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THE IMPACT OF INFORMATION SYSTEM SUCCESS ON BUSINESS INTELLIGENCE SYSTEM EFFECTIVENESS

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ABSTRACT

Business environment has become increasingly complex, along with the rapid development of economic globalization and information technology. organizations have to understand business intelligence (BI) system by showing information system success factors such as: system quality, information quality and service quality. Many organizations implemented BI system since there are a set of factors which influenced the success of the information system. The aim of this study is to investigate the relationship between information system success and BI system effectiveness in Jordanian banks. The study aims to promote better understanding of the benefits of the BI system that would be contributed toward enhancing BI system effectiveness. This paper used a quantitative methodological approach. 500 questionnaires were distributed to bank employees in Jordan with BI system in place. The returned and valid questionnaires were 386. data analysis showed there is a positive and significant relationship between information system success and BI system effectiveness.
Keywords: *Business Intelligence System, System Quality, Information Quality And Service Quality.*

1. INTRODUCTION

Nowadays context of a competitive economic environment which is permanently changing the ability to use intelligent information in order to cope with the challenges and to benefit for the opportunities represent an essential condition for any company that wants not only to stay on the market, but also to consolidate its position. In any organization, there is a large volume of data concerns production indicators, financial reports, data about sales, balance sheets and forecasts etc.

In spite of this, managers are frequently missing information of high quality, timely updated, in order to make the best decisions. To remain competitive in the global competitive economy, companies have to adapt themselves to any action of the market, to respond dynamically to the changes in the business environment and customers requirements. Moreover, they have to anticipate the changes inside and outside the industry. They are acting in and quickly make the adequate decisions. Making a quick business decisions, based on a reliable information, are essential for any company. Therefore proper instruments to intercept immediately the changes in the economic, social, legislative and administrative environment, to analyze them and to make proper decisions as soon as possible are required. Companies ought to know which are the most highly demanded products on market? which are the most profitable customers? what new products and services they should provide if they want to stay efficient? [1].

Business intelligence (BI) system is integration of intelligent technologies and e-business, has been identified as a new direction and future stage of e-business. BI system provides much higher quality information, personalized recommendation and decisions support intelligence, as well as more integrated seamless link business, more business organizations. government department begins developing and providing Internet based BI system services. BI system offers great opportunities and includes a challenges for a plenty business areas. By intelligent technologies and methodologies, BI system reaches intelligent Internet information searching, presentation, provision, recommendation and online system design. With rapid development of intelligent technologies, BI system becomes essential for the future developments of e-business [2]. The aims of this research is to determine the level of information system success factors in Jordanian banks. As well as to examine the relationship between user engagement and information system success in Jordanian banks.

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2. EVOLUTION OF BUSINESS INTELLIGENCE SYSTEM

Financial services industry are rapidly changing. Factors such as globalization, deregulation, mergers and acquisitions competition from non-financial institutions, and technological innovation, have forced companies to re-think about their business.

Many large companies have been using BI System for many years to help them gain competitive advantage [3].

BI System, a phrase coined by Howard Dresner of Gartner Group in 1989, has become popular since the 90s. Nowadays, most BI tools are based on data warehouse and data analyzing software. BI tools are very accurate to improve decision making based on data analysis reports.

BI tools usually mine into the raw data stored in data warehouse and then try to create a report through a time consuming process using online analytical process OLAP, data mining and other data analysis software [4].

3. CRITERIA FOR EVALUATING BUSINESS INTELLIGENCE SYSTEM

According to [5] problem of BI systems are measuring success. There are some cases studies evidencing benefits generated by organizations that are successful with the use of BIS.

There are several studies calling for the development of a measure for evaluating the business performance effects of BIS[6, 7].

In deploying BIS, there are many risks involved: system design, data quality, and technology obsolescence. System design risks stem from poor conceptualization of an enterprise's true business needs before the technology is deployed. Data quality risks relate primarily to whether or not data has been properly cleansed. Technology obsolescence refers to the failure on the part of the vendor to anticipate new technologies. Large budgets and strategic information are involved in deploying BI systems. Thus, this is the reason for establishing rigorous criteria for evaluating such systems. These criteria are:

3.1 Decisions Based on Business Process

BIS should not be viewed only as a data repository or a large set of data. Instead, system's implementation should be concern on conceptualizing new data models, processes, and indicators form the content of BIS; also it should provides extensive understanding of the benchmarks that are useful to evaluate business processes.

3.2 Performance

This feature typically refers to the response time that the system provides to the users. Most responses should range from a few seconds to a maximum of 30 seconds for routine queries. Response times depend on the complexity of the database and the queries being requested.

3.3 Flexibility and Scalability

Flexibility determines whether a BI solution can continually adapt to change business conditions after the system has been delivering. BIS should be able to accommodate changes in any type of business process and positions like personnel, services, and processes, as well as new mandates, laws, and regulations requiring the capture of different types of data. BIS should be expanded to accommodate data growth and changes to organizational structure. BIS should allows contributed contents to grow without a slowdown in performance.

3.4 Integration

There are two main types of Integration; data integration and system integration.

Data integration is the ability to access data from different types of systems. BIS will be particularly effective if it can overcome the challenge of information fragmentation, allowing executives to measure features of business processes that involve information from inside and outside organization. System integration refers to two things: the ability to extent the BI software with new capabilities and modules and the system's ability to coexist with other enterprise solutions.

3.5 User Friendly User Interface

BIS should be designed to allow managers who are not train to use query languages and advanced technologies, a quick, easy, and understandable way to navigate into data and identify trends and patterns. BIS should permit the user interface to accommodate different degrees of technical knowledge[8].

4. DEVELOPMENT OF BUSINESS INTELLIGENCE SYSTEM

In order to be able to react quickly to change that take place in market, organizations need BI system

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that would make it possible to carry out different causes and effect analyses of organizations themselves and their environments.

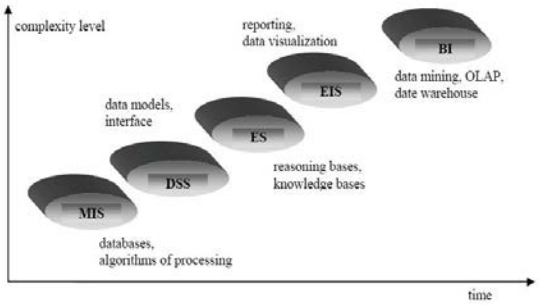

Figure1 Development Of Business Intelligence System.[9]

5. SYSTEM QUALITY

System quality is recognized as an important factor in successful BIS implementation [10] although issues relating to it received a fewer attention than information quality in the Information System (IS) literature [11]. Previous researchers defined system quality as about whether there are errors in the system, the consistency of the user interface, ease of use, quality of documentation, and quality and maintenance of the program code [12, 13]. They believed that higher-quality systems should be perceived as easier to use and, ultimately, have higher levels of usefulness and use.

[14]agrees with [12] that system quality is one of the factors in IS success model. He investigated the effects of business intelligence system on decision making performance and found out the evidence that support the basic concepts of the model that postulates positive impacts of system quality and information quality on decision performance through system use.

[15] Has identified system quality factors such as system throughput, ease of use, ability to locate data, access authorization, and data quality, which were regarded as crucial for the success of the BIS.

In accordance with its focus on decision support system, a successful BIS is generally characterized as easy to use efficient and effectiveness in producing information useful to decision makers. Although some attractive features that apply to other systems, such as standardization, scalability and security have mentioned[16], the success of BIS is more than likely be judged by how easy and efficient it is for all the management levels from operational, middle and top management to generate information to support decision making [17-19]

[12] notes that ‘‘system quality is concerned with whether there are bugs in the system, the consistency of user interface, ease of use, quality of documentation, and sometimes, quality and maintainability of program code”. In addition, [20] suggests additional dimensions such as ease of use, reliability, functionality, data quality, flexibility, and integration as a measurement of system quality.

6. INFORMATION QUALITY

Several studies [21-24] suggest that the information quality is an important aspect in BIS system success as implication business decisions are based on information drawn from data BI. It seems that BI is expected to enable production of information of higher quality as well as new information that may be put to innovative use. Over the last decade, quality information research activities have increased significantly to meet the needs of organizations attempting to measure and improve the quality of information. Furthermore, information quality is rated regularly as a top concern in BIS [25, 26].

The information quality refers to the quality of outputs the BIS produces [27, 28]. In a study on the determinants of information system success, [20] highlights the importance of relevance, timeliness, and accuracy of information.

[9] Any BIS suggests that implementation should involve carrying out data quality. Organizations need to keep a close eye on the quality of data they are capturing. This is to ensure that the information displayed later is able to boost the end-users productivity and efficiency, and ultimately the company’s system should enable managers at all levels to get on-demand and real-time information from internal and external sources. This BIS requires to adapt according to the way people think and work.

7. SERVICE QUALITY

Service quality is defined as the degree of inconsistency between the service receiver’s expectation of service and perceptions of actual service received [29]. The concept of service

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quality has attracted increasing interest in the IS field along the emergence of the role of the IS unit in an organization with the advancement in personal computing in the last decade. The notion of IS services were not well-defined initially when IS departments were primarily regarded as system developers and operators. Minimal services were rendered to the users in the form of maintenance tasks such as handling bug-fixing requests and analyzing usage statistics in the final phase of the traditional system development cycle [30, 31]. The role of IS departments as a service provider became more broadly recognized with the introduction of personal computers that facilitated higher interaction with users [32].

A wide range of services, including installation assistance and technical help counters, was provided to meet the rising demands from the data warehouse users. [33] observes that "commonly used measures of IS effectiveness focus on the products rather than the services of the IS function. Thus, there is a danger that IS researchers will miss measure IS effectiveness if they do not include in their assessment package a measure of IS service quality". According to [34], the service quality properly measured, deserves to be added as components of IS success.

Service quality is recognized as a driver of perceived value, which in turn will improve customer loyalty and enhance the provider's image, sales and profitability [35]. More than a decade ago,[35, 36] carried out comprehensive studies in different industries and developed the SERVQUAL instrument: service quality dimensions with a set of a 22-item scale to quantify a customer's appraisal of an organizations service quality. Five key dimensions of service quality – reliability, responsiveness, empathy, tangibles, and assurance – have identified and form the foundation on which many of other studies on service quality have been built. SERVQUAL is widely acknowledged and used, and it is considered as applicable to a number of industries, including the IS and information technology (IT) [12] [20].

8. CONCEPTUAL FRAMEWORK AND RESEARCH HYPOTHESES

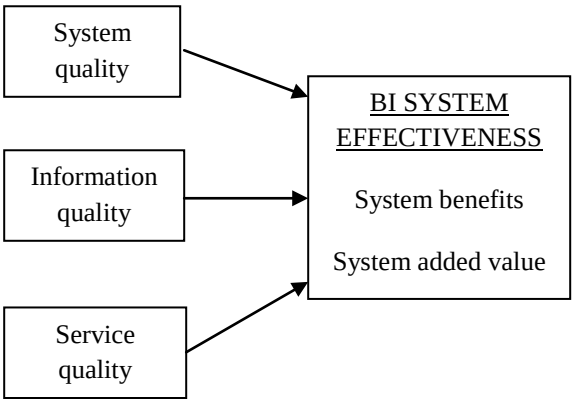

Figure 2 Conceptual Framework

8.1 Hypotheses

H1. There is a relationship between information system success factor (system quality, information quality, service quality) and business intelligence business (system benefits, system added value).

H2. There is a significance effect between system quality and BI system effectiveness (system benefits, system added value).

H3. There is a significance effect between information quality and BI system effectiveness (system benefits, system added value).

H4. There is a significance effect between service quality and BI system effectiveness (system benefits, system added value).

9. CONDUCT OF THE STUDY

The units of analysis for this study are the Jordanian banks that using BI system. BIS is information systems implemented in organizations. On other hand, information system success is the most important factors to increase the effectiveness for BIS; information system success is supposed to influence to the banks as whole including the information system that the banks use it.

Managers at the top, middle and operational level involved in this study serve as a key informant about the BIS since these managers and supervisors

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contribute and involved in the endeavor as well as they are consider as a reliable source to obtain information about BIS and information success factor.

10. SAMPLE DESIGN

The main interest of this paper is to explore what are the information success factors and how they can increase the effectiveness of BIS?

The populations of this study are the Jordanian banks embarking on BIS. A list of Jordanian banks were obtained from the central bank of Jordan.

The consolidated banking sector is comprised, as of the end of 2011, of 26 banks, with a combined total of 695 branches spread across the Kingdom of Jordan. The Central Bank of Jordan classifies the banks into two major categories; namely national banks and branches of foreign banks. Each of these categories are divided into commercial banks and Islamic banks

11. DATA COLLECTION AND PROCEDURE

In this study 500 questionnaire were distributed to bank employees in Jordan embarking on BIS.
The survey was divided into three phases. The first phase involves 120 questionnaires distributed to the target respondents working at top management level. A total number of received usable questionnaires from the first were 97.

The second phase of the survey involves 250 questionnaires distributed to the target respondents who work in the middle management level such as the heads of department and supervisors. A total number of received usable questionnaires from this phase were 184.

The last phase of the survey involves 130 questionnaires which were distributed to the low level management workers. A total number of returned and valid questionnaires from this phase were 105.

12. FINDINGS AND RESULTS

12.1 Descriptive Analysis

Descriptive analysis refers to the transformation of the raw data into a form that will make them easy to understand and interpret [37]. There are three measures of central tendencies and they are mean, median and mode. Mean or average is a measure of central tendency that offers a general picture of the data without unnecessarily inundating one with each of the observations in a data set [38]. Median is the central item in a group of observation and mode is the most frequently occurring phenomenon. Mean and standard deviations were used as descriptive statistics in this study.

Table 1 Descriptive Statistics For System Quality Items

	System quality items	Mean	Std. Deviation	Rank
1	Does BIS provide up to date information	3.58	1.211	3
2	Do you get the information you need in time	3.67	1.104	2
3	Is BIS accurate	3.68	1.169	1
	General Arithmetic mean and Standard deviation	3.62	1.051	

Table 1 shows that the arithmetic means for system quality items was between 3.68 and 3.58 it is observed that the highest item was “business intelligence system is accurate” (M=3.68 and S = 1.169) while the lowest item was “business intelligence system is provide up to date information” (M=3.58 and S=1.211); the general arithmetic means and standard deviation was (M= 3.62 and S =1.051) that is mean the level of importance for system quality was middle

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Table 2 Descriptive Statistics For Information Quality Items

	Information quality items	Mean	Std. Deviation	Rank
1	Does BIS provides output exactly what you need?	3.86	1.291	1
2	Does BIS provides the precise information you need?	3.74	1.193	2
3	Are the output option (print type, page size, allow for …etc)sufficient for your use?	3.69	1.247	3
	general arithmetic means and standard deviation	3.77	1.067	

Table 2 shows that the arithmetic means for information quality items is between 3.86 and 3.69. It is observed that the highest item is "business intelligence system is provide output exactly what the bank needed" (M=3.86 and S = 1.291) while the lowest item is "the output option sufficient for users" (M=3.69 and S=1.247); the general arithmetic means and standard deviation is (M= 3.77 and S =1.067) that is mean the level of importance for information quality is high.

Table 3 Descriptive Statistics For Service Quality Items

	Service quality items	Mean	Std. Deviation	Rank
1	Information system employees give prompts service to users.	3.65	1.195	1
2	BIS is dependable.	3.57	1.418	2
3	Information system employees have the knowledge to do their jobs well.	3.55	1.406	3
4	general arithmetic means and standard deviation.	3.60	1.041	

Table 3 shows that the arithmetic means for service quality items is between 3.65 and 3.55 it is observed that the highest item is "Information system employees give prompts service to users" (M=3.65 and S = 1.195) while the lowest item is "Information system employees have the knowledge to do their jobs well" (M=3.55 and S=1.406); the general arithmetic means and standard deviation is (M= 3.77 and S =1.067) that is mean the level of importance for information quality is high.

Table 4 Displays Descriptive Statistics For System Benefit Items

	System benefit items	Mean	Std. Deviation	`
1	The BIS achieve a competitive advantage for organization.	3.68	1.133	3
2	The BIS contribute to develop ability for organization.	3.70	1.051	2
3	The BIS contribute. achievement of effective integrated between department.	3.60	1.170	4
4	The BIS reduce the cost.	3.77	1.100	1
5	The BIS can issue periodic reports on the all organization activities.	3.32	1.207	5
	general arithmetic means and standard deviation.	3.50	.957	

Table 4 shows that the arithmetic means for system benefit items between 3.77 and 3.32. It is observed that the highest item is "business intelligence

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system reduce the cost" (M=3.77 and S = 1.100) while the lowest item is "business intelligence system can issue periodic reports on the all organization activities" (M=3.32 and S=1.207); the general arithmetic means and standard deviation is (M= 3.50 and S =.957) that is mean the level of importance for system benefit is middle.

Table 5 Descriptive Statistics For System Added Value Items

	System added value items	Mean	Std. Deviation	Rank
1	BIS reduce the uncertainty situation and confirm the expectation.	3.60	1.154	2
2	BIS contribute to mange customer relationship with top management.	3.63	1.231	1
3	BIS explain the tasks to employees which is assist them to understand organization goals.	3.48	1.108	4
4	BIS support knowledge management activities.	3.56	1.228	3
5	BIS support business strategic in organization.	3.32	1.207	5
	general arithmetic means and standard deviation.	3.45	.952	

Table 5 shows that the arithmetic means for system added value items is between 3.63 and 3.32 it is observed that the highest item is "business intelligence system contribute to mange customer relationship with top management" (M=3.63 and S = 1.231) while the lowest item is "business intelligence system support business strategic in organization" (M=3.32 and S=1.207); the general arithmetic means and standard deviation are (M= 3.45 and S =.952) that is mean the level of importance for system added value was middle.

12.2 Multiple Regression Analysis

The multiple regression analysis has conducted in order to test the hypotheses as well as to determine the variance of BIS effectiveness that explained by the information system success.

The significance effect between information system success (system quality, information quality and service quality) and BIS effectiveness (system benefits)

Table 6 Summary Of The Significance Effect Between Information System Success (System Quality, Information Quality And Service Quality) And Bis Effectiveness (System Benefits)

Independent variable (information system success)	Dependent variable (system benefits) Std. Beta Coefficients and Significant Level
System quality	.11
Information quality	.22
Service quality	.32
R	.54
R2	.29
Adjusted R	.28
F	51.7

According to the results in the Table 6 information system factor explained .29% of the variance in BIS effectiveness (system benefit) (R2 =.29). The F-value was 51.7 indicates that there is a significant linear model at Alpha = 0.01. On the other hand, system quality (β = 0.11, $p<0.05$), information quality (β = 0.22, $p<0.05$) and service quality (β = 0.32, $p<0.05$) positively and significantly associated with BIS effectiveness (system benefit).

These results show that service quality, has the largest beta coefficient contribution in information system success β = 0.32, it has positively and significantly associated with BIS effectiveness (system benefit) which concludes that information system success positively and significantly associated with BI system effectiveness (system benefit).

The significance effect between information system success (system quality, information quality and service quality) and system usage

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Table 7 Summary Of The Significance Effect Between Information System Success (System Quality, Information Quality And Service Quality) And Bis Effectiveness (System Usage)

Independent variable (information system success)	Dependent variable (system usage) Std. Beta Coefficients and Significant Level
System quality	.18
Information quality	.13
Service quality	.43
R	.62
R2	.39
Adjusted R	.38
F	15.3

According to the results in Table 7, information system factor explained .39% of the variance in BIS effectiveness (system usage) (R2 =.39). The F-value was 15.5 indicates that there is a significant linear model at Alpha = 0.01. On the other hand, system quality (β = 0.18, $p<0.05$), information quality (β = 0.13, $p<0.05$) and service quality (β = 0.43, $p<0.05$) positively and significantly associated with BI system effectiveness (system usage)

These results show that service quality, has the largest beta coefficient contribution in information system success β = 0.43, it has positively and significantly associated with BIS effectiveness (system usage) which concludes that user information system success positively and significantly associated with BIS effectiveness (system usage)

13. CONCLUSION

This research answered two research questions: Do the researched in Jordanian banks realize the importance of information success factor to increase the BIS? Does the banking managements realize the importance of the relationship between information system factors and BIS effectiveness?

The first question is answered by testing hypotheses two, three and four. The finding suggests that the quality whether system, information and service quality are very important to increase the effective of the BIS.

The second research question is answered by testing hypotheses one. The result shows that there is a positive and significance relationship between information system success (system quality, information quality and service quality) and BIS effectiveness.

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APPENDIX

1. Figure 1 Development of business intelligence system
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