أثر تكنولوجيا المعلومات على أداء البنوك الأردنية

The impact of Information Technology on The Performance of Jordanian Banks

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Abstract:

The purpose of this thesis seeks to examine the impact of adopting IT on the performance of Jordanian banks listed in Amman Stock Exchange for a period of five years (2005-2008). In order to achieve this goal, a questionnaire (qualitative approach) was administered for the sake of the evaluation of IT in the banking sector. Meanwhile, the performance was estimated by the use of some financial ratios. By the adoption of ANOVA and regression analyses to depict the possible relationships in the collected data, evidence about the non-relationship between IT and bank performance in Jordanian banks was shown. Therefore, it can be concluded that the performance of banks in Jordan can be explained by other topics instead of IT investment.

Key Words:

Information Technology (IT), Information System (IS), performance, Jordanian Banks.

ملخص

الهدف من هذا البحث دراسة أثر اعتماد تكنولوجيا المعلومات على أداء البنوك الأردنية المدرجة في بورصـة عمان لمدة خمس سنوات (2005ء2008). من أجل تحقيق هذا الهدف، أعتمد على الإستبيان

(نهج نوعي) من أجل تقييم تكنولوجيا المعلومات في القطاع المصرفي. وفي الوقت نفسه، قدر الأداء عن طريق استخدام بعض النسب المالية. وتحليل الانحدار لتصوير العلاقات الممكنة في البيانات التي تم جمعها، وقد أظهرت الأدلة حول عدم وجود علاقة بين تكنولوجيا المعلومات وأداء البنوك الأردنية. وبالتالي، فإنه يمكن استنتاج أن أداء البنوك في الأردن يمكن تفسيره بمواضيع أخرى غير الاستثمار في تكنولوجيا المعلومات.

كلمات مفتاحية

تكنولوجيا المعلومات، نظام المعلومات، بنوك الأردنية، الأداء

1- Introduction

The revolution of Internet with the exponential development of breakthrough products of software and hardware is perhaps the most important trait of the new millennium highlighting the domination of the new era of Information Technology or just IT. This IT was expanded in all the domains of life to be integrated especially in the field of business where it is assumed as a contingent factor that may explain the performance of the organizations and more specifically the banking sector does not break this fundamental rule.

The Jordanian banks operate in an increasingly complex and changing environment: Saturated markets, increasing competition from banks, more access to knowledge, and customers more demanding and less loyal. Moreover, it is characterized by complexity and rapid change whether social, economic and technological: in fact IT creates new opportunities for Jordanian banks in the way it organize product development, delivery and marketing. That is why a substantial portion of banks budgets is associated to IT.

Therefore, it is suggested the implementation of IT as an effective tool for banks' use in pursuit of improved performance. A large and growing body of academic research has been conducted to investigate the relationship between bank performance and IT. In an era where management carefully weighs the benefits of every discretionary investment dollar, finding evidence of positive relationship between bank performance and IT investments is critical. This research shows if weak or non-existent link between IT investment and bank performance exist in Jordanian banks.

2- Literature review:

2-1 Foreign Literature:

Lubbe (1994) studied the effect of investing resources in information technology on the performance of an organization. The purpose was to study the effect of IT using industry in Namibia. He selected a sample of 48 organizations. It includes some stated organizations, schools. The period under study is between 1990 and 1992.He developed models such as

efficiency ratio, IT efficiency ratio, operating cost efficiency ratio, IT efficiency ratio and return on turnover. Using 120 questionnaire data, the main result of this study was that the low profitability of the companies is at greater risk, with low level of IT capital intensity than high profitability companies with high level of IT. The second finding was that the competitive value of IT is complicated by the market structure of the organization such as the rate of technology change in organizations; the strategic dependence of the organizations, the opportunities to redefine market structure through IT related cost economies.

Devaraj and Kohli (2003) studied the performance impacts of IT. This study posits that the driver of IT impact is not posits that the driver of IT impact is not the investment in the technology, but the actual usage of the technology. This proposition is tested in a longitudinal setting of a healthcare system comprising eight hospitals. Monthly data for a three-year period on various financial and nonfinancial measures of hospital performance and technology usage were analyzed. Models based upon the system of equations represented specific the relationships between the use of technology and financial and nonfinancial measures of performance, they employ time-series analyses to estimate the different models. Specifically, they estimated a fixed effects model for each dependent variable. Technology usage was positively and significantly associated with measures of hospital revenue and quality, and this effect occurred after time lags.

Tippins and Sohi (2003) studied IT competency and firm performance from the perspective of organizational learning. Their study proposed that organization learning plays a significant role in determining the outcomes of IT; to achieve their purpose they take a sample of manufacturing organizations in SIC codes 35industrial and commercial machinery manufactures, 36 electronic and other electrical equipment manufacturers, transportation equipment manufacturers and 38 measuring and analyzing instruments manufacturers; for achieving their goal they sent mail surveys to 524 executives, and by using structural equations modeling with data collected, they show that organizational learning plays a significant role in mediating the effects of IT competency on firm performance.

Lai et al., (2007) studied the impact of IT on the competitive advantage of logistics firms in China. They aimed to examine the relationships between IT and competitive advantages at China's 3PL firms, to achieve this purpose 760 questionnaires were distributed, and regressions were used to model the relationship between IT and competitive advantages, they found that the improvement of service variety advantage is flat when IT is at low level, higher IT may help improve delivery speed and reliability, customer relations, and order accuracy; higher IT may lead to a higher cost advantage when it is beyond the strategic necessity level

2-2 Arabic literature:

Karakish and Dahmash (2005) studied the role of IT in enhancing the efficiency of internal control systems at the Jordanian manufacturing companies. The researchers covered all the Jordanian manufacturing companies which depend on intellectual languages in designing programs. The methods used were statistical analysis and field study of a company. The important findings of this research are that internal control systems face many challenges

in the use of IT. These challenges include the absence of documentation of the most of accounting information system processes in the computerized system, another issue is that intangible nature of the computerized systems and the absence of document lead to another problem related to the mechanisms of protecting the systems from hackers and securing customers data. Another result is that IT increases the efficiency of internal control systems and adds higher trustability on the outputs of accounting information system (AIS).

Al-Zoabi (2005) studied the effect of using IT on improving performance, in terms of speed, quality, trustworthiness and job knowledge-ability. The research identifies the level of variance of using IT on task performance due to the difference in demographic characteristics such as sex, age, academic achievements and years of experience. Using 353 employees working at the departments of the Jordanian tax directorate located in Amman area, the study use percentage, frequency, simple regression analysis and variance analysis (ANOVA). The main result is that: there is an impact with a statistical implication for the implementation of IT on work performance in all dimensions.

Zaatreh (2008) developed a Framework for evaluating the effectiveness of Information Systems (IS) at Jordan Banks. The paper measures the factors which determine information systems effectiveness at Jordan main banks. These variables are presumably system decision performance, system usage and user satisfaction among others that are considered the most effective variables in banks performance. A descriptive approach is conducted. High ranking managers at major banks were interviewed and information regarding banks general IT investments for conducting a cost – benefit analysis is collected. The data was collected by designing a survey and distributing it nationwide. The goal of surveying is to investigate the investment of IS at Jordan banks and to evaluate the contribution of IS in the effectiveness of banks operations. To achieve this goal, the research focuses on two tested instruments that were developed by Moore and Benbasat (1991) and Idowu et al., (2002). The main results are the following IS provide a competitive advantage to the banking industry and the effectiveness of IS has a positive impact on Jordan banks.

Al Dahir (2009) measured the impact of implementing information technology balanced scorecard (IT-BSC) on financial performance measurement system in the Jordanian banks. The aim of this study is to investigate the important use of balanced scorecard (BSC) as a performance measurement system with IT integration in Jordan banking sector; to achieve the goal the study takes a sample of 19 Jordanian banks and takes the data of 2008 in measurement. It developed an integrate model that consists of five perspectives (financial, international business process, strategic competitiveness; strategic competitiveness, customer satisfaction, and learning growth) with IT indicator. The results showed three significant relationship between IT application and the internal business process, financial and strategic competitiveness perspectives. Also, there is no significant relationship with customers and employee's perspective IT BSC model is a promising tool for organizations to access and evaluate their performance.

3 – Methodology and Data

3-1 Methodology

The population in this study consists all banks working in Jordan (13 commercial banks, 8 foreign, and 2 islamic); however;The sample consists of 15 banks, listed in Amman Stock Exchange market with a non-response of three banks, the sample of the study is reduced to 12 banks.

3-2 Data Sources:

This study considers the data of 12 banks operating in Jordan during the period 2005-2008. The data used in this study are financial information extracted and analyzed from the balance sheets and income statements and other information available in the annual reports. Also, other sources were used as articles, reports and making papers available to the research.

A questionnaire was used in estimating IT through seven perspectives: IT output, IT costs, IT effectiveness, IT valence, IT resource commitment, IT Managerial commitment and IT competency. The four last measures of IT focus are developed by converting the definition of constructs into questionnaire format (Lai et al, 2006). Respondents were asked to indicate the extent to which the banks performance is related to IT output, cost, effective, valence, resource commitment, managerial commitment and competency using a five point Likert scale.

3-2-1 Variables of the Study:

Performance is considered as a dependent variable. Both of the Return on Assets (ROA) and the Return on Equity (ROA) were assumed to be good proxies for the measurement of the profitability of bank. However, other measures will be used like Price Earnings Ratio (PER) and, Earning per share (EPS) in addition to apprehend the performance concept.

Concerning the IT indictors are the independent variables. A questionnaire was developed for estimating the IT considering seven concepts, the first three ones are developed by the researcher and the last four ones by referring to Lai et all, (2006): IT utilization, IT costs, IT effectiveness, IT valence, IT resource commitment, IT managerial commitment, and IT competency. All of these measures were anchored with a Likert scale of 1-5, the questionnaire is shown in the appendix.

Statistical analyses

In the current article, it was basically adopted a descriptive/ inferential approach to depict the possible relationships in the collected data by the quetionnaire and financial statements. As a first step, the data was assessed for the reliabilities by the mean of Cronbach alpha. The threshold of 0.70 was considered by the researcher as the minimal accepted reliability for the outlined scales in the questionnaire. After purification of the measurements upon the reliability assessments, the variables of the study were obviously defined as the average score of the items constructing the dimension. In a further step, descriptive analysis was provided for each variable with a t-test for one sample testing whether the means of the variables were significantly different from the middle point of the likert scale (i.e., 3). The decision rule was to reject the null hypothesis if the significance value was less than 0.05. The following phase focused on the possible controlling variables (i.e., bank type, gender, administrative level,

experience, educational level) where one way ANOVAs were conducted to check for the possible differences in the IT score with respect to the levels of the highlighted factors

In the last phase of analyses, simple linear regression was adopted as a consistent tool to see if there is a significant effect of IT scores on performance variables (i.e., ROA, ROE, EPS, PER).

4- Data Analyses

4-1 Characteristics of the sample

A total of 78 participants from 12 banks responded for the questionnaire. The different frequencies of the responses among the studied banks are highlighted in Table 1. As it is shown in this Table, the range of frequencies varied between 1.3% and 11.5%.

From Table 2, it was found that the majority of the respondents were males with a frequency of 66.7% versus only 33.3% of females. The quasi totality of the participants in the study were administrators (38.5%, Table 3). Also, it was found that more than 46% of the respondents have an experience more than 10 years (Table 4). The sample exhibited a majority of bachelor degrees with more than 97%.

4-2 Reliability analyses

In this current section, reliability analyses (Appendix §) were carried out on the dimensions of the IT concept by the use of Cronbach's Alpha. The decision rule was to remove the items that influenced the reliability scores exhibiting an alpha less than 70% (Nunally, 1978).

Starting by the utilization dimension, an alpha of more than 0.84 was found which is considered as an acceptable level. Concerning the costs' dimension, it was found an alpha of 0.67; trying to remove successively several items did not help in improving the value of alpha Cronbach for this dimension.

Therefore, this entire dimension was removed from measurement in the next steps. It was found reliability more than 0.79 for the effectiveness dimension suggesting to keep it in further measurements. The reliability factor for the valence dimension was less than 0.52 which stipulated to remove it automatically from the measurement of IT score. Concerning the resource and managerial commitment, it was found successively a reliability of 0.81 and 0.73 suggesting that we can go ahead with these two dimensions. Finally, the competitiveness dimension, exhibited a reliability factor of 0.73 which is considered as an acceptable level of reliability.

4-3 Descriptives Statistics

The different descriptive statistics are displayed in **Table 6.**

4-4 inferential statistics

In this section, each reliable dimension of the measurement was tested whether it is significantly different from the middle point of the Likert scale i.e., the value of 3. Starting by the utilization variable, it was found (**Table 7**) that the average utilization score is significantly larger than the value 3 (mean difference= 1.17, $t(77)=16.34$, $p<0.001$)

Concerning the Cost variable, it was found (**Table 8**) that the average cost score is significantly larger than the middle point 3 (mean difference=0.94, $t(77)=12.90$, $p<0.001$). Carrying out the same test for the rest of the variable.

From **Table 9**, it was found that the average effectiveness score was significantly larger than the middle point value of 3 (mean difference=0.99, $t(77)=12.53$, $p<0.001$). Similar results were found for the resource commitment, managerial commitment, and competitiveness where the least student value was $t(77)=9.88$ showed a significance value less than 0.001.

In **Table 11**, Analysis of Variance (ANOVA) was provided to test whether IT score is significantly different across the different Jordanian banks. It was found that the average IT score is significantly different among the Jordanian banks ($F(11,66)=3.19$, $p<0.01$) showing clear disparities of IT across the studied banks.

In **Table 12**, the different descriptive statistics with respect to each gender type are displayed. **In Table 13**, Analysis of Variance (ANOVA) was provided to test whether IT score is significantly different between males and females. It was found that the average IT score is not significantly different between males and females ($F(1,76)=0.09$, $p>0.05$).

In **Table 14**, the different descriptive statistics with respect to each job position type are displayed. In **Table 15**, Analysis of Variance (ANOVA) was provided to test whether IT score is significantly different across job position's types. It was found that the average IT score is not significantly different among the job position's types ($F(3,74)=2.08$, $p>0.05$).

In **Table 16**, the different descriptive statistics with respect to each category of experience by years are displayed.

In **Table 17**, Analysis of Variance (ANOVA) was provided to test whether IT score is significantly different across experience categories. It was found that the average IT score is not significantly different among the experience categories ($F(2,75)=0.02$, $p>0.05$).

In **Table 18**, the different descriptive statistics with respect to educational levels are displayed.

In **Table 19**, Analysis of Variance (ANOVA) was provided to test whether IT score is significantly different bachelor and master degrees. It was found that the average IT score is not significantly different between them ($F(1,76)=0.26$, $p>0.05$).

4-5 Regression Analyses

In the current section, regression analyses were adopted to test whether the IT is significantly affecting the financial variables i.e., return on assets (ROA), return on equity (ROE), earnings per share (EPS), and price earnings ratio (PER).

From Table 20, it was found that a substantial negative relation may exist between IT and ROA (beta=-0.06). However, this effect was found to be non-significant (p>0.05). For the case of ROE, it was found (**Table 21**) that IT did not have any significant effect on the ROE (beta=0.14, p>0.05). Similar results (**Table 22 and 23**) were found for the case of dependent variables: EPS and PER where IT did not have a significant effect on the highlighted financial variables (p>0.05).

4-6 Discussion of the Results

There are no-relation between IT and profitability ratios (ROA, ROE)

In Jordanian banks which was confirmed by "Robert Slow" in his study

"Productivity Paradox" (noble prize of economics in 1987) saying that "We see the computer age everywhere except in the profitability and productivity statistics", in other side There is no-relation between market performance measures (EPS, PER), according to that two main results we conclude that there are no impact of IT on the performance of Jordanian banks which is confirmed by the research of Im and al (2001), they found a positive relationship between performance and IT investment exists in the small firms and not in the large ones, considering the sample of our study which is large banks (listed banks in Amman Stock Exchange), cited research explain the non-relationship between IT investment and performance measures.

4-7 main results

According to the current research, it was shown a clear evidence that no relationship between IT and profitability ratios (ROA, ROE) in Jordanian banks is found. Moreover, it was found an inexistent relationship between IT investment and market measures (PER, EPS), according to these two main results we conclude that there is no-relationship between IT and Jordanian banks performance measures.

Considering the non-response of all Jordanian banks, we recommended to the other researches to take all the population of Jordanian banks for longer period in order to broaden the field of research. According to the limitations of financial ratios (cited in the theoretical background) other methods can be used in estimating the performance. As cited in our discussion, by taking all the population of Jordanian banks the future researches can study if the size really affect the relationship between banks performance and IT investment in Jordanian banks which was highlighted by Im et al (2001).

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Apendix

Table 1. Frequency distribution of the respondents

Banks	Frequency	Percent	Valid Percent	Cumulative Percent
Societe Generale	6	7.7	7.7	7.7
Capital Bank	10	12.8	12.8	20.5
Union Bank	1	1.3	1.3	21.8
Jordan Dubai Islamic Bank	5	6.4	6.4	28.2
Housing Bank	8	10.3	10.3	38.5
Arab Bank	5	6.4	6.4	44.9
Arab Jordan Investment Bank	8	10.3	10.3	55.1
Jordan Bank	5	6.4	6.4	61.5
Jordan Kuwait Bank	5	6.4	6.4	67.9
Cairo Amman Bank	10	12.8	12.8	80.8
Jordan Islamic Bank	9	11.5	11.5	92.3
Ahli Bank	6	7.7	7.7	100.0
Total	78	100.0	100.0	

Table 2. Gender

	Frequency	Percent	Valid Percent	Cumulative Percent
Female	26	33.3	33.3	33.3
Male	52	66.7	66.7	100.0
Total	78	100.0	100.0	

Table 3. Experience

	Frequency	Percent	Valid Percent	Cumulative Percent
1-5 years	25	32.1	32.1	32.1
6-10	17	21.8	21.8	53.8
>10	36	46.2	46.2	100.0
Total	78	100.0	100.0	

Table 4. Educational Level

	Frequency	Percent	Valid Percent	Cumulative Percent
Bachelor	76	97.4	97.4	97.4
Master	2	2.6	2.6	100.0
Total	78	100.0	100.0	

Table 5. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Utilisation	78	2.67	5.00	4.1752	.63502
Cost	78	2.00	5.00	3.9487	.64929
Effectivess	78	1.50	5.00	3.9936	.70016
Resource Commitment	78	2.50	5.00	4.1474	.65519
Managerial Commitment	78	1.00	5.00	3.8077	.72179
competitiveness	78	2.00	5.00	4.0192	.74049
IT Score	78	14.83	30.00	24.0920	3.20290
Valid N (listwise)	78				

Table 6. One-Sample Test for Utilisation

	Test Value = 3					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Utilisation	16.345	77	.000	1.17521	1.0320	1.3184

Table 7. One sample test for Cost

	Test Value = 3					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Cost	12.905	77	.000	.94872	.8023	1.0951

Table 8. One sample test for rest of the variables

	Test Value = 3			
	t	df	Sig. (2-tailed)	Mean Difference
Effectivess	12.533	77	.000	.99359
Resource Commitment	15.467	77	.000	1.14744
Managerial Commitment	9.883	77	.000	.80769
competitiveness	12.156	77	.000	1.01923

Table 9. Descriptives for IT Score per Bank

	N	Mean	Std. Deviation	Std. Error
Societe Generale	6	21.7778	2.95647	1.20698
Capital Bank	10	26.4167	1.24040	.39225
Union Bank	1	26.5000	.	.
Jordan Dubai Islamic Bank	5	19.9333	3.22447	1.44203
Housing Bank	8	25.5208	2.80368	.99125
Arab Bank	5	22.7333	1.25056	.55927
Arab Jordan Investment Bank	8	22.5833	4.67431	1.65262
Jordan Bank	5	23.1333	3.87549	1.73317
Jordan Kuwait Bank	5	24.2333	2.62096	1.17213
Cairo Amman Bank	10	26.1167	2.41529	.76378
Jordan Islamic Bank	9	24.6481	2.03177	.67726
Ahli Bank	6	23.3067	2.41133	.98442
Total	78	24.0920	3.20290	.36266

Table 10.ANOVA of IT Score versus banks

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	274.389	11	24.944	3.194	.002
Within Groups	515.520	66	7.811		
Total	789.908	77			

Table 11. Descriptives for IT Score per gender

					95% Confidence Interval for Mean	
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound
Female	26	23.9297	2.71453	.53236	22.8333	25.0262
Male	52	24.1731	3.44328	.47750	23.2145	25.1317
Total	78	24.0920	3.20290	.36266	23.3698	24.8141

Table 12. ANOVA of IT Score versus gender

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.026	1	1.026	.099	.754
Within Groups	788.882	76	10.380		
Total	789.908	77			

Table 13. Descriptives for IT Score per job position

	N	Mean	Std. Deviation	Std. Error
Administrator	30	23.3278	3.20066	.58436
Responsible for devision	7	23.4048	3.21002	1.21327
Chief departement	21	24.0556	3.73621	.81531
CEO	20	25.5170	2.18063	.48760
Total	78	24.0920	3.20290	.36266

Table 14. ANOVA of IT Score versus job position

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	61.468	3	20.489	2.081	.110
Within Groups	728.441	74	9.844		
Total	789.908	77			

Table 15. Descriptives for IT Score per years of experience

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
1-5 years	25	24.1867	3.00244	.60049	22.9473	25.4260

6-10	17	23.9902	3.86017	.93623	22.0055	25.9749
>10	36	24.0743	3.09253	.51542	23.0279	25.1206
Total	78	24.0920	3.20290	.36266	23.3698	24.8141

Table 16. ANOVA of IT Score versus years of experience

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.412	2	.206	.020	.981
Within Groups	789.497	75	10.527		
Total	789.908	77			

Table 17. Descriptives for IT Score per education level

					95% Confidence Interval for Mean	
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound
Bachelor	76	24.0615	3.23322	.37088	23.3227	24.8003
Master	2	25.2500	1.76777	1.25000	9.3672	41.1328
Total	78	24.0920	3.20290	.36266	23.3698	24.8141

Table 18. ANOVA of IT Score versus education level

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.753	1	2.753	.266	.608
Within Groups	787.155	76	10.357		
Total	789.908	77			

Table 19. Regression of ROA as a function of IT

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.414	.792		4.311	.000
	IT Score	-.062-	.033	-.212-	-1.889-	.063

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.414	.792		4.311	.000
	IT Score	-.062-	.033	-.212-	-1.889-	.063

Table 20. Regression of ROE as a function of IT

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	10.124	3.065		3.303	.001
	IT Score	.142	.126	.128	1.124	.265

Table 21. Regression of EPS as a function of IT

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.262	.170		1.545	.127
	IT Score	.003	.007	.044	.381	.705

Table 22. Regression of PER as a function of IT

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	29.079	6.140		4.736	.000
	IT Score	-.447-	.253	-.199-	-1.769-	.081