of Visual Emphasis on an iPad[Source: (Few, 2006)]

Figure 2.39: Supporting Touch [Source: (SAS Institute, Inc.)]

Figure 2.40: Single Tap Navigation: Select a Report and Display Tooltips [Source: (SAS Institute, Inc.)]
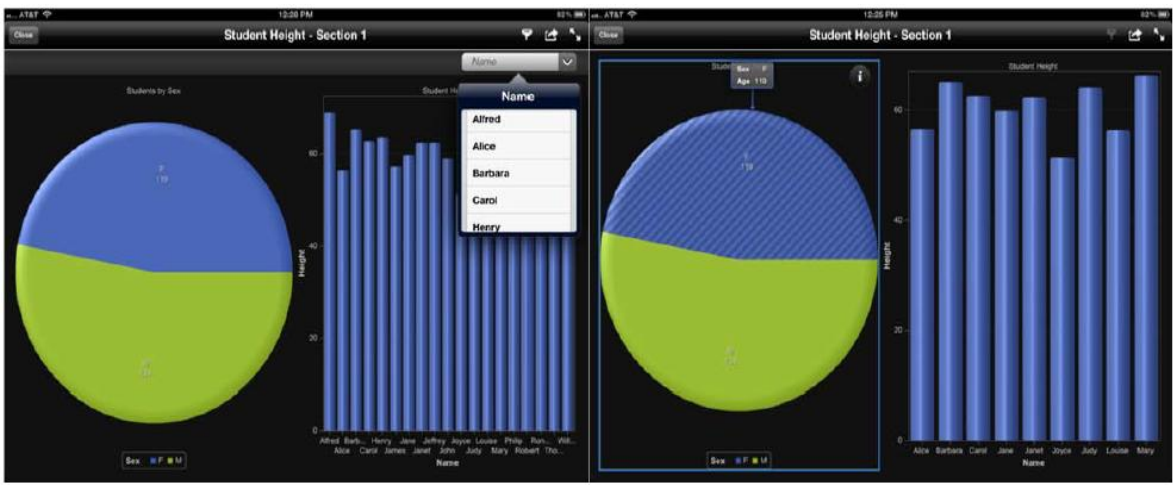
Figure 2.41: Prompt to (Globally) & Filtering Data (SAS Institute, Inc.)

Figure 2.42: Titles, Labels, and Descriptions [Source: (SAS Institute, Inc.)]
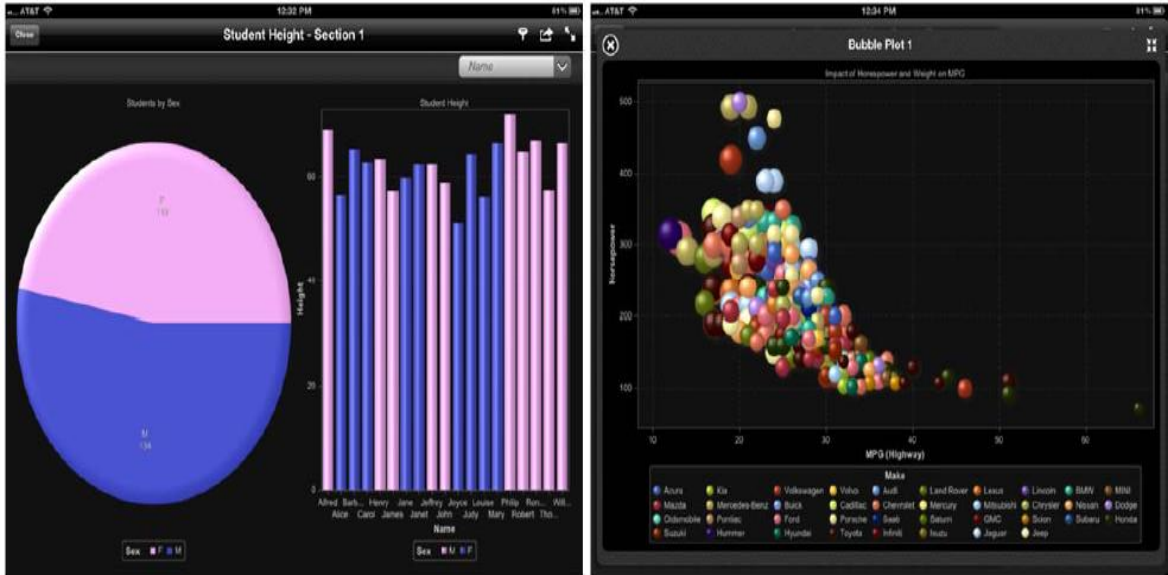
Figure 2.43: Color for a Sub Group Category & as a Variable in a Bubble Plot [Source: (SAS Institute, Inc.)]
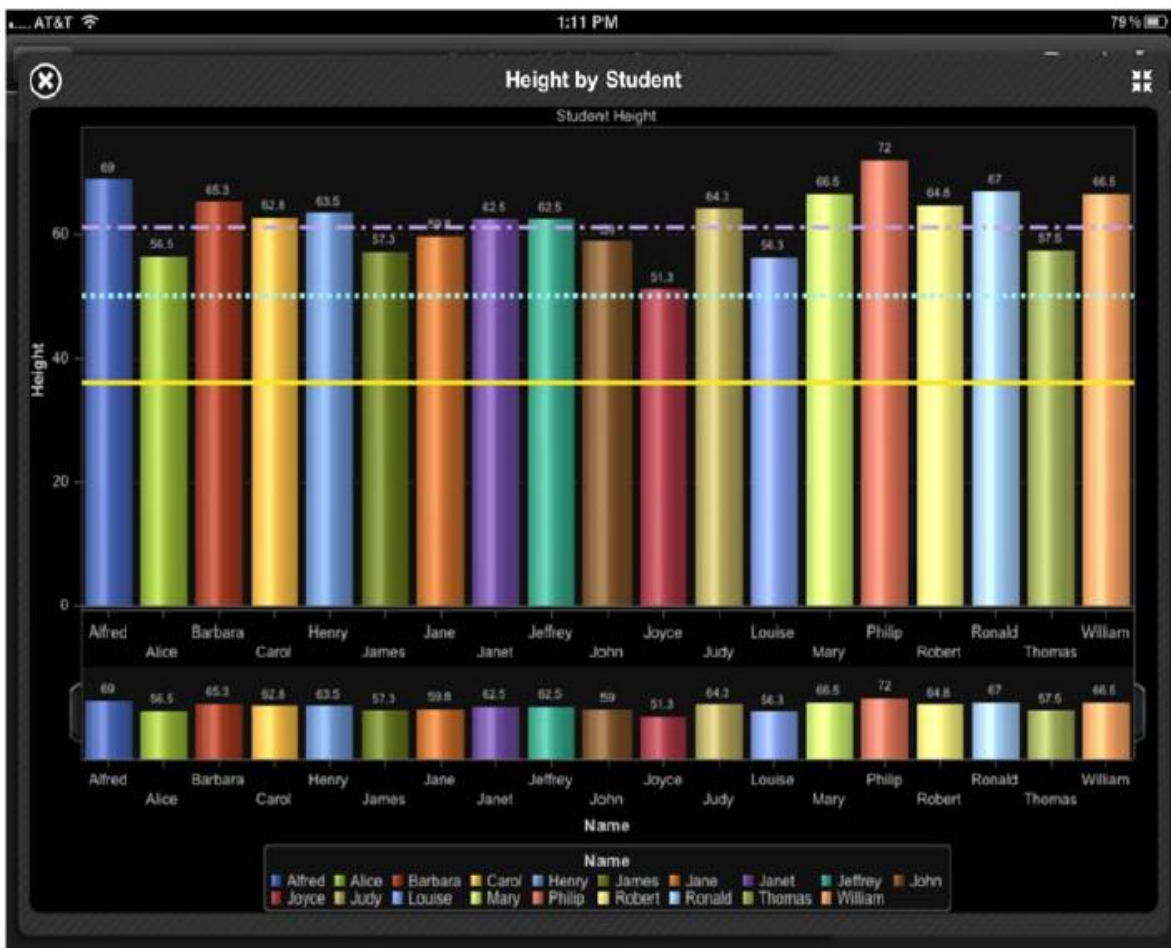
Figure 2.44: Overuse of Reference Lines, Labels, and Color [Source: (SAS Institute, Inc.)]

To deliver a successful MBI project, employers should (Yellowfin, 2010):

- Adopt an open 'anywhere, anytime' attitude towards business data to empower employees to make decisions and take full-advantage of the benefits associated with pervasive BI. As companies continue to focus on delivering information to the mobile workforce, they will need to ensure information is delivered promptly to affect action in the field.
- Equip as many people as possible from across the organization with the skills, knowledge and permission to access business data – widespread user-adoption is the key factor to successful BI projects.
- Understanding the reporting needs of each of the three main beneficiaries of MBI – the executive, sales and service teams – is critical. Their needs will differ, and appropriate KPI reports should be developed that are specific and meaningful to each user-group to ensure quick end-user uptake and assure high ROI.
- Link MBI to clearly defined business goals and objectives. Openly articulate these objectives throughout the organization to deliver MBI in a way that supports those demands.

According to (Evans, 2002) the action steps for MBI are: Step #1: Make MBI part of your business strategy, Step #2: Make the IT department a strategic partner, Step #3: Pursue a holistic MBI strategy, Step #4: Exploit and defend your position in the new MBI value chain, Step #5: Design business processes to take advantage of MBI, Step #6: Design technical architectures to take advantage of MBI, Step #7: Design for rapid change in process and technology, Step #8: Focus on user acceptance and training and Step #9: Measure the results of MBI initiatives.

According to (MicroStrategy, 2010) the MBI implementing strategies are:
1. Mobilize Your Existing Reports: Run Existing Grid and Graph Reports Directly.
2. Mobilize Your Dashboards: either built in dashboards applications or web dashboards.
3. Build New BI Applications: which include transactions such as replenish inventory based on predictive analytics, place an order based on latest pricing upgrade customer based on lifetime value and set new prices based on supply & demand.
4. Innovative New Applications: New Business Processes, New Business Models and New Revenue Streams which divided to:
   - Innovative Customer Strategies: Direct mobile payment solutions, "Talking" products, Customer loyalty application, Mobile coupon / tickets, Location-specific offers, Customer forums and Customer support interaction.
   - Innovative Process Strategies: Remote intelligence gathering, Integrated re-supply processes, Sales training simulators, Upsell / cross-sell advisor, Remote testing and Work process monitoring.

Decision makers at all levels in an organization need data at their fingertips (Figure 2.45), wherever they are. Tablets and other large form factor mobile devices promise to make business data ubiquitous (QlikView, 2011). According to (Yellowfin, 2010) three types of users will benefit from the implementation of a MBI solution (Table 2.5):

1. Senior management: Time-poor executives will appreciate the ability to access Key Performance Indicators at a glance whilst on-the-go.
2. Key sales people: Having access to real-time sales data, provides the information needed to increase sales via up-selling/cross-selling, and act upon opportunities as they unfold.
3. Field service personnel: Pro-active alerts and access to both real-time and historical data, detailing current customer needs and past behaviors, will lead to increased efficiency and productivity 'in the field'.

Table 2.5: MBI Users Analysis [Source: (Crupi, 2011)]

Type of User	Mobility	Mobile BI Tasks	Data	Need
Line Manager	Supervise domain by walking and talking	Dashboards: Monitor store and employee performance Operational Reports: Check inventory, shipments, complaints, staffing Actions: Scan inventory, order products, schedule meetings, award merits/demerits, etc.	Historical, Summary, Detail, Real-time	High
Outside Salespeople	Travel to and from clients	Dimensional Report: 360- degree view of customers sales/interactions Actions: Update customer records, submit orders	Historical, Summary, Detail, Real-time	High
Field Technicians	Travel to and from customer/ work sites	Dashboards: Review personal performance and bonus points Reports: Check customer and work site inventory and records Actions: Update customer/work site records, submit orders	Historical, Summary, Detail, Real-time	Moderate
Internal Technicians	Travel across corporate campus: Nights and weekends	Dashboards: View KPI status and real-time trends Alerts: View errors and exception Actions: Log in, troubleshoot	Historical, Summary, Detail, Real-time	Moderate
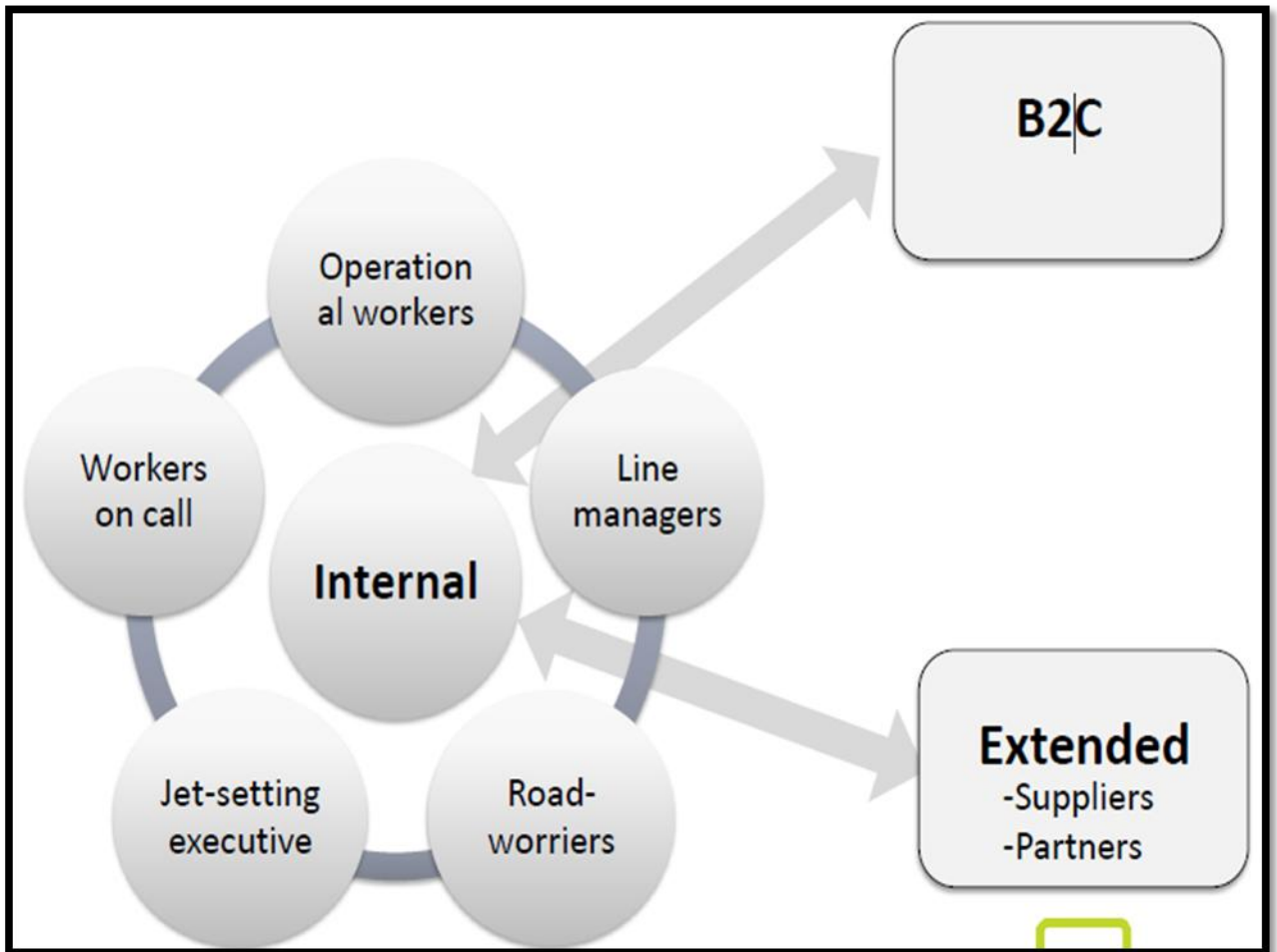
Figure 2.45: MBI Users [Source: (McCollem & Zanarotti, 2011)]

According to (Kotorov, 2007) the four main MBI adoption segments are:

- Nay-sayers, who will deny the benefits of mobile BI and resist its implementation – the screen will be too small, the keyboard ergonomically inconvenient, and the whole application too slow; their use of the mobile device is limited to e-mail and voice communication.

- Minimalists, who will use information delivered to mobile devices either as an attachment or as a Web page but are not likely to navigate complex reports or interact with the data; Minimalists want static reports that fit within their device's screen and require minimal navigation.

- Personalizers, who want control over content and will choose which reports are delivered and in what formats; to capture their interest, provide easy-to-use management capabilities.

- Enthusiasts, who are likely to be both technically and analytically savvy will engage with BI content as well as consume and manage it. Enthusiasts want the full power of BI on their mobile device.

According to (Dresner, 2011) the greatest adoption by role focus heaped upon the most senior of executives, followed by middle managers which indicated that primary focus upon executives increasing from 68% to 82% and middle managers from 42% to 55% (Figure 2.46).

Roles Targeted for Mobile BI: 2010 vs. 2011
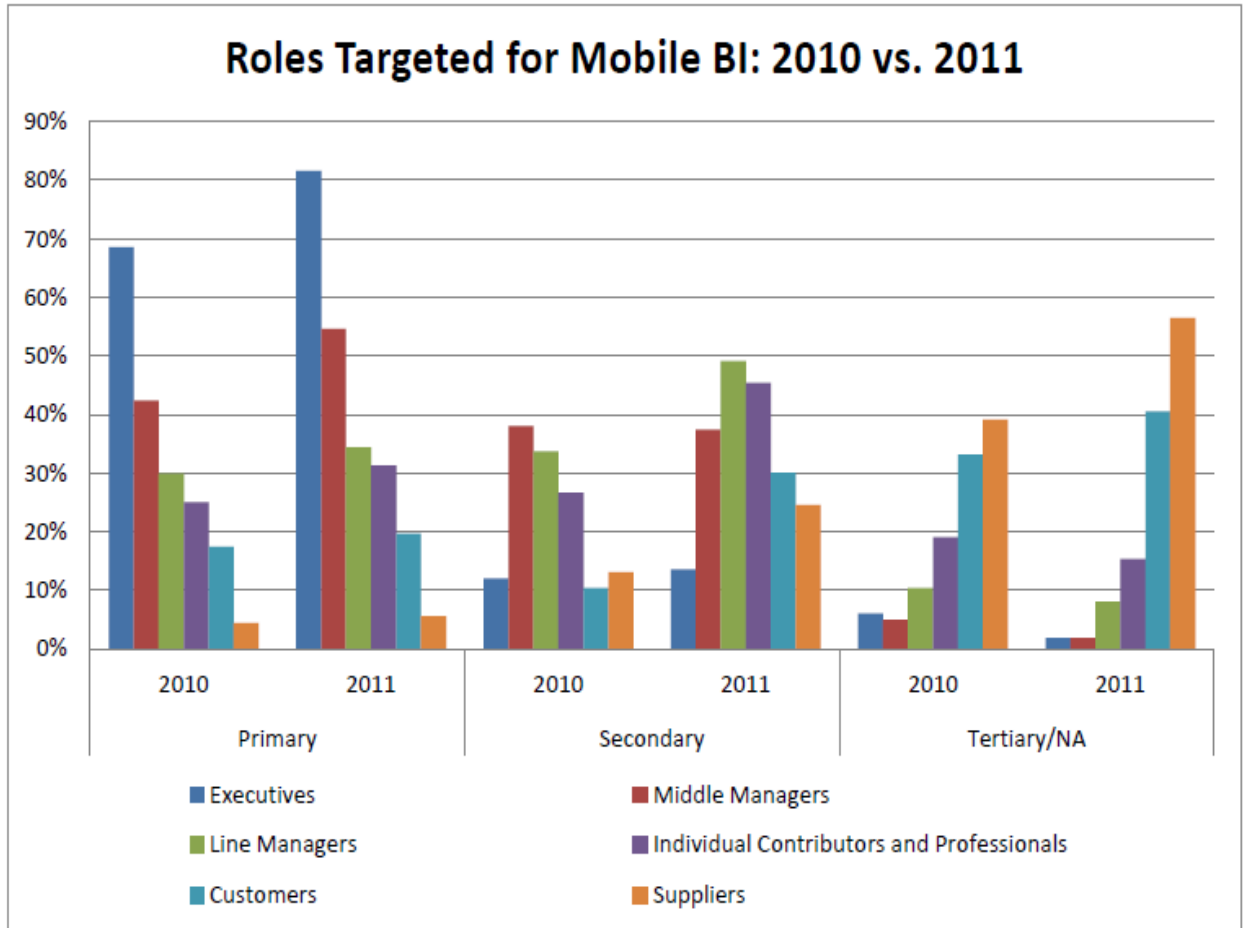
Figure 2.46: Roles Targeted for MBI: 2010 vs. 2011 [Source: (Dresner, 2011)]

2.2 Decision Making

2.2.1 Introduction

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). Decisions are a big part of everything managers do. Planning, organizing, leading and controlling are the basic management functions. Each of these calls for decisions, which plan to implement, what goals to choose, which people to hire (Dessler, 2002). 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 (Effy, 2009).

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 and Blenko, 2006).

2.2.2 Decision Making and Problem Solving Conditions

Decision making is the process of developing and analyzing alternatives and making a choice. Decisions don't always involve problems. On the other hand, problem solving always involves making decisions (Dessler, 2002). The terms decision making and problem solving are used interchangeably. However, problem solving involves of overcoming a certain obstacle in the path toward the goal.

Problem-solving decisions in organizations are typically made under three different conditions or environments: certainty, risk, and uncertainty. Certain environments exist when have all the information you need, and can predict precisely the consequences of your action. Certainty is an ideal condition for managerial decision-making but perfect certainty is rare (Hareem, 2004). Risk situation occurs when a decision maker is aware of the relative probabilities of occurrence associated with each alternative (Rue and Byars, 2009). Uncertain environments exist when you has insufficient information to know how the

consequences of different actions. Uncertainty is a key difficulty in decision-making (Simon, 2000). In case the decision maker has little information about a certain condition, or no reliable information to evaluate the outcomes, this means that the he is operating in a situation of uncertainty (Rue and Byars, 2009). It forces him to rely heavily on individual and group creativity to succeed in problem solving. It requires unique, novel, and often totally innovative alternatives to existing patterns of behavior. Responses to uncertainty are often heavily influenced by intuition, educated guesses, and hunches. Furthermore, an uncertain decision environment may also be characterized as a rapidly changing organizational setting in terms of (a) external conditions, (b) the information technology requirements called for to analyze and make decisions, and (c) the personnel influencing problem and choice definitions (Schermerhorn et al, 2002).

2.2.3 Types of Decisions

2.2.3.1 Structured Decisions

When an optimal solution can be reached following certain steps, the problem is called a structured one since the steps are known, and they must be followed the same way, which yields getting the same solution for the same problem all the time (Effy, 2009). Operational management and team leader end to execute and handle the structured decisions (Laudon and Laudon, 2006).

2.2.3.2 Unstructured decisions

A problem can be classified as an unstructured problem when reaching an optimal solution does not follow a certain set of steps or there is no algorithm to follow (Effy, 2009). The senior management of the company is responsible for making the decisions for the unstructured problems, because the problem requires many sources of information, and the evaluation procedure is not easy. In addition, this kind of decision depends on the personal experience of the decision maker (Laudon and Laudon, 2006).

2.2.3.3 Semi-structured decisions

A semi-structured problem is one that is neither fully structured nor totally unstructured (Effy, 2009). Middle management in the firms is responsible for making the

semistructured decisions. However, they face more structured decisions, but their decisions include unstructured components (Laudon and Laudon, 2006).

2.2.4 Classification of Decisions

2.2.4.1 Programmed Decisions

Routine problems arise on a regular basis and can be addressed through standard responses, called programmed decisions. These decisions have been encountered and made before. They have objectively correct answers and can be solved by using simple rules, policies, or numerical computation (Bateman and Snell, 2004). Each decision that can be reached by an established or systematic procedure is a programmed decision(Rue and Byars, 2009). Programmed decisions are repetitive and routine and can be solved through mechanical procedures such as applying rules, and through mathematical procedures. When classifying the decision, it was found that 90% of managerial decisions are programmed decisions (Dessler, 2002).

2.2.4.2 Non-programmed Decisions

Non-programmed decisions are the kind of decisions that the managers are paid to address, and they rely heavily on judgment and on the strategic development and survival of the firm (Dessler, 2002). These non-programmed decisions are new, novel, complex, and having no certain outcomes. There are varieties of possible solutions. The decision maker must create or impose methods for making the decision; there is no predetermined structure on which to rely (Alamry and Alghalby, 2007).

2.2.5 Decision Making Process

In decision making process, there is a classic five-step approach that decision maker should find extremely helpful. That does not mean he would follow it blindly in all situations. It is a fairly natural sequence. Of thought, however, and so even without the formal framework he would tend to follow this mental path. The advantage of making it conscious is that it is easier to be swiftly aware when a step is missing or more probably has been performed without understanding or intention (Adair, 2007). This decision making model in five steps shows a logical structured methodology for making a decision. The

discipline that it provides will guide you to the goal of good decision making. The five steps are (Project Management Institute, 2012):

1. State the Problem: If the problem is stated incorrectly or unclearly then your decisions will be wrong.
2. Identify Alternatives: to ensure you have as many good alternatives as possible.
3. Evaluate The Alternatives: This is where the analysis begins. You must have some logical approach to rank the alternatives.
4. Make A Decision: Review all the details of the remaining high ranked close alternatives, so they are completely clear in your mind. Then the decision will likely be very clear in your head.
5. Implement Your Decision: A decision has no value unless you implement it.

2.2.6 Factors Affecting the Decision Making Process

Full execution of the five-stage decision-making process is the exception rather than the rule in managerial decision-making. But research shows that when managers use such rational process, better decisions result. Mangers that make sure they engage in these processes are more effective (Bateman and Snell, 2004).There are many factors that affect the decision making process. They are divided into three categories (Toma, 2010):

1. Factors related to the problem.
2. Environmental Factors.
3. Manager personal traits.

2.2.7 Technology-Mediated Decision Making

As in nearly every other aspect of business life, computers have entered the area of decision-making, where they are useful not only in collecting information more quickly but also offering several advantages, including the benefits of anonymity, greater number of ideas generated, efficiency of recording and storing for later use, ability to handle large groups with geographically dispersed members, and in reducing roadblocks to group consensus (Schermerhorn et al, 2002).

BI which is the activity of intelligently gathering, integrating, storing, processing and analyzing business data in order to find out pertinent and meaningful information to

improve business decision making (Diallo, Badard, Hubert, & Daniel, 2010). In other words BI is the process of transforming raw data into meaningful information to enable more effective business insight and decision-making (MicroStrategy, 2011). MBI has ignited to take advantage of the real estate and storage capacity these devices offer to provide critical information in the form of reports and dashboards at the fingertips of decision makers (McQuiggan, Coyle, Thorne, & Sabourin, 2012).

2.3 Palestine Cellular Communication Company (Jawwal)

Jawwal, the first provider for mobile services in Palestine, was able to continue its leadership position challenging several operational obstacles by providing a number of exceptional value added services achieving a coverage of 98% of the Palestinian territories, While maintaining a well governed and transparent system of management and customer interface (Paltel Group, 2012).

2.3.1: About PalTel

PalTel is an integrated telecom operator offering fixed, mobile, Internet and data services throughout The Palestinian Territories. PalTel is publicly listed on the Palestinian Stock Exchange (PSE) and the Abu Dhabi Securities Exchange (ADX).

PalTel owns majority equity ownership in fixed line operator, Jawwal (Mobile Operator), Reach (Call Centre services), Palmedia (Information and Media Services Provider), Hulul (Business Solutions Provider), Ayla (Consulting Services Provider), and Hadara (Internet Services Provider).

PalTel also owns equity in Vtel Holdings a Dubai-based multinational telecommunications company with interests in Middle East, Asia and Europe. As at 31st March 2011, PalTel had 2.5 million mobile customers, 390,000 fixed line customers and 160,000 ADSL customers. PalTel held an exclusivity position today in the Palestinian Territories; however a second license has been awarded to Wataniya Telecom and competition is therefore anticipated in the last few months (Paltel Group, 2012)

2.3.2: About Jawwal

Jawwal is a member of PalTel Group. It is the first cellular telecommunications service provider in Palestine. It started its operation in summer of 1999, after PalTel officially received the license to operate in the Palestinian Territory in 1996. In December 2000, Jawwal developed into an independent, private corporation.

Jawwal is the first Palestinian Provider for communication services; it helps all people to communicate through the latest technology regardless of the hard political, economical and social obstacles facing it. With its committed team, it had been able to overcome all the various challenges (Paltel Group, 2012).

Jawwal invested over $140 million to establish a cellular network that covers all of West Bank and Gaza Strip. Jawwal is currently offering new advanced services to its more than 2,445,0000 subscribers , despite the difficulty that Jawwal has faced in clearing from customs required network expansion equipment currently held by Israeli authorities. This is in addition to the illegal operation of Israeli cellular companies in the Palestinian territories, which caused temporary setbacks for Jawwal. Despite this formidable resistance Jawwal continued to provide customers with the best possible service and technology available.

Jawwal now is preparing to increase the number of transmission stations in order to service more than 2,500,000 customers. The core network will also be enhanced for the expansion and will add new data platforms (CDMA, 3G &4G) ((Jawwal, 2012).

2.3.3 Jawwal Vision & Mission

2.3.3.1 Exhibit Jawwal Vision Statement

Jawwal aspires to attaining leadership in the Palestinian companies, cellular market and the region(Jawwal employees Internally Page, 2012).

2.3.3.2 Exhibit Jawwal Mission Statement

Jawwal mission is to strongly establish Jawwal as a leading global mobile operator that provides professional, world-class mobile and data services to all our customers, wherever they are, worldwide. And we aim to achieve this by exceeding our customers'

expectations, rewarding our employees, and providing returns beyond reasonable expectations for our Shareholders (Jawwal, 2012).

2.3.4 Jawwal BI System

Jawwal 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.

Jawwal has three BI systems to cover all Jawwal departments and services as follow:
1. CRM for customer and sales services.
2. Oracle BI for financial and administrative departments.
3. Business Object BI for engineering department.

2.3.5 Jawwal Encourages MBI

Paltel Group and the Palestine Information and Communications Technology Incubator (PICTI) launched the "Mobile Applications Developers and Innovators Project" (MADI) as a pilot that enables developers to collaborate with stakeholders to develop, test and deploy innovative new mobile application and services into the marketplace. The MADI Program intends on developing a cluster of community technical developers that PICTI and The Paltel Group are keen on developing through a series of guided instruction, hands-on coding exercises, and discussions, where knowledge transfer on how to create full-featured mobile applications from scratch, and the fundamentals of creating applications that look and function professionally. The program will work to train, identify talent to develop, test and deploy mobile applications and services (PICTI , 2012).

Jawwal distributed smartphones (Samsung Galaxy S2) as a gift for all employees and Paltel will distribute smart planets (ipad) also for all employees. This step indicates that they encourage MBI system.

CHAPTER THREE
METHODOLOGY

This chapter consists of the following sections:

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

To accomplish the research objectives specified in chapter 1, this study was conducted in five phases.

The first phase of the research thesis proposal included identifying and defining the problems and establishment objective of the research and development research plan.

The second phase of the research included the relevant literature on MBI and decision-making were reviewed. Based on the literature review results, related hypotheses were produced.

The third phase of the research focused on the modification of questionnaire design, through distributing the questionnaire to pilot study, The purpose of the pilot study was to test and prove that the questionnaire questions are clear to be answered in a way that help to achieve the target of the research. The questionnaire was modified based on the results of the pilot study.

The fourth phase of the research focused on distributing questionnaire and data analysis and discussion. This questionnaire was used to collect the required data in order to achieve the research objective. SPSS was used to perform the required analysis

The fifth phase of the research includes the conclusions, recommendations and future works.

350 questionnaires were distributed to the research population and **307 questionnaires** are received. Figure (3.1) shows the methodology flowchart, which leads to achieve the research objective.

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┌──────────────────────────────────────────────────────────────────────┐
│                                                                        │
│                  ┌──────────────┐              ┌──────────────┐        │
│                  │Topic Selection│             │ Identify the │        │
│                  └──────┬───────┘              │   Problem    │        │
│                         │                      └──────┬───────┘        │
│   ┌──────────────┐      ▼                      ┌──────▼───────┐        │
│   │   Develop    │ ┌──────────────┐            │Define the Problem│    │
│   │Research Plan │ │Thesis Proposal│           └──────┬───────┘        │
│   └──────────────┘ └──────┬───────┘            ┌──────▼───────┐        │
│                    ┌──────▼───────┐            │Establish Objective│   │
│                    │Literature Review│         └──────────────┘        │
│                    └──────┬───────┘                                    │
│                    ┌──────▼───────┐                                    │
│                    │Field Surveying│                                   │
│                    └──────┬───────┘                                    │
│   ┌─────────────────┐┌────▼─────────┐                                  │
│   │   ┌──────────┐  ││Questionnaires│                                  │
│   │   │  Pilot   │  ││   Design     │                                  │
│   │   │Questionnaires│└──────┬───────┘                                 │
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│   │   ┌──────────┐  │ │Questionnaires│                                 │
│   │   │Questionnaires│└──────┬───────┘                                 │
│   │   │ Validity │  │ ┌──────▼───────┐                                 │
│   │   └──────────┘  │ │Results and   │                                 │
│   │   ┌──────────┐  │ │Data Analysis │                                 │
│   │   │Questionnaires│└──────┬───────┘                                 │
│   │   │Reliability│  │┌──────▼───────┐                                 │
│   │   └──────────┘  ││ Conclusion & │                                  │
│   └─────────────────┘│Recommendation│                                 │
│                      └──────────────┘                                  │
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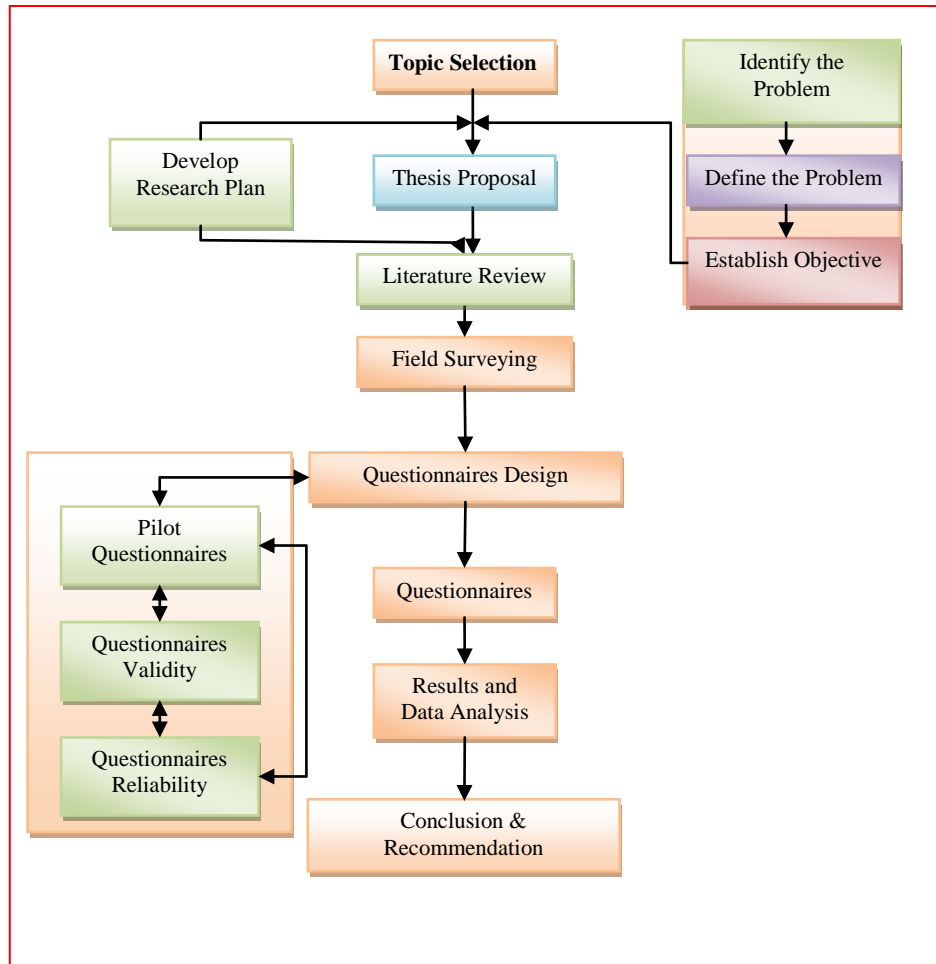
Figure (3.1): Illustrates the methodology flow chart.

3.3 Research methodology

3.3.1 Data Collection

As the study follows the analytical descriptive methodology, different tools to collect primary and secondary data were utilized as follows:

3.3.1.1 Secondary data

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

- Books and references in both English and Arabic about mbi and decision-making.
- Periodicals, published papers and articles.
- Reports and statistics
- Web sites.

3.3.1.2 Primary data

To collect the primary data of the research, a questionnaire was developed and distributed to the sample of the study. This questionnaire consists of two parts:

Part one: Include the personal and professional information about the subjects.

Part two: Include the three dimensions of the study, which are:

1. The effect of the features of MBI platforms on decision-making process at Jawwal.
2. The effect of MBI functions on decision-making process at Jawwal.
3. The effect of MBI applications on decision-making process at Jawwal.
4. The effect of Jawwal maturity level of implementing MBI on decision-making process at Jawwal.
5. The effect of the level of business need for creating a MBI implementation on decision-making process at Jawwal.

3.3.2 Population

The research sample was one sample includes employees of Jawwal. There are almost 862 employees at Jawwal including 243 employees in Gaza and 619 employees in West Bank.

Kasiulevicius et. al., (2006) indicate that Yamane (1967) provides a simplified formula to calculate sample sizes according to the following law: $N = \dfrac{NP}{1 + (NP \times e^2)}$

Where:

N: Sample size

NP: Is the size of population

E: Is the level of precision errors= 0.05

After applying the previous law, it is clear that the sample size will be 274 employees. The questionnaire distributed equal 350, and 307 questionnaires fit for study was obtained. So the recovery rate of questionnaires is equal to 87.77% as shown in Table(3.1).

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Table (3.1): Sample Distribution

	Population	Sample	Distributed	Obtained	Valid	Recovery Ratio
West Bank	619	196	230	187	187	81.3%
Gaza	243	78	120	120	120	100%
Sum	862	274	350	307	307	87.8%

3.4 Pilot Study

A pilot study for the questionnaire was conducted before distributing the questionnaire to all of the study population. A total of 35 questionnaires were distributed to Jawwal different departments to make sure that the questionnaire will give good results to the research; in addition, these questionnaires were used in the analysis, because the number of the employees is small.

3.5 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	*Strongly agree*	*Agree*	*Do not Know*	*Disagree*	*Strongly Disagree*
Scale	5	4	3	2	1

3.6 Test of Normality

Table (3.2) shows the results for Kolmogorov-Smirnov test of normality. From Table (3.2), the p-value for each field is greater than 0.05 level of significance, then the distribution for each field is normally distributed. Consequently, Parametric tests will be used to perform the statistical data analysis.

Table 3.2: Kolmogorov-Smirnov test

Field	Kolmogorov-Smirnov	
	Statistic	**P-value**
The effect of the features of MBI platforms on decision-making process at Jawwal	0.952	0.296
The effect of MBI functions on decision-making process at Jawwal	0.962	0.270
The effect of MBI applications on decision-making process at Jawwal	0.969	0.431
The effect of Jawwal maturity level of implementing MBI on decision-making process at Jawwal	0.962	0.281
The effect of the level of business need for creating a MBI implementation on decision-making process at Jawwal	0.973	0.539
All paragraphs of the questionnaire	0.981	0.811

3.7 Statistical Analysis Tools

Data analysis both qualitative and quantitative data analysis methods would be used. The Data analysis will be made utilizing (SPSS 20). The researcher would 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 and Analysis of Variance (ANOVA)).

T-test is used to determine if the mean of a paragraph 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, $\alpha = 0.05$ then the mean of a paragraph 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 $\alpha = 0.05$, then the mean a paragraph is insignificantly different from a hypothesized value 3.

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 Role of Implementing Mobile Business Intelligence (MBI) in Decision making Process due to (Age, Educational Attainment, Field of Specialization, Total years of Experience and Years of Experience in Jawwal).

3.8 Validity of Questionnaire

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. Statistical validity is used to evaluate instrument validity, which include internal validity and structure validity.

3.8.1 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 paragraph in one field and the whole field.

Table (3.3) clarifies the correlation coefficient for each paragraph of the "The effect of the features of MBI platforms on decision-making process at Jawwal " 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 $\alpha = 0.05$, so it can be said that the paragraphs of this field are consistent and valid to be measure what it was set for.

Table 3.3: Correlation coefficient of each paragraph of " The effect of the features of MBI platforms on decision-making process at Jawwal " and the total of this field

No.	Paragraph	Pearson Correlation Coefficient	P-Value (Sig.)
1.	Smartphones have broadened the bounds of communications, enabling graphical Web access that goes far beyond the email capabilities of earlier generations of cellular phones.	.440	0.005*
2.	Smartphones and Jawwal credentials can prevent accessing its information of lost/stolen/compromised devices.	.691	0.000*
3.	The MBI platforms (mobile devices and planets as iPhone, iPad , android devices as Galaxy etc) have multi-touch screens (Tap to drill and explore, Pinch to zoom, Swipe↑↓ to scroll, Swipe←→ to turn page, Tap through workflows, Rotate to visualize, Tap & hold for tooltips, Tap to link and Shake to refresh) which allow me to call up and interact with the information that I need quickly and easily.	.514	0.001*
4.	Integrating Google Mapping directly into my mobile reports which by GPS enable me to visualize location-specific data, trends, and analysis on maps.	.639	0.000*
5.	Sensor-based Query enable me to prompt input directly from mobile sensors which integrating with sensors and inputs to provide context to applications.	.560	0.000*
6.	MBI platforms advantages encourage accessing my BI content (email, work programs) on it more than a laptop in case of their light weight, easier carry, larger screens, processing power, dual wireless connectivity (GSM & WLAN) and storage capacity.	.664	0.000*

No.	Paragraph	Pearson Correlation Coefficient	P-Value (Sig.)
7.	MBI platforms that can be used at the time of decisions making enhance the efficiency of my work by providing the most current territory information at my fingertips, instant and easy accessing to analytics and helping in retrieving account information, so I can make informed business decisions and take immediate actions anytime, anywhere.	.622	0.000*
8.	Smartphones will help in changing the work nature and decision making process.	.598	0.000*

* Correlation is significant at the 0.05 level

Table (3.4) clarifies the correlation coefficient for each paragraph of the "The effect of MBI functions on decision-making process at Jawwal "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 α = 0.05, so it can be said that the paragraphs of this field are consistent and valid to be measure what it was set for.

Table 3.4: Correlation coefficient of each paragraph of "The effect of MBI functions on decision-making process at Jawwal" and the total of this field

No.	Paragraph	Pearson Correlation Coefficient	P-Value (Sig.)
1.	More than one MBI function can be used at once to achieve the related target (example: alerts, reports and dashboard)	.788	0.000*
2.	To be instantly alerted by my mobile device when action happens, a new report is published and when data has changed within the reports etc, helps me to be even more effective in my job, no matter where I am.	.750	0.000*

No.	Paragraph	Pearson Correlation Coefficient	P-Value (Sig.)
3.	Access, navigate, and analyze familiar reports by my mobile device facilitate my work and help in taking affective decisions.	.713	0.000*
4.	When charts, tables and figures are delivered to my mobile on one integrated screen which summarized latest updates data and reports, help me to take effective decisions.	.872	0.000*
5.	MBI dashboards provide broad array of data visualizations which assist in adopting proper decisions and provide the ability to analyze current and future situations.	.891	0.000*
6.	Receiving reports that are dynamically filtered with location-specific information, via BlackBerry and Android smart phones, ("location-aware" intelligence) enable me to analyze and make decisions which are relevant to where I am.	.837	0.000*
7.	With MBI functions real time data is available for my use so they reduce lag time and eliminate the desk bound constraint for receiving information to the decision maker.	.769	0.000*
8.	MBI functions assist in assigning clear responsibilities for the employees and implementing decentralization in decisions-making process.	.683	0.000*

* Correlation is significant at the 0.05 level

Table (3.5) clarifies the correlation coefficient for each paragraph of the " The effect of MBI applications on decision-making process at Jawwal ″ 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 α = 0.05, so it can be said that the paragraphs of this field are consistent and valid to be measure what it was set for.

Table 3.5: Correlation coefficient of each paragraph of "The effect of MBI applications on decision-making process at Jawwal" and the total of this field

No.	Paragraph	Pearson Correlation Coefficient	P-Value (Sig.)
1.	MBI social applications (face book, twitter, Email etc.) enhance positive relations among employees and provide them with the ability to contact with the different concerned parties (customers, distributers and clients).	.851	0.000*
2.	Delivering BI applications on mobile devices so that decisions can be made when and where business situations call for them, administrative tasks can be decreased and optimum levels of productivity can be maintained at all times.	.788	0.000*
3.	I can take the advantages of MBI social applications and collaborative exchange to share our decisions and actions that assist in overcoming complicated obstacles. (users can share their perspectives with others by highlighting an area for discussion and then sending an email with comments, insights and actions to the appropriate people)	.566	0.000*
4.	MBI applications enable us to follow up our tasks remotely (away from the office), so our Jawwal team does not need to be office-based; we can be more flexible in our day-to-day work.	.818	0.000*
5.	For security purposes MBI data/content resides on server so mobile web-based applications is better than mobile native applications to access information by them.	.383	0.014*
6.	Mobile based Applications will rapidly replace the desktop applications and give me the ability to integrate with enterprise applications such as CRM.	.709	0.000*

* Correlation is significant at the 0.05 level

Table (3.6) clarifies the correlation coefficient for each paragraph of the "The effect of Jawwal maturity level of implementing MBI on decision-making process at Jawwal" 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 α = 0.05, so it can be said that the paragraphs of this field are consistent and valid to be measure what it was set for.

Table 3.6: Correlation coefficient of each paragraph of "The effect of Jawwal maturity level of implementing MBI on decision-making process at Jawwal" and the total of this field

No.	Paragraph	Pearson Correlation Coefficient	P-Value (Sig.)
1.	Jawwal has a technology strategy (IT systems are frequently updated and applications are frequently developed to adapt with the rapid acceleration in technologies)	.654	0.000*
2.	Jawwal employees enjoy the required competencies to use new technologies.	.497	0.001*
3.	Jawwal has a mobile strategy (Program initiatives selection of applications to mobilize which leads to employees being effectively benefited from smartphones).	.695	0.000*
4.	I surf my work E-mail by my smartphone or tablet.	.635	0.000*
5.	I do collect the substantial related information about the work problems before making decisions.	.422	0.006*
6.	I tend to use voluntarily my smartphone to collect information which I need in decision making, install some applications and store needed information and reports to ease my work.	.593	0.000*
7.	I encourage my company to build and implement MBI and if it is optional, I'll use it.	.738	0.000*
8.	Business challenges (strategy, maturity level and ROI measures) will not prevent implementing MBI in Jawwal.	.406	0.009*

No.	Paragraph	Pearson Correlation Coefficient	P-Value (Sig.)
9.	Technical challenges (diverse standards for applications and networks, spotty coverage, low bandwidth, perceived lack of security, diversity of devices, slow response times, primitive user interfaces, and numerous other factors) will not prevent implementing MBI in Jawwal.	.308	0.038*

* Correlation is significant at the 0.05 level

Table (3.7) clarifies the correlation coefficient for each paragraph of the "The effect of the level of business need for creating a MBI implementation on decision-making process at Jawwal" 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 α = 0.05, so it can be said that the paragraphs of this field are consistent and valid to be measure what it was set for.

Table 3.7: Correlation coefficient of each paragraph of "The effect of the level of business need for creating a MBI implementation on decision-making process at Jawwal" and the total of this field

No.	Paragraph	Pearson Correlation Coefficient	P-Value (Sig.)
1.	I need real time updates of information and reports which I need in decision making process when I am out of office.	.498	0.001*
2.	The job nature enhances using MBI at Jawwal.	.689	0.000*
3.	I feel that decisions at Jawwal need to be taken on time and not to be delayed.	.600	0.000*
4.	The MBI new technologies will complement existing investments at Jawwal.	.773	0.000*
5.	Implementing MBI considers a competitive advantage for your company.	.681	0.000*

No.	Paragraph	Pearson Correlation Coefficient	P-Value (Sig.)
6.	If you are really having mobile applications to immediate access and manipulate the valuable resource in your database securely, will that help you in decision making process?	.793	0.000*
7.	With MBI I no longer need to spend time in the office, or forced to go back to it, or taking up other employees' time by calling in asking for account details, I can on the road view data needed to prepare for my work, access records, and finish some pending transactions so I can focus purely on my main work.	.761	0.000*
8.	Workers who cannot retrieve vital information for decision-making purposes simply aren't as efficient and successful as those who can.	.643	0.000*
9.	All hierarchal levels of Jawwal employees are in need of implementing MBI not only executives or managers or mobile workers, a sales representative who is only in the office occasionally needs to access information in a meeting down the hall through his mobile.	.646	0.000*

* Correlation is significant at the 0.05 level

3.8.2 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 (3.8) 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 α = 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 study.

Table 3.8: Correlation coefficient of each field and the whole of questionnaire

No.	Field	Pearson Correlation Coefficient	P-Value (Sig.)
1.	The effect of the features of MBI platforms on decision-making process at Jawwal	.737	0.000*
2.	The effect of MBI functions on decision-making process at Jawwal	.790	0.000*
3.	The effect of MBI applications on decision-making process at Jawwal	.780	0.000*
4.	The effect of Jawwal maturity level of implementing MBI on decision-making process at Jawwal	.729	0.000*
5.	The effect of the level of business need for creating a MBI implementation on decision-making process at Jawwal	.779	0.000*

* Correlation is significant at the 0.05 level

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. 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.

Cronbach's Coefficient Alpha

This method is used to measure the reliability of the questionnaire between each field and the mean of the whole fields of the questionnaire. 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. The Cronbach's coefficient alpha was calculated for each field of the questionnaire.

Table (3.9) 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 0.692 and 0.912. This range is considered high; the result ensures the reliability of each field of the questionnaire. Cronbach's Alpha equals 0.919 for the entire questionnaire which indicates an excellent reliability of the entire questionnaire.

Table 3.9: Cronbach's Alpha for each field of the questionnaire

No.	Field	Cronbach's Alpha
1.	The effect of the features of MBI platforms on decision-making process at Jawwal	0.731
2.	The effect of MBI functions on decision-making process at Jawwal	0.912
3.	The effect of MBI applications on decision-making process at Jawwal	0.776
4.	The effect of Jawwal maturity level of implementing MBI on decision-making process at Jawwal	0.692
5.	The effect of the level of business need for creating a MBI implementation on decision-making process at Jawwal	0.851
	All paragraphs of the questionnaire	0.919

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

CHAPTER FOUR
RESEARCH ANALYSIS AND FINDINGS

This chapter consists of the following section:

4.1 Statistical description of the study population

4.2 Discussion and Hypotheses Test

4.1 Statistical description of the study population

4.1.1 Gender

Table (4.1) shows that 85.0% of the respondents are Males and 15.0% of the respondents are Females. The ratio is distributes as sees due to the cultural force and the work nature. The findings agree with Shaban (2011) study where the male ratio is 84.8%, and female ratio is 15.2% and Bolbol study (2011) where the male ratio is 82.4% and the female ratio is 17.6%.

Table (4.1): Gender

Gender	Frequency	Percent
Male	261	85.0
Female	46	15.0
Total	307	100.0

4.1.2 Age

Table (4.2) shows that 3.5% of the sample are "Less than 25 years ", 33.2% of the sample are of "25 to less than 30", 54.1% of the sample are of "30 to less than 40",8.5% of the sample are of "40 to less than 50" and 0.7% of the sample are of "50 Years and more ". It can be noticed from the table that 90.1% of the respondents are less than 40 years which indicates that Jawwal is Youth Company. The findings agree with Bolbol (2011) study where 94.1% are less than 40 years of age and disagree little with Shaban (2011) study where 83.8 are less than 40 years of age since Shaban (2011) study concentrate only on high management level not on all management level.

Table (4.2): Age

Age	Frequency	Percent
Less than 25	11	3.5
From 25 to less than 30	102	33.2
From 30 to less than 40	166	54.1
From 40 to less than 50	26	8.5
50 Years and more	2	0.7
Total	307	100.0

4.1.3 Educational Attainment

Table (4.3) shows that 0.3% of the sample are " Secondary " holders, 8.5% of the sample are " Diploma " holders, 75.6% of the sample are " Bachelor " holders and 15.6% of the sample are " High Education " holders. These figures indicate that Jawwal has good staff that will be able to deal with the new technology much easier. Although the findings agree with Shaban (2011) study in "High Education" holders where it is 15.2% and disagree with Bulbul (2011) study where it is 7.6% since the Shaban study is about whole Jawwal in Gaza and West Bank but Bulbul study is about Gaza only, they disagree with Shaban study in "Diploma" and "Bachelor" holders where they are 0% and 84.8% but agree with Bulbul in "Diploma" holders only since Shaban (2011) study concentrates only on high management level but Bolbol (2011) study concentrates on all management level.

Table (4.3): Educational Attainment

Educational Attainment	Frequency	Percent
Secondary	1	0.3
Diploma	26	8.5
Bachelor	232	75.6
High Education	48	15.6
Total	307	100.0

4.1.4 Field of Specialization

Table (4.4) shows that the highest ratio of 64.5% is for the commerce major, and the second highest ratio of 23.1% is for the Engineering major. So it can be indicated that all Jawwal employees are very specialized with their positions.

Table (4.4): Field of Specialization

Field of Specialization	Frequency	Percent
Commerce	198	64.5
Engineering	71	23.1
IT	12	3.9
Other	26	8.5
Total	307	100.0

4.1.5 Total Years of Experience

Table (4.5) below shows that 21.7% of the respondents have less than 5 years experience, 42.7% of the respondents have from 5 to < 10 years experience, 34.9% of the respondents have from 10 to < 20 years experience, and 0.7% of the respondents have more than 20 years experience. These results reflect that 78.3% of the sample has 5 years and more experience, which probably reflects capabilities of the sample. These figures match with age figures above.

Table (4.5): Total years of Experience

Total years of Experience	Frequency	Percent
Less than 5 years	67	21.7
5 – Less than 10 year	131	42.7
10- less than 20 years	107	34.9
20 years and more	2	0.7
Total	307	100.0

4.1.6 Years of Experience in Jawwal

Table (4.6) below shows that 30.6% of the respondents have less than 5 years experience in Jawwal, 33.8% of the respondents have from 5 to < 10 years experience, 35.6% of the respondents have more than 10 years experience in Jawwal. These results reflect that 69.4% of the sample has 5 years and more experience in Jawwal, which probably reflects the loyalty of the employees for their company and the stability atmosphere which leads them to be creative and ready for any voluntary work effort.

Table (4.6): Years of Experience in Jawwal

Years of Experience in Jawwal	Frequency	Percent
Less than 5 years	94	30.6
5 – Less than 10 years	104	33.8
10 years and more	109	35.6
Total	307	100.0

4.1.7 Managerial Level

Table (4.7) below shows that 9.4% of the respondents are classified from the top management, 33.9% of the respondents are classified from the middle management, while more than 56.7% 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.

Table (4.7): Managerial Level

Managerial Level	Frequency	Percent
Top Management (Director/Manager)	29	9.4
Middle Management (Head of Section/ Head of Unit)	104	33.9
Low Management (Engineer /Administrator /…)	174	56.7
Total	307	100.0

4.1.8 Duty Station

Table (4.8) below shows that 39.1% of the respondents are working at Gaza Strip, while 60.1% of the respondents are working at West Bank and this is consistence with the percentage of the number of the employees who are working at them.

Table (4.8): Duty Station

Duty Station	Frequency	Percent
Gaza Strip	120	39.1
West Bank	187	60.9
Total	307	100.0

4.1.9 Department

Table (4.9) shows that there was 46.9% of the respondents are working at the commercial department which is less than half of the sample, 23.1% of the respondents are working at the technical department, 14.31% of the respondents are working at the financial department, 9% of the respondents are working at the Corporate supply chain department, and 6.6% of the respondents are working at procurement & administrative affairs department. These results reflect that Jawwal continued operating according to its strategy that evolves around maximizing the customer satisfaction since 56% of the respondents deal with customers and providing the latest up-to-date technology through several running projects.

Table (4.9): Department

Department	Frequency	Percent
Technical	71	23.1
Commercial	144	46.9
Financial	44	14.3
Corporate supply chain	28	9.1
Procurement	20	6.6
Total	307	100.0

4.1.10 Model Type of Your Personal Mobile Device

Table (4.10) shows that all respondents have smart phones and 72.3% of them have Samsung galaxy which indicates that most of the have the same operating system (Android) so that eases to design MBI system.

Table (4.10): Model type of your personal mobile device

Model type of your personal mobile device	Frequency	Percent
Blackberry	16	5.2
Htc Onex	3	1.0
iphon	24	7.8
LG	2	0.7
Nokia	28	9.1
Samsung galaxy	223	72.6
Sony Ericson xperia arc	11	3.6
Total	307	100.0

4.1.11 Percentage of Time Allocated for Use Mobile in work against PC/Laptop

Table (4.11) shows that 18.6% of the respondents use mobile in work less than 20% against their PC's/Laptops, 62.5% of the respondents use it from 20% to 60% and 18.9% of the respondents use it more than 60% which indicates that Jawwal employees have excellent maturity level to implement MBI system.

Table (4.11): Percentage of time allocated for use mobile in your work against PC/Laptop

Percentage of time allocated for use mobile in your work against PC/Laptop	Frequency	Percent
Less than 20%	57	18.6
20%-60%	192	62.5
61%-100%	58	18.9
Total	307	100.0

4.1.12 Percentage of Time Allocated for Employees Outdoor Work against their Desk Work

Table (4.12) shows that 39.1% of the respondents work outdoor less than 20% against their deskwork, 40.7% of the respondents work outdoor from 20% to 60% and 20.2% of the respondents work outdoor more than 60% . This result reflects that the job nature at Jawwal support implementing MBI system and Jawwal employees are in need for implementing MBI system.

Table (4.12): Percentage of time allocated for your mobile work against your desk work

Percentage of time allocated for your mobile work against your desk work	Frequency	Percent
Less than 20%	120	39.1
20%-60%	125	40.7
61%-100%	62	20.2
Total	307	100.0

4.2 Discussion and Hypotheses Test

In the following tables We use a one sample t test to test if the opinion of the respondent in the content of the sentences are positive (weight mean greater than "60%" and the p-value less than 0.05) or the opinion of the respondent in the content of the sentences are neutral (p- value is greater than 0.05) or the opinion of the respondent in the content of the sentences are negative (weight mean less than "60%" and the p-value less than 0.05)

4.2.1 Hypothesis 1

There exits significant positive effect of implementing MBI at the level (α ≤ 0.05) on Decision Making Process.

Table (4.13) shows the following results:

- The mean of all paragraphs equals 4.05 (81.08%), Test-value $=55.07$, 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 all statements is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to all paragraphs. This means that there exists significant positive effect of implementing MBI on Decision Making Process. This is acceptable result which encourages implementing MBI system in Jawwal Company . This result agrees with the following prior studies:

1. Bahloul (2011); This study found that there exists a significant positive relationship between Marketing Information Systems Technology and the decision making processes in the banking sector in Palestine.

2. (QlikView, 2011); This study found that after implementing MBI in DE HYPOTHEEKSHOP, the results are: 30% average increase in customer conversion rates, 90% of regulatory compliance inquiries answered in one day, 10% reduction in operating costs, 50% reduction in reporting time, and 15% reduction in marketing spend.

3. El-Sheikh Deeb (2008); This study found there is a significant correlation between modern communication technologies and decision making process in PalTel.

On the other hand, this result disagrees with the following studies:

1. Al- Buheisy (2005); this article found that there was no considerable effect of modern technologies in decision-making process in the Palestinian firms. The author of this article 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 study was conducted on a previous time seven years ago.

2. Bhappu (1999); the result of this research showed that individuals in teams had weaker team identity and lower decision quality when teams communication was computer mediated. From my opinion, this negative result was because this research was conducted on 1999 at the beginning of the internet revolution.

Table (4.13): Means and Test values for all paragraphs

	Mean	Proportional mean (%)	Test value	P-value (Sig.)
Implementing MBI	4.05	81.08	55.07	0.000*

*The mean is significantly different from 3

4.2.1.1 Sub Hypothesis 1:

There exits significant positive effect of MBI platforms' features at the level (α ≤ 0.05) on decision-making process in Jawwal Company.

Table (4.14) shows the following results which are being analyzed according to the ranking of each pragragh:

The mean of paragraph #3 "The MBI platforms (mobile devices and planets as iPhone, iPad , android devices as Galaxy etc) have multi-touch screens (Tap to drill and explore, Pinch to zoom, Swipe↑↓ to scroll, Swipe←→ to turn page, Tap through workflows, Rotate to visualize, Tap & hold for tooltips, Tap to link and Shake to refresh)

which allow me to call up and interact with the information that I need quickly and easily" equals 4.46 (89.12%), Test-value = 43.73, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that the multi-touch screens/interfaces gesture navigation feature enhance and encourage using MBI platforms (smartphones and planet computers) since that this feature enables to conduct to any information and interact with any program by touch-based applications which allows respondents to point at what they want, touch where they want to go, and move the device to indicate how they want to explore the information. All respondents feel of the value of this feature since all of them have smartphones.

The mean of paragraph #1 "Smartphones have broadened the bounds of communications, enabling graphical Web access that goes far beyond the email capabilities of earlier generations of cellular phones." equals 4.43 (88.62%), Test-value = 46.15, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that smartphones overcome the problem that respondents face with earlier phone at surfing their emails and internet web sites. Smartphones have many advantages which encourage using them not as communication tools only but also as video conference rooms and brainstorm sessions to share up to date information, problems, actions, solutions, experiences and knowledge to enhance effective decisions. With MBI's App Integration for example, employees can directly link to/from other mobile Apps and support interconnections with other Apps and data sources. As link to e-mail system, embedding addresses and content into the message.

The mean of paragraph #6 "MBI platforms advantages encourage accessing my BI content (email, work programs) on it more than a laptop in case of their light weight, easier carry, larger screens, processing power, dual wireless connectivity (GSM & WLAN) and storage capacity…" equals 4.4 (88.01%), Test-value = 37.12, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that in case that respondents have outdoor tasks that to be performed out of the office so that encourage them to use their smartphones and planet computers which are very light comparing with laptops. Addition to light weight of MBI platforms, they approximately have no delay time to power on their touch screens and work on them. MBI platforms' dual wireless connectivity guarantees the respondents to be online wherever and whenever by WLAN or cellular connection so they can be as on their desks although if they are in the bed or on the beach or wherever.

The mean of paragraph #7 "MBI platforms that can be used at the time of decisions making enhance the efficiency of my work by providing the most current territory information at my fingertips, instant and easy accessing to analytics and helping in retrieving account information, so I can make informed business decisions and take immediate actions anytime, anywhere." equals 4.22 (84.43%), Test-value = 29.51, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that the respondents are often in need to access helpful information while they are out of their offices which they need to make fast decisions that can't be delayed until they return to their offices. MBI system applies the solution for them which enhance their work efficiency by Mobile Information Capture feature which enables remotely capturing data and initiating transactions, making information come alive to the user through sight, touch, and sound and providing Apps with finely-crafted information flow.

The mean of paragraph #4 "Integrating Google Mapping directly into my mobile reports which by GPS enable me to visualize location-specific data, trends, and analysis on maps." equals 4.21 (84.1%), Test-value = 27.84, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that Jawwal employees use smartphones' GPS and maps not only to reach locations of their out tasks but also to make better decisions for managing their outdoor work trips and Receiving reports that are

dynamically filtered with location-specific information, via BlackBerry and Android smart phones, ("location-aware" intelligence) which enable them to analyze and make decisions which are relevant to where they are.

The mean of paragraph #5 "Sensor-based Query enable me to prompt input directly from mobile sensors which integrating with sensors and inputs to provide context to applications." equals 4.18 (83.66%), Test-value = 39.97, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that Smartphone can be used as computer with dual connections (cellular and WLAN), camera, GPS, money wallet and barcode. Smartphone become now as complete package with its sensors which the employees can not only to use them but also to save their money, time and effort by carrying it only instead of carrying all of the mentioned instruments.

The mean of paragraph #8 "Smartphones will help in changing the work nature and decision making process." equals 3.9 (783.05%), Test-value = 21.09, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows Jawwal employees realize the smartphones revolution which is rapidly changes the way of our life is changing the way of our work. Since the work nature is really changed by MBI because the smartphones become the new work offices which you can perform all your tasks and make effective decisions. With smartphones the work becomes time/place independent.

The mean of paragraph #2 "Smartphones and Jawwal credentials can prevent accessing its information of lost/stolen/compromised devices" equals 3.59 (71.73%), Test-value = 12.89, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that Jawwal employees think that the smartphones security programs can protect their information and when these programs linked with company

credentials which run on company servers, they become more secure. So Jawwal employees trust their company's security programs.

In General, the mean of the field "**The effect MBI platforms' features on decision-making process at Jawwal**" equals 4.17 (83.49%), Test-value = 53.08, 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 field is significantly greater than the hypothesized value 3. We conclude that the respondents agreed that "**MBI platforms features affect the decision-making process at Jawwal**". This result is supported by the following previous studies:

1. (QlikView, 2011); This study found that MBI platforms can create and share knowledge and analysis in groups and across organizations. They deliver insight everywhere, an application model, mobility and reassembly, and a social and collaborative experience which help people make decisions based on multiple sources of insight: data, people, and the environment. Also it found they are secure since MBI applications benefit from a 'build once deploy anywhere' approach that reduces the burden associated with maintaining multiple versions of applications for native clients. And organizations reduce risk by keeping data inside the firewall and maintaining independence from third-party application stores.

2. (Hejazinia & Razzazi, 2010); This study found that there are many mobile phones that do not use their infinite capacities. With this approach there wouldn't be any limitations on mobile phone platforms.

3. (MicroStrategy, 2010); This paper found that MBI Expands Personal Query Relevance by a Factor of 4 because it is further enhanced with other rich features such as multi-touch and navigation screens, visual inputs via a camera or audio inputs via a microphone, and converting images into data inputs from barcodes, fingertips, fonts, and facial recognition. Also MBI platforms are distinguished by integrating maps which by GPS can visualize location-specific data, trends, and analysis on maps, multi-touch gestures which enables designers to create Apps with unique visual personalities, and dual connection which guarantees Mobile Information Remote Capture.

4. (Pimienta, 2010); This study found that high definition, large screen, multi-touch functionalities are essential characteristics for devices holding MBI solutions and very recent smartphones are proposing such functionalities.

5. (GS1 Mobile Com, 2008); This research found that smartphones which are with dual mode connection (WLAN & 3G) are a place where multiple applications can meet and fuse. They are integrated with a phone, a camera, a location finder (GPS) and Radio Frequency Identification (RFID) chips that can turn smartphones into mobile wallets able to carry and exchange electronic money securely and engage in other transactions (payment, ticketing, coupons, etc.) with RFID readers in the physical world.

6. (Kotorov, 2007); This research found that smartphones have an advantage over laptops because they can be carried anywhere and used anytime. They don't require mobile hot spots or other Internet connections and with their sensors they can be easily connected to peripherals making almost the entire office portable. Initial evidence of this convergence is the large volume of e-mails sent from them and other mobile Windows-enabled smart phones, as well as the proliferation of customer relation management (CRM) mobile applications. Also they are secure since the browser-based decryption prevents unauthorized access if the report is accidentally forwarded or the device is stolen. An administrator can change or deny access to an application immediately upon notification that the device is missing. Since the data is not stored on the device it cannot be compromised. Decision-makers know this and are inclined to maximize use of the smartphones devices and applications.

On the other hand, this result is inconsistent with other previous studies:

1. (Trif, 2011); This study pointed out that many limitations of the MBI devices for which the product is made for, as: memory, processing power, display, low to moderate complexity, small to medium applications, low to medium assignment speed. This study pointed this inconsistency is for device type, not for mobiles in general so smartphones can be excluded.

2. (Airinei & Homocianu, 2010); This study pointed out that many limitations of the MBI applications are related to the physical features of the mobile devices (Tiny screens, Low memory and Low processing power) and also to the architecture of the mobile operating systems (MOS). From my point of view, the year of conducting this research and the type of mobile devices that used in this research are the key factors of this result.

3. (Brodkin, 2008); This article found that mobile applications market is being held back by small screen sizes and limitations in storage, memory and computing power. One reason for this inconsistency is that; this article had been conducted on year 2008, which is prior of smartphones revolution.

4. (McDowell, 2008); This study found that Employees using mobile solutions could not securely connect to the company network to access corporate data, making them a threat to the integrity of a company's most critical information. From my point of view, this result since security, being a major area of concern to users as well as companies especially when personal devices are misplaced or lost, as commercially-sensitive information can be involved.

Table (4.14): Means and Test values for "The effect of the features of MBI platforms on decision-making process at Jawwal"

	Item	Mean	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	Smartphones have broadened the bounds of communications, enabling graphical Web access that goes far beyond the email capabilities of earlier generations of cellular phones.	4.43	88.62	46.15	0.000*	2
2.	Smartphones and Jawwal credentials can prevent accessing its information of lost/stolen/compromised devices.	3.59	71.73	12.89	0.000*	8
3.	The MBI platforms (mobile devices and planets as iPhone, iPad , android devices as Galaxy etc) have multi-touch screens which allow me to call up and interact with the information that I need quickly and easily.	4.46	89.12	43.73	0.000*	1

	Item	Mean	Proportional mean	Test value	P-value (Sig.)	Rank
4.	Integrating Google Mapping directly into my mobile reports which by GPS enable me to visualize location-specific data, trends, and analysis on maps.	4.21	84.10	27.84	0.000*	5
5.	Sensor-based Query enable me to prompt input directly from mobile sensors which integrating with sensors and inputs to provide context to applications.	4.18	83.66	39.97	0.000*	6
6.	MBI platforms advantages encourage accessing my BI content (email, work programs) on it more than a laptop in case of their light weight, easier carry, larger screens, processing power, dual wireless connectivity (GSM & WLAN) and storage capacity.	4.40	88.01	37.12	0.000*	3
7.	MBI platforms that can be used at the time of decisions making enhance the efficiency of my work by providing the most current territory information at my fingertips, instant and easy accessing to analytics and helping in retrieving account information, so I can make informed business decisions and take immediate actions anytime, anywhere.	4.22	84.43	29.51	0.000*	4
8.	Smartphones will help in changing the work nature and decision making process.	3.90	78.05	21.09	0.000*	7
	All paragraphs of the field	4.17	83.49	53.08	0.000*	

* The mean is significantly different from 3

4.2.1.2 Sub hypothesis 2:

There exits significant positive effect of MBI functions at the level (α ≤ 0.05) on decision-making process in Jawwal Company.

Table (4.15) shows the following results which are being analyzed according to the ranking of each pragragh:

The mean of paragraph #2 "To be instantly alerted by my mobile device when action happens, a new report is published and when data has changed within the reports etc, helps me to be even more effective in my job, no matter where I am." equals 4.34 (86.71%), Test-value = 37.30 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that Jawwal employees need to be up to date with new actions and information. They think that their mobiles are the proper way for this need since mobiles are always online when and where they are so they can take proper decision at proper time.

The mean of paragraph #7 "With MBI functions real time data is available for my use so they reduce lag time and eliminate the desk bound constraint for receiving information to the decision maker." equals 4.25 (84.97%), Test-value = 31.88 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that Jawwal employees think that MBI functions will save their time and effort to reach for needed information since it will come alive for their use.

The mean of paragraph #3 "Access, navigate, and analyze familiar reports by my mobile device facilitate my work and help in taking affective decisions." equals 4.23 (84.69%), Test-value = 34.67 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that MBI reports which are information sources

for decisions will be between employees hands where and when they need not only to access them but also to analyze them in order to take proactive decisions.

The mean of paragraph #4 "When charts, tables and figures are delivered to my mobile on one integrated screen which summarized latest updates data and reports, help me to take effective decisions." equals 4.14 (82.8%), Test-value = 28.82 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that when all needed information is resided on one screen at employees' fingertips, it will be very effective especially when it updated instantly.

The mean of paragraph #6 "Receiving reports that are dynamically filtered with location-specific information, via smartphones, ("location-aware" intelligence) enable me to analyze and make decisions which are relevant to where I am." equals 4.05 (80.98%), Test-value = 24.35 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that MBI functions can be linked with smartphones features to customized functions according to employees need. For example, automatically filter reports per location by link GPS with reports in order to send them to relevant employees. This will save employees time and effort and help them to focus mainly about what they really need in order to not be confused with not important information that may be received.

The mean of paragraph #1 "More than one MBI function can be used at once to achieve the related target (example: alerts, reports and dashboard)." equals 3.86 (77.26%), Test-value = 24.33 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that employees need more than one MBI function to achieve their objectives. They need to be alerted and reported with updated

information, pull any needed reports and have all updated information at one screen independently with time and place.

The mean of paragraph #5 "MBI dashboards provide broad array of data visualizations which assist in adopting proper decisions and provide the ability to analyze current and future situations." equals 3.81 (76.29%), Test-value = 22.03 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that dashboards' data visualizations present updated information in fast and easy way and enable employees to take fast and effective decisions instantly.

The mean of paragraph #8 "MBI functions assist in assigning clear responsibilities for the employees and implementing decentralization in decisions-making process" equals 3.64 (72.79%), Test-value = 14.34, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that MBI functions distribute updated information and tasks for relevant employees by intelligence aware filtering feature which assist in assigning clear responsibilities for the employees and implementing decentralization in decisions-making process.

The mean of the field "**The effect of MBI functions on decision-making process at Jawwal**" equals 4.04 (80.81%), Test-value = 40.40, 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 field is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to field of "**MBI functions affect decision-making process at Jawwal**". This result is supported by the following previous studies:

1. (Dresner, 2011); This study found that MBI "Viewing" functions (i.e., View Charts/Reports, Alerts, KPI Monitoring) remain the focus of most users – with "KPI Monitoring" seeing the greatest increase in demand, followed by "Alerts" (the number one MBI functions). "Interactive" MBI capabilities – such " "Data Selection and

Filtering" increased slightly – as more sophisticated users/organizations mature in their use and requirements for MBI. "Advanced" MBI function this year, respondents indicated greater importance for "Real-time data refresh", followed by "Off-line" and, lastly "Write-back". Also this study found that vendor support for "Alerting" improved since June, but had been surprisingly limited. Advanced features such as "write back" and "dashboard assembly" would be uncommon during 2011.

2. (Oracle, 2011); This study found that MBI alerts enable users to define alert conditions on data driven thresholds on specific analytic measures and on time driven conditions (define their own processes). So MBI functions provide users with a rich, interactive experience where information is filtered and personalized to a user's identity or role. This helps to make business information intuitive and easy to understand and guide users in their decision making.

3. (MicroStrategy, 2010); This study found that MBI Expands Information Opportunities by at Least a Factor of 10: From the moment they wake, they can use applications that not only enhance their personal lives but also make them more productive and effective at work.

4. (Loubier, Berrada, Dousset, & El Haddadi, 2010); This study found that MBI reporting is the service responsible for presenting the analysis results to the decision-makers according to the push strategy with IPhone Service, SMS Service, and E-mail Service or pull strategy with Web Site Services.

5. (Kotorov, 2007); This research found that mobile reporting is in users' self-interest and they are willing to make tradeoffs to get the information they need, when they need it.

On the other hand, this result is inconsistent with other previous studies:

1. (Airinei & Homocianu, 2010); This study pointed that the architecture of the mobile operating systems (MOS) they are running on, together with a lack of compatibility with the corresponding operating systems on personal computers. So some Excel 2007 sheets conceived as BI reports are not completely readable even on the newest Microsoft mobile platforms. This inconsistency is returned to the year of conducting this research and the type of mobile devices that used in this research.

2. (Business Objects Labs, 2006); This study found that MBI is a "pull only" by design and does not cache report data at all. Also it does not offer push updates within the

application although regular email on the mobile device may be used for that purpose. One reason for this inconsistency is that; this study had been conducted on year 2006, which is prior of smartphones revolution.

Table (4.15): Means and Test values for "The effect of MBI functions on decision-making process at Jawwal"

	Item	Mean	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	More than one MBI function can be used at once to achieve the related target (example: alerts, reports and dashboard)	3.86	77.26	24.33	0.000*	6
2.	To be instantly alerted by my mobile device when action happens, a new report is published and when data has changed within the reports etc, helps me to be even more effective in my job, no matter where I am.	4.34	86.71	37.30	0.000*	1
3.	Access, navigate, and analyze familiar reports by my mobile device facilitate my work and help in taking affective decisions.	4.23	84.69	34.67	0.000*	3
4.	When charts, tables and figures are delivered to my mobile on one integrated screen which summarized latest updates data and reports, help me to take effective decisions.	4.14	82.80	28.82	0.000*	4

	Item	Mean	Proportional mean (%)	Test value	P-value (Sig.)	Rank
5.	MBI dashboards provide broad array of data visualizations which assist in adopting proper decisions and provide the ability to analyze current and future situations.	3.81	76.29	22.03	0.000*	7
6.	Receiving reports that are dynamically filtered with location-specific information, via smartphones, ("location-aware" intelligence) enable me to analyze and make decisions which are relevant to where I am.	4.05	80.98	24.35	0.000*	5
7.	With MBI functions real time data is available for my use so they reduce lag time and eliminate the desk bound constraint for receiving information to the decision maker.	4.25	84.97	31.88	0.000*	2
8.	MBI functions assist in assigning clear responsibilities for the employees and implementing decentralization in decisions-making process.	3.64	72.79	14.34	0.000*	8
	All paragraphs of the field	4.04	80.81	40.40	0.000*	

* The mean is significantly different from 3

4.2.1.3 Sub hypothesis 3:

There exits significant positive effect of MBI applications at the level (α ≤ 0.05) on decision-making process in Jawwal Company.

Table (4.16) shows the following results:

The mean of paragraph #2 "Delivering BI applications on mobile devices so that decisions can be made when and where business situations call for them, administrative tasks can be decreased and optimum levels of productivity can be maintained at all times" equals 4.18 (83.58%), Test-value = 30.00, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that Jawwal employees think that with MBI they can be connected to their tasks wherever and whenever. By this approach there won't be pending tasks for any reason although more than 60% of employees spend more than 20% of their time work in outdoor tasks (table 4.12).

The mean of paragraph #4 "MBI applications enable us to follow up our tasks remotely (away from the office), so our Jawwal team does not need to be office-based; we can be more flexible in our day-to-day work." equals 4.15 (83.08%), Test-value = 24.86, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that Jawwal employees need to have more flexibility to be time/place independent. So they see with MBI applications the solution for office-based tasks which are always pending for more than 60% of the employees (table 4.12).

The mean of paragraph #3 "I can take the advantages of MBI social applications and collaborative exchange to share our decisions and actions that assist in overcoming complicated obstacles. (Users can share their perspectives with others by highlighting an area for discussion and then sending an email with comments, insights and actions to the appropriate people)" equals 4.06 (81.18%), Test-value = 29.66, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that Jawwal employees benefit from social applications to share knowledge and experience. They use their smartphones to access these applications which guarantee for them to be always online. Jawwal company benefits from this feature by designing internal operation application which has social application style and its name is "your answer is at us". If this application customized to be MBI application, it will be more and more useful.

The mean of paragraph #3 "MBI social applications (face book, twitter, Email etc.) enhance positive relations among employees and provide them with the ability to contact with the different concerned parties (customers, distributers and clients)." equals 4.02 (80.33%), Test-value = 22.54, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that smartphones social applications guarantee for employees to contact with others and with other external parties whenever and wherever. That enhances positive relations among them which reflect good signs to work at health relations and positive atmosphere.

The mean of paragraph #5 "For security purposes MBI data/content resides on server so mobile web-based applications is better than mobile native applications to access information by them." equals 3.61 (72.26%), Test-value = 13.83, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that Jawwal employees trust on their company security and they agree that it is better not to save important information at their smartphones since they can be lost or stolen. They think it is better to save important work information at their company servers for more security.

The mean of paragraph #6 "Mobile based Applications will rapidly replace the desktop applications and give me the ability to integrate with enterprise applications such as CRM" equals 3.59 (71.73%), Test-value = 12.95, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that Jawwal employees realize the smartphones revolution which is rapidly changes the way of our life and also will change the way of our work. They think that the smartphones features will enable MBI to be the propose system and will replace BI system gradually.

The mean of the field "**The effect of MBI applications on decision-making process at Jawwal**" equals 3.93 (78.68%), Test-value = 36.86, 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 field is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to field of " **MBI applications affect decision-making process at Jawwal** ". This result is supported by the following previous studies:

1. (Lekova, 2012); This study found that the data processing and communication go to the background and must adjust to the user's personality. Some of the decisions related to communication have to be completely made at run time by learning the users' mobility patterns based on personal actions, roles, and social networks. MANETs concept for "anytime and anywhere" is supposed to support network services independent on the application scenarios.

2. (Dresner, 2011); this study found that 40% indicated that data would only be stored on secured servers and not on mobile devices but the great majority of respondents expect data to reside on both - devices and servers.

3. (QlikView, 2011); This research found that MBI is user-driven business intelligence that helps people make decisions based on multiple sources of insight: data, people, and the environment. Users can create and share knowledge and analysis in groups and across organizations. MBI platforms help people ask and answer their own questions and follow their own path to insight. MBI platforms deliver insight everywhere, an application model, mobility and reassembly, and a social and collaborative experience.

4. (Ventana Research, 2011); This research found that many workers are now used to interacting on social networking sites through their smartphones which created a connected economy and a degree of near-real-time social networking not before seen,

and wise employers already are exploring how to harness this propensity for business purposes. Social networking model has conditioned workers to a kind of free-flowing collaboration that has implications for business productivity. MBI should include collaborative capabilities to support the decision-making process, including workflow and approval processes as well as tracking communications. Collaborative capabilities must be available on smartphones and tablets, and linked to BI analytics and information sharing for decision support regardless of where the collaborators may be.

5. (Trif, 2011); This study found that with MBI applications the user accesses sensitive data from the inside of its organization. Also, the obtained results under the form of reports are sensitive information that must be protected. In this scenario, security becomes an important aspect that has to be considered. Each type of mobile application has particular characteristics and security is implemented in specific ways. Also mobile applications' security aspect has an important role in software developing process. Using the security, mobile applications tend to become more and more reliable.

6. (MicroStrategy, 2010); This study found that MBI Applications distinguishes from previous Web-based BI Applications by remotely capturing data and initiating transactions, making information come alive to all users through sight, touch, and sound and providing Applications with finely-crafted information flow for all time and everywhere by linking applications features with smartphones features.

7. (Airinei & Homocianu, 2010); This study found that this days the BI applications running on mobile devices use different kinds of dashboards usually depending on the provider who have learned that in a changing world not so many users can easily and precisely identify what data they will need and when. So the developers have created many set of KPI and various types of reports, dashboards, tables, or charts for the wireless devices and for their small screens.

8. (Kotorov, 2007); This study offered an additional layer of security through encrypted Active Reports. The user will be required to enter their credentials and, once authenticated, the data will be decrypted within the browser. The browser-based decryption prevents unauthorized access if the report is accidentally forwarded or the device is stolen. Web-based applications, on the other hand, do a better job at minimizing this risk. An administrator can change or deny access to an application

immediately upon notification that the device is missing. Since the data is not stored on the device it cannot be compromised. Initial evidence of this convergence is the large volume of e-mails sent from smartphones, as well as the proliferation of customer relation management (CRM) mobile applications.

On the other hand, this result is inconsistent with other previous studies:

1. (McDowell, 2008); This study found that Employees using mobile solutions could not securely connect to the company network to access corporate data, making them a threat to the integrity of a company's most critical information. From my point of view, this result since security, being a major area of concern to users as well as companies especially when personal devices are misplaced or lost, as commercially-sensitive information can be involved.

2. (Business Objects Labs, 2006); This study found that MBI supports Web Intelligence and Desktop Intelligence report engines only and does not support cascading prompts. Also it does not offer push updates within the application. One reason for this inconsistency is that; this study had been conducted on year 2006, which is prior of smartphones application revolution.

Table (4.16): Means and Test values for "The effect of MBI applications on decision-making process at Jawwal"

	Item	Mean	Proportional mean	Test value	P-value (Sig.)	Rank
1.	MBI social applications enhance positive relations among employees and provide them with the ability to contact with the different concerned parties.	4.02	80.33	22.54	0.000*	4
2.	Delivering BI applications on mobile devices so that decisions can be made when and where business situations call for them, etc.. can be maintained at all times.	4.18	83.58	30.00	0.000*	1

	Item	Mean	Proportional mean (%)	Test value	P-value (Sig.)	Rank
3.	I can take the advantages of MBI social applications and collaborative exchange to share our decisions and actions that assist in overcoming complicated obstacles. (users can share their perspectives with others by highlighting an area for discussion and then sending an email with comments, insights and actions to the appropriate people)	4.06	81.18	29.66	0.000*	3
4.	MBI applications enable us to follow up our tasks remotely (away from the office), so our Jawwal team does not need to be office-based; we can be more flexible in our day-to-day work.	4.15	83.08	24.86	0.000*	2
5.	For security purposes MBI data/content resides on server so mobile web-based applications is better than mobile native applications to access information by them.	3.61	72.26	13.83	0.000*	5
6.	Mobile based Applications will rapidly replace the desktop applications and give me the ability to integrate with enterprise applications such as CRM.	3.59	71.73	12.95	0.000*	6
	All paragraphs of the field	3.93	78.68	36.86	0.000*	

* The mean is significantly different from 3

4.2.1.4 Sub hypothesis 4:

There exits significant positive effect of Jawwal maturity level of implementing MBI at the level (α ≤ 0.05) on using MBI in decision-making process in Jawwal Company.

 Table (4.17) shows the following results:

The mean of paragraph #4 "I surf my work E-mail by my smartphone or tablet" equals 4.41 (88.25%), Test-value = 33.22, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that Jawwal employees who all of them have smartphones surf their e-mails with their smartphones so they are familiar with smartphones which will help them in using MBI functions and applications to take proactive decisions. All respondents have smartphones but not all of them surf their emails by them since they think their company must pay this cost for them so that not to be on their accounts.

The mean of paragraph #1 "Jawwal has a technology strategy (IT systems are frequently updated and applications are frequently developed to adapt with the rapid acceleration in technologies)" equals 4.39 (87.75%), Test-value = 40.03, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that Jawwal company is ready to apply MBI system since that MBI system must align with IT technology to enhance decision making process.

The mean of paragraph #5 "I do collect the substantial related information about the work problems before making decisions." equals 4.32 (86.43%), Test-value = 38.98, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that Jawwal employees are ready to use MBI system and they will accept this system and interact with it to make effective decisions.

The mean of paragraph #3 "Jawwal has a mobile strategy (Program initiatives selection of applications to mobilize which leads to employees being effectively benefited from smartphones)." equals 4.30 (85.97%), Test-value = 30.70, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that Jawwal company is ready to implement MBI system since it gave their employees smartphones as a gift and published instructions guide for use them. so that they benefit from them in decision making process.

The mean of paragraph #7 "I encourage my company to build and implement MBI and if it is optional, I'll use it" equals 4.18 (83.53%), Test-value = 28.20, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that Jawwal employees will not be obstacle to implement MBI system and they will help their company to overcomes the challenges which will be faced the implementation process. That will not only support MBI implementation process but also decision making process.

The mean of paragraph #6 "I tend to use voluntarily my smartphone to collect information which I need in decision making, install some applications and store needed information and reports to ease my work." equals 3.91 (78.29%), Test-value = 22.10, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that Jawwal employees really have simple MBI system which are used in voluntarily way and personal way. That encourage Jawwal company to implement MBI system which has approved from its employees since the simple voluntary one helps them to ease their work, save their time and effort and make affective decisions.

The mean of paragraph #2 "Jawwal employees enjoy the required competencies to use new technologies." equals 3.90 (78.05%), Test-value = 19.80, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that Jawwal Company has a good trained staff who is able to deal with any new technology like MBI system. That encourages implementing MBI system which enhances dicision making process.

The mean of paragraph #8 "Business challenges (strategy, maturity level and ROI measures) will not prevent implementing MBI in Jawwal" equals 3.02 (60.46%), Test-value = 0.38, and P-value = 0.353 which is greater than the level of significance $\alpha = 0.05$. Then the mean of this paragraph is insignificantly different from the hypothesized value 3. We conclude that the respondents (Do not know, neutral) to this paragraph. This result shows that the respondents have different opinions about commercial challenges and most of them don't know exactly it's effect since the respondents are form all management levels not from high level only.

The mean of paragraph #9 "Technical challenges (diverse standards for applications and networks, spotty coverage, low bandwidth, perceived lack of security, diversity of devices, slow response times, primitive user interfaces, and numerous other factors) will not prevent implementing MBI in Jawwal." equals 2.76 (55.24%), Test-value = -4.24, and P-value = 0 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is negative, so the mean of this paragraph is significantly smaller than the hypothesized value 3. We conclude that the respondents disagreed to this paragraph. This result shows that the respondents think that the technical challenges which most of them returned to Israeli siege will affect implementing MBI system to be very affective in decision making process not prevent implementing it. This obstacle may be removed in 2013 year if Israel agrees to give Palestinian cellular companies 3G license.

The mean of the field "**The effect of Jawwal maturity level of implementing MBI on using MBI in decision-making process at Jawwal**" equals 3.91 (78.16%), Test-value = 37.06, 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 field is significantly greater than the

hypothesized value 3. We conclude that the respondents agreed to field of "**Jawwal maturity level of implementing MBI affects on using MBI in decision-making process at Jawwal** ". This result is supported by the following previous studies:

1. (Bulbul, 2011); This study found that 75.80 % of respondents agree that Jawwal company adopt new technology for management and marketing purposes.

2. (Dresner, 2011); this study found that 70% of respondents expect a quarter and 25% expect half of their user-base to utilize BI exclusively, through mobile devices, within 2 years.

3. (MicroStrategy, 2010); This study found that MBI Expands the User Population by a Factor of 10: The range and number of mobile devices is showing explosive growth and the boundaries between these devices is blurring.

4. **(**Hernaus, Pejic, & Rebac, 2010); This study found that business strategy has a strong positive influence on the success of BI initiative if it is aligned with IT. Also the results show that in most of the observed companies decisions are made by simultaneously combining objective data and information with intuitive feelings and experience. Almost in 60% of cases decisions are made on the basis of data but they are in the same time corroborated with managerial intuition and their previous experience. Even more, 13% of respondents said that in their companies decisions were made exclusively according to the available information.

5. (Pimienta, 2010); This study found that MBI at delivering key information to business users in situations of mobility to improve decision-making and action taking. But limited remote access to operational systems deprives the mobile user of taking actions in situations of mobility. Additionally, none-pervasiveness of connectivity currently prevents real ubiquity of MBI. Wireless connections are facing technological difficulties (limited wireless coverage as 3G or WiFi are mainly in cities).

6. **(**Hernaus, Pejic, & Rebac, 2010); This study found that in most of the observed Croatian companies decisions are made by simultaneously combining objective data and information with intuitive feelings and experience. Almost in 60% of cases decisions are made on the basis of data but they are in the same time corroborated with managerial intuition and their previous experience. Even more, 13% of respondents said

that in their companies decisions were made exclusively according to the available information.

7. (Evans, 2002); This book found that MBI faces considerable challenges. There are two main types of challenges to adoption business barriers and technology barriers. Some other factors that could induce limits and advantages refer to cultural aspects, geographic aspects, political and regulatory aspects, pricing factors for Internet access, and the penetration rate of the wired Internet within different countries

On the other hand, this result is inconsistent with other previous studies:

1. (McDowell, 2008); This study found that mobilizing an organization's workforce was always a costly endeavor that might not be offset by the savings from resulting efficiencies and benefits. One reason for this inconsistency is that; this study had been conducted on year 2006. From my point of view, that these beliefs are largely becoming relics of the past.

Table (4.17): Means and Test values for "The effect of Jawwal maturity level of implementing MBI on using MBI in decision-making process at Jawwal"

	Item	Mean	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	Jawwal has a technology strategy (IT systems are frequently updated and applications are frequently developed to adapt with the rapid acceleration in technologies)	4.39	87.75	40.03	0.000*	2
2.	Jawwal employees enjoy the required competencies to use new technologies.	3.90	78.05	19.80	0.000*	7
3.	Jawwal has a mobile strategy (Program initiatives selection of applications to mobilize which leads to etc..).	4.30	85.97	30.70	0.000*	4

	Item	Mean	Proportional mean (%)	Test value	P-value (Sig.)	Rank
4.	I surf my work E-mail by my smartphone or tablet.	4.41	88.25	33.22	0.000*	1
5.	I do collect the substantial related information about the work problems before making decisions.	4.32	86.43	38.98	0.000*	3
6.	I tend to use voluntarily my smartphone to collect information which I need in decision making, install some applications and store needed information and reports to ease my work.	3.91	78.29	22.10	0.000*	6
7.	I encourage my company to build and implement MBI and if it is optional, I'll use it.	4.18	83.53	28.20	0.000*	5
8.	Business challenges (strategy, maturity level and ROI measures) will not prevent implementing MBI in Jawwal.	3.02	60.46	0.38	0.353	8
9.	Technical challenges (diverse standards for applications and networks, spotty coverage, low bandwidth, perceived lack of security, diversity of devices, slow response times, primitive user interfaces, and numerous other factors) will not prevent implementing MBI in Jawwal.	2.76	55.24	-4.24	0.000*	9
	All paragraphs of the field	3.91	78.16	37.06	0.000*	

* The mean is significantly different from 3

4.2.1.5 Sub hypothesis 5:

There exits significant positive effect of the level of business need for creating a MBI implementation at the level (α ≤ 0.05) on using MBI in decision-making process in Jawwal Company.

Table (4.18) shows the following results:

The mean of paragraph #6 "If you are really having mobile applications to immediate access and manipulate the valuable resource in your database securely, will that help you in decision making process?" equals 4.42 (88.37%), Test-value = 41.99, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that Jawwal employees are very need of implementing MBI system and they think that MBI system will enhance their decision making process.

The mean of paragraph #9 "All hierarchal levels of Jawwal employees are in need of implementing MBI not only executives or managers or mobile workers, a sales representative who is only in the office occasionally needs to access information in a meeting down the hall through his mobile." equals 4.30 (86.08%), Test-value = 34.84, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that all management levels in Jawwal take decisions which are based on information available. They think that MBI system is a very good solution for them.

The mean of paragraph #7 "With MBI I no longer need to spend time in the office, or forced to go back to it, or taking up other employees' time by calling in asking for account details, I can on the road view data needed to prepare for my work, access records, and finish some pending transactions so I can focus purely on my main work." equals 4.29 (85.84%), Test-value = 29.89, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents

agreed to this paragraph. This result shows that Jawwal employees need to have place and time flexibility to be very affective in their work and decision making process. They see MBI system which is place and time independent is a solution for that.

The mean of paragraph #1 "I need real time updates of information and reports which I need in decision making process when I am out of office." equals 4.29 (85.82%), Test-value = 31.66, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that Jawwal employees use health ways in decision making process by searching for updated information which they need so they think that MBI system will apply that for them.

The mean of paragraph #2 "The job nature enhances using MBI at Jawwal." equals 4.20 (83.92%), Test-value = 35.12, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that Jawwal employee's jobs depend on time and place independent so they required being ready any time and at any place which is possible with MBI system only.

The mean of paragraph #8 "Workers who cannot retrieve vital information for decision-making process simply aren't as efficient and successful as those who can." equals 4.16 (83.29%), Test-value = 29.89, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that Jawwal employees use a very health way in their decision making process which is not only related information but also vital (the most updated) information.

The mean of paragraph #4 "The MBI new technologies will complement existing investments at Jawwal." equals 4.01 (80.26%), Test-value = 28.26, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that Jawwal employees really need MBI system which is complementing their existing one to perform their work on effective system that overcomes constrains in the existing system.

The mean of paragraph #5 "Implementing MBI considers a competitive advantage for your company." equals 4.01 (80.20%), Test-value = 26.55, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows that Jawwal employees really appreciate MBI system and will adopt it to face their competitors by making proactive decisions.

The mean of paragraph #3 "I feel that decisions at Jawwal need to be taken on time and not to be delayed" equals 4.00 (80.07%), Test-value = 26.00, 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 paragraph is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to this paragraph. This result shows decisions at Jawwal are time critical so Jawwal need system that enable their employees to make decisions on time and not to delay them so that not to lose business opportunities.

The mean of the field "**The effect of the level of business need for creating a MBI implementation on using MBI in decision-making process at Jawwal**" equals 4.19 (83.75%), Test-value = 53.78, 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 field is significantly greater than the hypothesized value 3. We conclude that the respondents agreed to field of "**The level of business need for creating a MBI implementation affects on decision-making process at Jawwal** ". This result is supported by the following previous studies:

1. (QlikView, 2011); This study found that after implementing MBI in DE HYPOTHEEKSHOP, the results are: 30% average increase in customer conversion rates, 90% of regulatory compliance inquiries answered in one day, 10% reduction in

operating costs, 50% reduction in reporting time, and 15% reduction in marketing spend.

2. (MicroStrategy, 2011); This study found that MBI helps to know what is happening in the supply chain real-time, enabling you to make rapid decisions to optimize performance and to strengthen your negotiations on price and quality and gives them the right information to take the right action at the right time.

3. (Dresner, 2011); this study found that a majority of user respondents continue to view MBI as critical or important. Overall MBI user penetration increased over June 2010. The demand for executive use of MBI further solidified its top spot (top priority within ~ 80% of organizations) – with a slight uptick in the requirement for customers and suppliers.

4. (Airinei & Homocianu, 2010); this study found that MBI approach is just another way of sustaining the competitive advantage. But it might generate an obvious difference between two high-rated competitors within an environment with equal access to capital, technology, market research, customer data and distribution facilities because of the people behavior and above all because of the quality and speed of the decisions they make. Moreover, the integration of all data channels can offer a broader analytical perspective on the business for any such competitor.

5. (Hernaus, Pejic, & Rebac, 2010); This study found that 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.

6. (Kotorov, 2007); This study found that a low-cost MBI solution that does not require additional infrastructural investments drives up the per-user return on investment (ROI), and as mobile computing spreads through the ranks to all employees, the ROI increases exponentially

7. (Evans, 2002); This book found that with MBI business can be conducted anytime and anyplace in order to meet the informational and transactional demands of end users, remove former process and technology bottlenecks, and hence increase customer satisfaction, revenues and productivity, and reduce costs.

On the other hand, this result is inconsistent with other previous studies:

1. (McDowell, 2008); this study found that mobilized workers were a specialized subgroup of employees who represented a small fraction of any organization's overall workforce so it was perceived to be costly, complex and a security nightmare. The inconsistency may return to the year and the sample that this study was conducted on. Since researcher found that more than 40% of Jawwal employees are mobilized workers.

Table (4.18): Means and Test values for "The effect of the level of business need for creating a MBI implementation on decision-making process at Jawwal"

	Item	Mean	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	I need real time updates of information and reports which I need in decision making process when I am out of office.	4.29	85.82	31.66	0.000*	4
2.	The job nature enhances using MBI at Jawwal.	4.20	83.92	35.12	0.000*	5
3.	I feel that decisions at Jawwal need to be taken on time and not to be delayed.	4.00	80.07	26.00	0.000*	9
4.	The MBI new technologies will complement existing investments at Jawwal.	4.01	80.26	28.26	0.000*	7
5.	Implementing MBI considers a competitive advantage for your company.	4.01	80.20	26.55	0.000*	8
6.	If you are really having mobile applications to immediate access and manipulate the valuable resource in your database securely, will that help you in decision making process?	4.42	88.37	41.99	0.000*	1

	Item	Mean	Proportional mean (%)	Test value	P-value (Sig.)	Rank
7.	With MBI I no longer need to spend time in the office, or forced to go back to it, or taking up other employees' time by calling in asking for account details, I can on the road view data needed to prepare for my work, access records, and finish some pending transactions so I can focus purely on my main work.	4.29	85.84	34.90	0.000*	3
8.	Workers who cannot retrieve vital information for decision-making purposes simply aren't as efficient and successful as those who can.	4.16	83.29	29.89	0.000*	6
9.	All hierarchal levels of Jawwal employees are in need of implementing MBI not only executives or managers or mobile workers, a sales representative who is only in the office occasionally needs to access information in a meeting down the hall through his mobile.	4.30	86.08	34.84	0.000*	2
	All paragraphs of the field	4.19	83.75	53.78	0.000*	

* The mean is significantly different from 3

4.2.2 Hypothesis 2

There are no significant statistical differences at significant level (α≤0.05) among the respondents' answers regarding the Role of Implementing MBI in the Decision Making Process due to the personal traits of the respondents (Age, Gender, Educational Attainment, Field of Specialization, Managerial level, Duty station, Department, Percentage of time allocated for outdoor work, Percentage of time allocated for smartphones against PCs/Laptops, Total years of Experience and Years of Experience in Jawwal).

Table (4.19) shows that the p-value (Sig.) is greater than the level of significance α = 0.05 for each personal trait, then there is insignificant difference in respondents' answers regarding the Role of Implementing MBI in the Decision Making Process due to each personal trait. This is acceptable result since it encourages implementing MBI system in Jawwal Company. It can be concluded that the personal traits have no effect on the Role of Implementing MBI in the Decision Making Process. That because of the following:

1. Most of Jawwal employees are at the same age period and the same educational level.
2. All respondents of different gender, educational attainment and field specialization use smartphones and benefit from their features.
3. All respondents of different years experience, duty station, departments and management levels need system that overcomes constrains that they face in existing system. They also need to enhance their decisions and be effective in their jobs.
4. All respondents' mobile devices are considered smartphones.
5. Most of respondents are considered mobile workers since they allocated all or part of their work time in outdoor tasks.

This result is supported on most personal traits by the following previous studies: (Bolbol, 2011), (Shaban. 2011), (Bahloul, 2011) and (Elshiekdeeb, 2008).
On other hand the inconsistent with some personal traits with the mentioned previous studies returned to the different in the topic of the study since this study is the first study that links between MBI system and decision making process.

Table (4.19): ANOVA test for Personal Traits

No	Personal Trait	Test Name	Test Value	P-value(Sig.)
1.	Age	ANOVA	0.928	0.396
2.	Educational Attainment	ANOVA	0.320	0.726
3.	Field of Specialization	ANOVA	2.286	0.079
4.	Total years of Experience	ANOVA	0.700	0.553
5.	Years of Experience in Jawwal	ANOVA	1.830	0.162

CHAPTER FIVE

CONCLUSION FINDINGS &

RECOMMENDATIONS

This chapter consists of the following section:

5.1 Introduction

5.2 Findings

5.3 Conclusion

5.4 Recommendations

5.5 Suggestions for Future Researches

5.1 Introduction

This research concentrates efforts to explore the potential of wireless technologies especially MBI technology to enhance decision making process. The aim of this research was to examine the impact of implementing MBI on decision-making process in Jawwal. This chapter will consolidate the main results of the previous chapters in the light of research problem and objectives and focuses 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 MBI System in Jawwal. Suggestions obtained would be taken into consideration for future enhancements and implementation

5.2 Findings

The research investigates the role of Implementing MBI in the decision making process and summarizes the following findings based on the data analysis and findings:

- 81.08% of the respondents agree that there is significant positive effect of implementing MBI on Decision Making Process at Jawwal Company.

- 83.49% of the respondents agree that there is significant positive effect of MBI platforms' features on Decision Making Process at Jawwal Company, depending on the following results.

- Smartphones have broadened the bounds of communications, enabling graphical Web access that goes far beyond the email capabilities of earlier generations of cellular phones.

- Smartphones and Jawwal credentials can prevent accessing its information of lost/stolen/compromised devices.

- The MBI platforms (mobile devices and planets as iPhone, iPad , android devices as Galaxy etc) have multi-touch screens (Tap to drill and explore, Pinch to zoom, Swipe↑↓ to scroll, Swipe←→ to turn page, Tap through workflows, Rotate to visualize, Tap & hold for tooltips, Tap to link and Shake to refresh) which allow user to call up and interact with the information that he need quickly and easily.

- Integrating Google Mapping directly into mobile reports which by GPS enable to visualize location-specific data, trends, and analysis on maps.

- Sensor-based Query enable to prompt input directly from mobile sensors which integrating with sensors and inputs to provide context to applications.

- MBI platforms advantages encourage accessing BI content (email, work programs) on it more than a laptop in case of their light weight, easier carry, larger screens, processing power, dual wireless connectivity (GSM & WLAN) and storage capacity.

- MBI platforms that can be used at the time of decisions making enhance the efficiency of work by providing the most current territory information at user fingertips, instant and easy accessing to analytics and helping in retrieving account information, so he can make informed business decisions and take immediate actions anytime, anywhere.

- Smartphones will help in changing the work nature and decision making process.

- 80.81% of the respondents agree that there exists significant positive effect of MBI functions on Decision Making Process at Jawwal Company, depending on the following results.

- More than one MBI function can be used at once to achieve the related target such as for example: alerts, reports and dashboard.

- Instantly alerted by mobile device when action happens, a new report is published and when data has changed within the reports etc, helps user to be even more effective in his job, no matter where he is.

- Access, navigate, and analyze familiar reports by mobile device facilitate work and help in taking affective decisions.

- When charts, tables and figures are delivered to mobile on one integrated screen which summarized latest updates data and reports, help user to take effective decisions.

- MBI dashboards provide broad array of data visualizations which assist in adopting proper decisions and provide the ability to analyze current and future situations.

- Receiving reports that are dynamically filtered with location-specific information, via smartphones, ("location-aware" intelligence) enable user to analyze and make decisions which are relevant to where he is.

- With MBI functions real time data is available for using so they reduce lag time and eliminate the desk bound constraints for receiving information to the decision maker.

- MBI functions assist in assigning clear responsibilities for the employees and implementing decentralization in decisions-making process.

- 78.68% of the respondents agree that there exists significant positive effect of MBI applications on Decision Making Process at Jawwal Company, depending on the following results.

- MBI social applications (face book, twitter, Email etc.) enhance positive relations among employees and provide them with the ability to contact with the different concerned parties (customers, distributers and clients).

- Delivering BI applications on mobile devices so that decisions can be made when and where business situations call for them, administrative tasks can be decreased and optimum levels of productivity can be maintained at all times.

- Jawwal employees can take the advantages of MBI social applications and collaborative exchange to share their decisions and actions that assist in overcoming complicated obstacles. Users can share their perspectives with others by highlighting an area for discussion and then sending an email with comments, insights and actions to the appropriate people.

- MBI applications enable to follow up our tasks remotely (away from the office), so Jawwal team does not need to be office-based; they can be more flexible in our day-to-day work.

- For security purposes MBI data/content resides on server so mobile web-based applications is better than mobile native applications to access information by them.

- Mobile based Applications will rapidly replace the desktop applications and give the ability to integrate with enterprise applications such as CRM.

- 78.16% of the respondents agree that there is significant positive effect of Jawwal maturity level of implementing MBI on using MBI in Decision Making Process at Jawwal Company, depending on the following results.

- Jawwal has a technology strategy (IT systems are frequently updated and applications are frequently developed to adapt with the rapid acceleration in technologies)

- Jawwal employees enjoy the required competencies to use new technologies.

- Jawwal has a mobile strategy (Program initiatives selection of applications to mobilize which leads to employees being effectively benefited from smartphones).

- 88.25% of the respondents surf their work E-mail by smartphones or tablets.

- 86.43% of the respondents do collect the substantial related information about the work problems before making decisions.

- 78.29% of the respondents tend to use voluntarily their smartphones to collect information which they need in decision making, install some applications and store needed information and reports to ease their work.

- 83.53% of the respondents encourage their company to build and implement MBI and they'll use it if it is optional.

- Technical challenges (diverse standards for applications and networks, spotty coverage, low bandwidth, perceived lack of security, diversity of devices, slow response times, primitive user interfaces, and numerous other factors) may affect negatively implementing MBI in Jawwal.

- 83.75% of the respondents agree that there is significant positive effect of the level of business need for creating a MBI implementation on using MBI in Decision Making Process at Jawwal Company, depending on the following results.

- 85.82% of the respondents need real time updates of information and reports which they need in decision making process when they are out of their offices.

- The job nature enhances using MBI at Jawwal.

- 80.07% of the respondents feel that decisions at Jawwal need to be taken on time and not to be delayed.

- The MBI new technologies will complement existing investments at Jawwal.

- Implementing MBI considers a competitive advantage for your company.

- 88.37% of the respondents think that will help them in decision making process if they are really having mobile applications to immediate access and manipulate the valuable resource in their database securely.

- 85.84% of the respondents think that with MBI they no longer need to spend time in the office, or forced to go back to it, or taking up other employees' time by calling in asking for account details. Instead of that they can on the road view data needed to prepare for their work, access records, and finish some pending transactions so they can focus purely on their main work.

- Workers who cannot retrieve vital information for decision-making purposes simply aren't as efficient and successful as those who can.

- All hierarchal levels of Jawwal employees are in need of implementing MBI not only executives or managers or mobile workers, a sales representative who is only in the office occasionally needs to access information in a meeting down the hall through his mobile.
- There are no significant statistical differences regarding the role of implementing MBI in the Decision Making Process due to the personal traits of the respondents.

5.3 Conclusion

This research tries to apply a new system which will develop the old one in Jawwal Company and give solutions for the most of its problems. MBI is really advanced system which overcomes time and place constraints that exist in the previous system. MBI increases work efficiency and productivity since it enhances decision making process. The key factors of MBI system are that it is considered time and place independent system as soon as it benefits from the features of smartphones and planet computers.

Jawwal Company as leader Palestinian company is ready for implementing MBI system. Its employees have the requirements for Implementing MBI system and they will accept, interact and benefit from it. They really need MBI system to overcome the constraints in the exits one and to promote of their performance and decisions.

As well as it can be concluded that this research achieved its objectives since:
- This research suggests MBI system which will overcome the existing constrains in the current system.
- 81.08% of the respondents agree that there is significant positive effect of implementing MBI on Decision Making Process at Jawwal Company. That is acceptable and supports above objective.
- 83.49% of the respondents agree that there is significant positive effect of MBI platforms' features on Decision Making Process at Jawwal Company. This is acceptable and supports above objective.
- 80.81% of the respondents agree that there is significant positive effect of MBI functions on Decision Making Process at Jawwal Company. This result is acceptable and supports implementing MBI system.

- 78.68% of the respondents agree that there is significant positive effect of MBI applications on Decision Making Process at Jawwal Company. That supports the above.
- 78.16% of the respondents agree that there is significant positive effect of Jawwal maturity level of implementing MBI on using MBI in Decision Making Process at Jawwal Company. So it can be concluded that Jawwal is very ready for implementing this system.
- 83.75% of the respondents agree that there exists significant positive effect of the level of business need for creating a MBI implementation on using MBI in Decision Making Process at Jawwal Company. So it can be concluded that Jawwal is in very need for implementing this system.
- 86.08% of the respondents agree that all hierarchal levels of Jawwal employees are in need of implementing MBI. So that supports Implementing this system.
- The only barrier for implementing MBI system is some technical challenges.

5.4 Recommendations

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 and evaluate integrated channel partnerships similar to those formed between the wireless e-mail providers and carriers.

MBI system can help Jawwal company to overcome time and place constraints that exist in its system and increase work efficiency and productivity since it enhances decision making process as well as action taking process.

To develop this system, Jawwal 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. Data Source - valuable information that employees need to access anytime.
4. The databases can be in different places and connected to each other.
5. MBI server must have a software application to manage the employees' requests and query to the database.

6. Data to be resides on secured servers.

7. Smartphones or tablet computers for all employees.

In order to improve the capability of MBI System future works can be undertaken to enhance the system as follow:

1. Develop MBI system to be integrated solution to the existing system.

2. Develop process of MBI System especially in security and privacy protocols.

3. Customize MBI applications for all different employees' tasks.

4. Unify the types of smartphones or tablet computer to be on one type or one operating system type.

5. Allow remote access as VPN access.

6. Benefit from MBI social applications.

7. Benefit from all MBI functions.

8. Pay the cost of MBI access and not to be on employee's accounts.

5.5 Suggestions for Future Researches:

Due to the importance of the MBI further research can be carried on:

1. The effect of MBI on the performance of the employees.
2. The effect of MBI on strategic decisions of the firms.
3. The role of MBI in action taking process.
4. The role of MBI in maintains customer loyalty and customer satisfaction.
5. The effect of MBI on the firm's market share.
6. The effect of MBI on product and service development.
7. The role of MBI in maintains Competitive Advantages.
8. The effect of MBI on the ROI.

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APPENDICES

الجامعة الإسلامية – غزة		رقم الاستبانة:
الدراسات العليا –ماجستير إدارة الأعمال		تاريخ تعبئة الاستبانة:

أخي الكريم /أختي الكريمة

السلام عليكم ورحمة الله وبركاته...

يتشرف الباحث بأن يضع بين أيديكم استبانة لرسالة ماجستير بعنوان "**أثر تطبيق ذكاء الأعمال الإداري باستخدام الهواتف الذكية ((MBI) Mobile Business Intelligence) على عملية اتخاذ القرارات :دراسة حالة – شركة الاتصالات الخلوية الفلسطينية جوال**" لاستكمال متطلبات الحصول على درجة الماجستير في إدارة الأعمال من الجامعة الإسلامية – بغزة.

وتقترح هذه الدراسة تطبيق نظام ذكاء الأعمال الإداري باستخدام الهواتف الذكية (MBI) لشركة جوال؛ وذلك لزيادة كفاءة العمل، ولتسهيل عملية صنع القرارات. حيث يعتبر الـ(MBI) تطوير لاستخدام نظام ذكاء الأعمال الإداري التقليدي المستخدم (BI) المستخدم على أجهزة الكمبيوتر ليمتد استخدامه إلى الهواتف المحمولة. ويعرف الـ(BI) بأنه مزيج من العمليات، والتخصصات، والقدرات التنظيمية، والتقنيات، المرتبطة بجمع ودمج بيانات الأعمال وتكاملها؛ لتوفير إمكانية الوصول للبيانات، وتجسيدها، وتقديم معلومات قابلة للتنفيذ عن طريق مؤشرات الأداء الرئيسة (KPI's).

يمَكِّن الـ(MBI) مستخدمي الهواتف الذكية، وأجهزة الكمبيوتر اللوحية (مثل الأي باد)، وغيرها من الأجهزة المحمولة؛ للوصول والتفاعل مع بيانات الأعمال من خلال إنتاج التقارير وإجراء التحليلات. فيعتبر الـ(MBI) نظام موجه للمستخدم ليساعده على اتخاذ قرارات استنادا إلى مصادر متعددة: البيانات، والأشخاص، والبيئة. ومن خلال الـ(MBI) يمكن للمستخدمين إنشاء ومشاركة المعرفة وتحليل المعلومات عبر مجموعات أو الشركة ككل. حيث تساعد الهواتف الذكية المستخدمة في الـ(MBI) موظفي الشركة على طرح الأسئلة والحصول على إجاباتها ومشاركة الخبرة وتتبع مسار عملهم ومدى صحته وتبصيرهم بكل ما يحتاجون إليه في أي مكان وأي وقت. بالإضافة إلى المميزات التفاعلية التي تعمل على تسهيل وتطوير استخدام الـ(MBI) مثل سهولة تحديد وتنقية المعلومات بفضل تقنية اللمس، وسحبها أو تحميلها على جهاز المستخدم.

أدوات الـ(MBI) مثل الإنذارات، وعرض التقارير أو الرسوم البيانية، ولوحة عرض المعلومات المتكاملة؛ لا تزال محور معظم المستخدمين. حيث تُعرف لوحة عرض المعلومات المتكاملة بأنها أداة التقارير التي تمثل بيانياً

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مؤشرات الأداء الرئيسة على شاشة واحدة، وذلك باستخدام الأدوات البصرية الأساسية مثل المخططات والرسوم البيانية والجدوال والمقاييس.

تمكن تطبيقات الـ(MBI) المستخدمين من الوصول إلى العمل عن طريق الهواتف الذكية أو أجهزة الكمبيوتر اللوحية (مثل الأي باد)؛ لإدارة جميع إجراءات العمل، و الحصول على المعلومات، والشروع في المعاملات، مما يجعل المعلومات تصل حية عن طريق البصر، واللمس، والصوت، ودقة تدفق المعلومات لتلك التطبيقات.

ولتحقيق الهدف من الدراسة صُممت هذه الاستبانة من جزأين:

الجزء الأول : يشتمل على البيانات الأولية.

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

المحور الأول : أثر مميزات الهواتف الذكية المستخدمة في ذكاء الأعمال الإداري على عملية اتخاذ القرارات في شركة جوال.

المحور الثاني : أثر أدوات ذكاء الأعمال الإداري على عملية اتخاذ القرارات في شركة جوال.

المحور الثالث : أثر تطبيقات ذكاء الأعمال الإداري على عملية اتخاذ القرارات في شركة جوال.

المحور الرابع : أثر مستوى نضج شركة جوال لتطبيق ذكاء الأعمال الإداري على عملية اتخاذ القرارات في شركة جوال.

المحور الخامس : أثر مستوى حاجة شركة جوال لتطبيق ذكاء الأعمال الإداري على عملية اتخاذ القرارات في شركة جوال.

آمل تكرمكم بقراءة كل محور وعباراته، ومن ثم الإجابة بوضع علامة (X) على العبارة التي ترونها مناسبة، مع العلم أن مساهمتكم في تعبئة الاستبانة سيكون لها أكبر الأثر في الحصول على النتائج المرجوة. سيتم التعامل مع البيانات بسرية تامة، وستستخدم فقط في أغراض البحث العلمي.

وتقبلوا فائق التقدير والاحترام،

الباحث

م.هاني محمود الكرنز

أغسطس2012

الجزء الأول :المعلومات الشخصية:

***الرجاء التكرم بوضع إشارة (√) أو ادراج رمز (√ أو ×) أمام الإجابة الصحيحة:

1. الجنس

   □ ذكر □ أنثى

2. الفئة العمرية

   □ أقل من 25 سنة □ 25- أقل من 30 سنة □ 30- أقل من 40 سنة □ 40-أقل من 50 سنة □
   50 سنة فما فوق

3. المؤهل العلمي

   □ ثانوية عامة □ دبلوم متوسط □ بكالوريوس □ دراسات عليا

4. التخصص العلمي

   □ تجارة □ هندسة □ نظم معلومات □ تخصص آخر حدد
   _____

5. عدد سنوات الخبرة الكلية

   □ أقل من 5 سنوات □ 5- أقل من 10 سنوات □ 10- أقل من 20 سنة □ 20 سنة فأكثر
   حدد سنوات الخبرة في شركة جوال _____

6. المستوى الإداري

   □ إدارة عليا (مدير عام/ مدير إدارة/ مدير دائرة)
   □ إدارة وسطى (رئيس قسم/ رئيس وحدة)
   □ إدارة دنيا (مهندس/ إداري/...)

7. مكان العمل

   □ قطاع غزة □ الضفة الغربية

8. الإدارة

   □ الفنية □ التجارية □ المالية □ اللوازم والتوريدات □ الموارد البشرية

9. نوع جهاز هاتفك المحمول _____

10. نسبة وقت العمل الذي تقضيه خارج المكتب (عمل ميداني) خلال يوم عمل _____ (الرجاء
    تحديد نسبة مؤية)

11. نسبة استخدامك للهاتف المحمول في العمل مقارنة باستخدامك لجهاز الكمبيوتر _____ (الرجاء
    تحديد نسبة مؤية)

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

المحور الأول: أثر مميزات الهواتف الذكية المستخدمة في ذكاء الأعمال الإداري على عملية اتخاذ القرارات في شركة

جوال:

(أرجو الإجابة على البنود التالية بوضع إشارة X أو ادراج الرمز(×) أو حرف (X) باللغة الإنجليزية في المكان الذي يتوافق مع رأيك، بحيث تتدرج الإجابات من موافق بشدة كأعلى الاستجابات إلى غير موافق بشدة كأدنى الاستجابات.)

*****: استطاعت الهواتف الذكية تغيير طبيعة عملي : الإجابة مثلاً موافق تقع في الخانة الثانية تحت درجة (4)،

كما هو موضح في الجدول التالي:

غير موافق بشدة	غير موافق	محايد	موافق	موافق بشدة
1	2	3	4	5
			X	

غير موافق بشدة 1	غير موافق 2	محايد 3	موافق 4	موافق بشدة 5	البند
					1. الهواتف الذكية (مثل الآي فون، والآي باد، وأجهزة الأندرويد مثل الجلاكسي ..) وسعت حدود الاتصالات، ومكَّنت الوصول إلى الويب الرسومية التي تتجاوز بكثير قدرات البريد الإلكتروني من الأجيال السابقة من الهواتف الخلوية.
					2. تتمتع الهواتف الذكية ببرامج أمان وحماية، بالإضافة إلى برامج الشركة بحيث تمنع الوصول غير الآمن للمعلومات عن طريق الأجهزة المفقودة أو المسروقة أو المشتبه بها.
					3. شاشات الهواتف الذكية تعمل بميزات اللمس المتعددة (اضغط باصبع للاستكشاف، بكلا الاصبعين للتكبير، حرك ↑ ↓ للتمرير، حرك ←—→ لتحويل الصفحة، تدويرالأصابع لتصوير ، انقر مع الاستمرار لتلميحات الأدوات، انقر لربط واهتز لتحديث) تسمح لي استدعاء والتفاعل مع المعلومات التي احتاجها بسرعة وسهولة فائقة.
					4. تتيح الهواتف الذكية المزودة بتقية الـ (GPS) دمج "خرائط جوجل" المتوفرة عليها مباشرة في تقاريري المتنقلة التي تمكنني من وضع تصور للبيانات الخاصة بالموقع، والاتجاهات، والتحليل على الخرائط بنظام تحديد المواقع.
					5. تستخدم الهواتف الذكية أدواتها مثل (الكاميرا، الأشعة تحت الحمراء، البلوتوث،GPS Wi-Fi, إلخ..) كأجهزة استشعار مرتبطة بتطبيقاتها لتسهيل العمل وتوفير الوقت والتقليل من عدد الأدوات الخارجية المستخدمة مثل الكاميرا الخارجية، و جهاز الباركود، والبوصلة، والـ (GPS)، ومحفظة النقود، والشيكات، والأوراق إلخ...
					6. تشجع مميزات الهواتف الذكية على استخدامها في العمل (تصفح الإيميل، برامج العمل ..) بالتوازي مع أجهزة الكمبيوتر، إذا لم يفوقها؛ لخفة وزنها وسهولة حملها وتتمتعها بخاصية الاتصال المزدوج (GSM & WLAN) بالإضافة إلى مميزات حجم الشاشات، والقدرة المعالجية، والسعة التخزينية.
					7. الهواتف الذكية تعزز كفاءة عملي من خلال توفير المعلومات المحدثة، والوصول اللحظي والسهل والآمن إلى التحليلات، والمساعدة في استرجاع المعلومات المطلوبة؛ لاتخاذ قرارات مستنيرة وإجراءات مناسبة في أي مكان وأي وقت.
					8. ستُسهم الهواتف الذكية في تغيير طريقة العمل وطريقة اتخاذ القرارات.

المحور الثاني: أثر أدوات ذكاء الأعمال الإداري على عملية اتخاذ القرارات في شركة جوال:

غير موافق بشدة 1	غير موافق 2	محايد 3	موافق 4	موافق بشدة 5	البند
					1. يمكن استخدام أكثر من أداة من أدوات الـ (MBI) في وقت واحد مثل الإنذارات، وعرض التقارير أو الرسوم البيانية، ولوحة عرض المعلومات المتكاملة؛ لتحقيق هدف مشترك.
					2. أن يتم تنبيهي عن طريق هاتفي المحمول لحظة وقوع الحدث، وعند نشر تقرير جديد، وعند تغير البيانات في التقارير، وإلخ..؛ يساعدني في أن أكون أكثر فعالية في عملي في أي وقت وأي مكان.
					3. الوصول إلى التقارير المألوفة لي عندما أحتاجها، والتنقل خلالها، وتحليلها، باستخدام هاتفي المحمول يسَهِّل عملي ويساعدني في اتخاذ قرارات فعَّالة.
					4. عندما يتم تزويدي بالمخططات، والجداول، والرسوم البيانية، على شاشة واحدة متكاملة على هاتفي المحمول، والتي تلخص آخر تحديثات البيانات والتقارير؛ تساعدني على اتخاذ قرارات فعَّالة.
					5. تتيح لوحة عرض المعلومات المتكاملة نطاق عريض من التصوير(مخططات، جداول، رسوم بيانية، وأجهزة قياس) يساعد في اتخاذ قرارات حكيمة، وتحليل المواقف الحالية والمستقبلية.
					6. تمكِّن خاصية ربط انتقاء المعلومات (filtering) في التقارير مع خواص الهواتف الذكية من سرعة اتخاذ القرارات، مثل أن يتم انتقاء المعلومات من التقارير بواسطة الهواتف الذكية أتوماتيكياً بناءً على موقع العمل مثلاً.
					7. توفر أدوات الـ (MBI) البيانات في لحظة الاحتياج لها؛ فتوفر بالتالي الوقت، وتقضي على معوقات وصول المعلومات لمتخذ القرار. (من المعوقات مثلاً الحاجة إلى استمرار تواجده في المكتب أو إضاعة وقت الزملاء الآخرون بالاتصال عليهم ليزوده بالبيانات والتقارير التي يحتاجها)
					8. تساعد أدوات الـ (MBI) في إسناد مسئوليات واضحة للموظفين، وتحقيق اللامركزية في عملية اتخاذ القرارات.

المحور الثالث: أثر تطبيقات ذكاء الأعمال الإداري على عملية اتخاذ القرارات في شركة جوال:

غير موافق بشدة 1	غير موافق 2	محايد 3	موافق 4	موافق بشدة 5	البند
					1. تساعد البرامج الاجتماعية (الإيميل- الفيس بوك- تويتر إلخ..) المتاحة على الهواتف الذكية على تعزيز العلاقات الايجابية بين الموظفين وتمكّنهم من التواصل مع الأطراف المعنية (الزبائن، والموردين، والموزعيين).
					2. باستخدام برامج الـ(BI) على الهواتف المحمولة؛ نستطيع الوصول إلى المعلومات، وتحليلها، واتخاذ القرارات والإجراءات في لحظة ومكان وقوع الحدث؛ وبالتالي تقل المهام الإدارية و تزيد الإنتاجية.
					3. أستطيع الاستفادة من مزايا برامج الـ (MBI) الخاصة بالتعاون في تبادل المعرفة والمشاركة في القرارات والإجراءات للتغلب على المعيقات التي توجهنا. (يستطيع المستخدمون مشاركة وجهات نظرهم مع الآخرين بتسليط الضوء على مساحة للمناقشة وثم إرسال رسالة بالبريد إلكتروني مع التعليقات والأفكار والأعمال للأشخاص المناسبين)
					4. تمكّنا تطبيقات الـ(MBI) من متابعة أعمالنا عن بعد (من خارج المكتب)؛ فبذلك لا نحتاج (موظفو جوال) أن نرتبط في مكاتبنا وتسمح لنا بمرونة أعلى في متابعة أعمالنا اليومية.
					5. لحماية بيانات تطبيقات الـ (MBI)، تخزن المعلومات على السيرفر بدلاً من تخزينها على الهاتف المحمول؛ وبالتالي يكون من الأفضل تصفحها عن طريق متصفح الهاتف المحمول (web-browser).
					6. تدريجياً، ستحل برامج الـ (MBI) محل برامج الكمبيوتر، وستُمكّننا من استخدام برامج الشركة مثل (CRM).

المحور الرابع: أثر مستوى نضج شركة جوال لتطبيق ذكاء الأعمال الإداري على عملية اتخاذ القرارات:

غير موافق بشدة 1	غير موافق 2	محايد 3	موافق 4	موافق بشدة 5	البند
					1. تهتم شركة جوال بالتكنولوجيا (تعمل باستمرار على تحديث أنظمتها التكنولوجية، وتطوير برامجها، وتطبيقاتها؛ لتواكب التقدم التكنلوجي المتسارع)
					2. يتمتع موظفو جوال بالكفاءات اللازمة للتعامل مع أحدث التكنولوجيا.
					3. تُشجِّع شركة جوال موظفيها على استخدام الهواتف الذكية؛ للاستفادة الفعَّالة منها.
					4. يمكّنني تصفح إيميل عملي من خلال هاتفي المحمول.
					5. أقوم دائما بجمع المعلومات المهمة المتعلقة بالعمل واللازمة لاتخاذ القرارات قبل أن أتخذ قراراتي.
					6. استخدم هاتفي المحمول في جمع المعلومات التي احتاجها في اتخاذ القرارات، وأقوم بتحميل بعض البرامج عليه؛ لتساعدني في زيادة كفاءة عملي.
					7. أشجع شركتي على بناء وتطبيق نظام الـ (MBI)؛ وسأستخدمه حتى لو لم يكن اجبارياً.
					8. لن تعيق التحديات التجارية (مثل استراتيجية الشركة، مستوى نضجها، وقياسات العائد على الاستثمار) من تطبيق الـ (MBI) في شركة جوال.
					9. لن تعيق التحديات التقنية (مثل عدم توحيد أنظمة الهواتف، الفجوات في تغطية الشبكة أوضعف قدرتها في تحميل البيانات، الآمان والخصوصية، إلخ..) من تطبيق الـ (MBI) في شركة جوال.

المحور الخامس : أثر مستوى حاجة شركة جوال لتطبيق ذكاء الأعمال الإداري على عملية اتخاذ القرارات

في شركة جوال:

غير موافق بشدة 1	غير موافق 2	محايد 3	موافق 4	موافق بشدة 5	البند
					1. أحتاج تحديثات آنية للمعلومات والتقارير اللازمة لاتخاذ القرارات، عندما أكون خارج مكتبي.
					2. طبيعة العمل في شركة جوال تُشجِّع على تطبيق نظام الـ (MBI).
					3. أعتقد بأن القرارات في شركة جوال يجب ألا تؤجل، وأن تؤخذ في وقتها.
					4. تعتبر تقنية الـ (MBI) مكمِّلة للتقنيات المتوفرة في شركة جوال .
					5. يعتبر تطبيق نظام الـ (MBI) في شركة جوال ميزة تنافسية للشركة.
					6. إذا امتلكت برنامج على هاتفي يمكِّنُني من الوصول إلى البيانات اللازمة ومعالجتها بفعالية وآمان؛ فإن ذلك يساعدني على اتخاذ قرارات فعَّالة.
					7. يوفر الـ (MBI) وقت تحضير العمل في المكتب، أو الاضطرار إلى العودة إليه أثناء العمل الميداني، أو اضاعة وقت الزملاء بالاتصال عليهم ليزودوني بما أحتاج؛ فأستطيع وأنا في الطريق عرض ما أحتاجه من بيانات، وتقارير، وانجاز الاجراءات العالقة. وبالتالي التركيز بدقة على مهامي الرئيسة.
					8. الموظفون الذين لا يستطيعون الحصول على المعلومات اللازمة لاتخاذ القرارات في الوقت المناسب؛ ليسوا بكفاءة من يستطيع ذلك .
					9. نظام الـ (MBI) ليس مقصوراً على الرؤساء أو المدراء أو الموظفين الميدانيين، وإنما كل المستويات الإدارية في شركة جوال بحاجة إلى تطبيقه، فمشرف المبيعات المتواجد دائماً في مكتبه يحتاج أحياناً الوصول إلى بعض المعلومات أثناء تواجده في غرفة الاجتماعتات مثلاً.

Islamic University
Graduates Studies Deanery
Business Administration Dept.
College of Commerce

Dear Colleagues

The attached questionnaire is a tool of collecting data reference in order to conduct a thesis about "**The Role of Implementing Mobile Business Intelligence (MBI) in Decision making Process: Case Study - Palestine cellular communication Company (Jawwal)**" to be submitted in partial fulfillment of the requirement for MS Degree in Business Administration.

This study suggests implementing a Mobile Business intelligence (MBI) system for Jawwal to increase work efficiency and facilitate decision making process. MBI is software that extends traditional desktop BI applications for use on a mobile device. At the heart of MBI is the ability for users of smart phones, tablets, and other mobile devices to access and interact with business data by generating reports and performing analyses. MBI is user-driven business intelligence that helps people make decisions based on multiple sources of insight: data, people, and the environment. Users can create and share knowledge and analysis in groups and across organizations. MBI platforms help people ask and answer their own questions and follow their own path to insight. MBI platforms deliver insight everywhere, an application model, mobility and reassembly, and a social and collaborative experience. Business Intelligence (BI) is the combination of processes, disciplines, organizational capabilities and technologies associated with the collection and integration of business performance data; providing access, visualization and delivery of actionable information via Key Performance Indicators (KPIs) . MBI functions (i.e., View Charts/Reports, Alerts, KPI Monitoring and Dashboards) remain the focus of most users – with "KPI Monitoring" seeing the greatest increase in demand, followed by "Alerts" (the number one MBI feature). "Interactive" MBI capabilities – such "Drag and Drop", "Drill Down" and "Data Selection and Filtering" increased

slightly – as more sophisticated users/organizations mature in their use and requirements for MBI. MBI dashboard is a reporting tool that graphically represents KPIs on a single screen, utilizing basic visual tools such as charts, graphs, tables and gauges. MBI applications enable users to access your work via smartphones or tablets (I pads), to manage all their work procedures and remotely to capture data and initiate transactions, making information come alive to the user through sight, touch, and sound and providing Apps with finely-crafted information flow.

In accordance with achieving the aimed goal of this study; this questionnaire is designed in two parts:

Part one: Include the general information of study Respondents.

Part two: Include the fifth dimensions of the study, which are:

The first dimension: The effect MBI platforms' features on decision-making process at Jawwal.

The second dimension: The effect of MBI functions on decision-making process at Jawwal.

The third dimension: The effect of MBI applications on decision-making process at Jawwal.

The fourth dimension: The effect of Jawwal maturity level of implementing MBI on decision-making process at Jawwal.

The fifth dimension: The effect of the level of business need for creating a MBI implementation on decision-making process at Jawwal.

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
Eng. Hani Elkrunz

Part One: General Information:

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

1. **Gender**

   □ Male   □ Female

2. **Age**

   □ Less than 25   □ From 25 to 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 than10 years   □ 10-less than 20 years   □ 20 years and more
   Specify your experience years at Jawwal _____

6. **Managerial Level**

   □Top Management (Director/Manager)
   □ Middle Management (Head of Section/ Head of Unit)
   □ Low Management (Engineer /Administrator /…)

7. **Duty Station**

   □ Gaza Strip   □ West Bank

8. **Department**

   □ Technical   □ Commercial   □ Financial   □Corporate supply chain   □ Human Resources

9. **Model type of your personal mobile device_____**

10. **Percentage of time allocated for use mobile in your work against PC/Laptop_____**

11. **Percentage of time allocated for your out work against your desk work_____**

Part Two: Questionnaire Dimensions:

The first dimension: The effect of the features of MBI platforms on decision-making process at Jawwal:

Please indicate your agreement/disagreement with the following statements by putting the sign X in the appropriate location on a scale of 5-1 (5 = agree strongly and 1 = disagree strongly).

Item	Strongly Agree 5	Agree 4	Neutral 3	Disagree 2	Strongly Disagree 1
1. Smartphones have broadened the bounds of communications, enabling graphical Web access that goes far beyond the email capabilities of earlier generations of cellular phones.					
2. Smartphones and Jawwal credentials can prevent accessing its information of lost/stolen/compromised devices.					
3. The MBI platforms (mobile devices and planets as iPhone, iPad , android devices as Galaxy etc) have multi-touch screens (Tap to drill and explore, Pinch to zoom, Swipe↑↓ to scroll, Swipe←→ to turn page, Tap through workflows, Rotate to visualize, Tap & hold for tooltips, Tap to link and Shake to refresh) which allow me to call up and interact with the information that I need quickly and easily.					
4. Integrating Google Mapping directly into my mobile reports which by GPS enable me to visualize location-specific data, trends, and analysis on maps.					
5. Sensor-based Query enable me to prompt input directly from mobile sensors which integrating with sensors and inputs to provide context to applications.					
6. MBI platforms advantages encourage accessing my BI content (email, work programs) on it more than a laptop in case of their light weight, easier carry, larger screens, processing power, dual wireless connectivity (GSM & WLAN) and storage capacity.					
7. MBI platforms that can be used at the time of decisions making enhance the efficiency of my work by providing the most current territory information at my fingertips, instant and easy accessing to analytics and helping in retrieving account information, so I can make informed business decisions and take immediate actions anytime, anywhere.					
8. Smartphones will help in changing the work nature and decision making process.					

The second dimension: The effect of MBI functions on decision-making process at Jawwal:

Item	Strongly Agree 5	Agree 4	Neutral 3	Disagree 2	Strongly Disagree 1
1. More than one MBI function can be used at once to achieve the related target (example: alerts, reports and dashboard)					
2. To be instantly alerted by my mobile device when action happens, a new report is published and when data has changed within the reports etc, helps me to be even more effective in my job, no matter where I am.					
3. Access, navigate, and analyze familiar reports by my mobile device facilitate my work and help in taking affective decisions.					
4. When charts, tables and figures are delivered to my mobile on one integrated screen which summarized latest updates data and reports, help me to take effective decisions.					
5. MBI dashboards provide broad array of data visualizations which assist in adopting proper decisions and provide the ability to analyze current and future situations.					
6. Receiving reports that are dynamically filtered with location-specific information, via smart phones, ("location-aware" intelligence) enable me to analyze and make decisions which are relevant to where I am.					
7. With MBI functions real time data is available for my use so they reduce lag time and eliminate the desk bound constraint for receiving information to the decision maker.					
8. MBI functions assist in assigning clear responsibilities for the employees and implementing decentralization in decisions-making process.					

The third dimension: The effect of MBI applications on decision-making process at Jawwal.

Item	Strongly Agree 4	Agree 3	Neutral 2	Disagree 1	Strongly Disagree 0
1. MBI social applications (face book, twitter, Email etc.) enhance positive relations among employees and provide them with the ability to contact with the different concerned parties (customers, distributers and clients).					
2. Delivering BI applications on mobile devices so that decisions can be made when and where business situations call for them, administrative tasks can be decreased and optimum levels of productivity can be maintained at all times.					
3. I can take the advantages of MBI social applications and collaborative exchange to share our decisions and actions that assist in overcoming complicated obstacles. (users can share their perspectives with others by highlighting an area for discussion and then sending an email with comments, insights and actions to the appropriate people)					
4. MBI applications enable us to follow up our tasks remotely (away from the office), so our Jawwal team does not need to be office-based; we can be more flexible in our day-to-day work.					
5. For security purposes MBI data/content resides on server so mobile web-based applications is better than mobile native applications to access information by them.					
6. Mobile based Applications will rapidly replace the desktop applications and give me the ability to integrate with enterprise applications such as CRM.					

The fourth dimension: The effect of Jawwal maturity level of implementing MBI on decision-making process at Jawwal.

Item	Strongly Agree 4	Agree 3	Neutral 2	Disagree 1	Strongly Disagree 0
1. Jawwal has a technology strategy (IT systems are frequently updated and applications are frequently developed to adapt with the rapid acceleration in technologies)					
2. Jawwal employees enjoy the required competencies to use new technologies.					
3. Jawwal has a mobile strategy (Program initiatives selection of applications to mobilize which leads to employees being effectively benefited from smartphones).					
4. I surf my work E-mail by my smartphone or tablet.					
5. I do collect the substantial related information about the work problems before making decisions.					
6. I tend to use voluntarily my smartphone to collect information which I need in decision making, install some applications and store needed information and reports to ease my work.					
7. I encourage my company to build and implement MBI and if it is optional, I'll use it.					
8. Business challenges (strategy, maturity level and ROI measures) will not prevent implementing MBI in Jawwal.					
9. Technical challenges (diverse standards for applications and networks, spotty coverage, low bandwidth, perceived lack of security, diversity of devices, slow response times, primitive user interfaces, and numerous other factors) will not prevent implementing MBI in Jawwal.					

The fifth dimension: The effect of the level of business need for creating a MBI implementation on decision-making process at Jawwal.

Item	Strongly Agree 4	Agree 3	Neutral 2	Disagree 1	Strongly Disagree 0
1. I need real time updates of information and reports which I need in decision making process when I am out of office.					
2. The job nature enhances using MBI at Jawwal.					
3. I feel that decisions at Jawwal need to be taken on time and not to be delayed.					
4. The MBI new technologies will complement existing investments at Jawwal.					
5. Implementing MBI considers a competitive advantage for your company.					
6. If you are really having mobile applications to immediate access and manipulate the valuable resource in your database securely, will that help you in decision making process?					
7. With MBI I no longer need to spend time in the office, or forced to go back to it, or taking up other employees' time by calling in asking for account details, I can on the road view data needed to prepare for my work, access records, and finish some pending transactions so I can focus purely on my main work.					
8. Workers who cannot retrieve vital information for decision-making purposes simply aren't as efficient and successful as those who can.					
9. All hierarchal levels of Jawwal employees are in need of implementing MBI not only executives or managers or mobile workers, a sales representative who is only in the office occasionally needs to access information in a meeting down the hall through his mobile.					

APPENDIX

C

Appendix (C)
Referees Who Judge the Reliability of the questionnaire

No.	Name	Position
1	Prof. Dr. Yousef Ashour	Islamic University of Gaza
2	Dr. Faris Abu Mouamar	Islamic University of Gaza
3	Dr. Mohammad El-Hanjouri	Islamic University of Gaza
4	Dr. Sameer Safi	Islamic University of Gaza
5	Dr. Wasseem Al Habeel	Islamic University of Gaza
6	Dr. Akram Sammour	Islamic University of Gaza
7	Dr. Faraj Abu Shmalah	Al-Quds Open University
8	Eng. Sohail El Badri	Planning Manager – Jawwal Company
9	Eng. Bassam Al Adini	Technical Manager – Jawwal Company
10	Eng. Omar Abu Rook	IT Expert – Hulul Company
11	Eng. Mohammad Al Shikh Eid	MBA from Islamic University & IT Expert in Jawwal Company
12	Eng. Ibraheem Abu Shamalah	Researcher and SPSS analyzer