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The results of this study were classified according to the sequence of questions and assumptions as follows: There is positive and statistical significance at the level ($\alpha = 0.05$) between the performance of Jordanian banks and each IT level. There were statistically significant differences at the level ($\alpha = 0.05$) between the mean responses of a sample study on the application of IT in Jordanian banks, attributed to variable size (assets) and in favour of assets (large). There were statistically significant differences at the level of ($\alpha = 0.05$), between the mean responses of the study sample, attributable to the asset size variable and in favour of large assets. There are significant differences at the level of ($\alpha = 0.05$) between the mean responses of the study sample, attributed to the variable ITI and the proportion of ITI.

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The Relationship between IT Investment Levels and Bank Performance: The Case of Jordanian Banking Sector

Hussam-Eldin Daoud [α], Torki M. Al-Fawwaz [σ] & Yaser Arabyat [ρ]

Abstract- The objective of this research is to examine the association between IT resources and profit performance in the Jordanian Banking Sector.

The researchers chose survey methods. The advantage of using surveys is the ability to calculate non-parameter variables; and this method is considered the most appropriate for this study. Three variables are explored. The dependent variable is bank performance. The independent variable is IT resources (levels), and the control variable is bank assets and IT size.

The results of this study were classified according to the sequence of questions and assumptions as follows: There is positive and statistical significance at the level ($\alpha = 0.05$) between the performance of Jordanian banks and each IT level. There were statistically significant differences at the level ($\alpha = 0.05$) between the mean responses of a sample study on the application of IT in Jordanian banks, attributed to variable size (assets) and in favour of assets (large). There were statistically significant differences at the level of ($\alpha = 0.05$), between the mean responses of the study sample, attributable to the asset size variable and in favour of large assets. There are significant differences at the level of ($\alpha = 0.05$) between the mean responses of the study sample, attributed to the variable ITI and the proportion of ITI.

This analysis seemingly demonstrates that Staff developing should be in line with the development and modernisation of technology. All technological means that enhance the service experience of customers should be adopted because they raise the level of satisfaction with banking services. Updating IT infrastructure in banks will reflect positively on performance.

I. Introduction

As the world economy continues to globalise and competition increases, the key challenges of today's banks are both how to respond more quickly to challenges and how to handle uncertainty. Today, most banks use IT not only to manage their business, but also to keep in contact with world markets (Peppard & Ward, 2004).

Information technology (IT) applications have created new opportunities and challenges that have changed business operations. Most successful companies have adopted IT to interact with their customers and business partners, to increase their efficiency and improve their services (Mann, 2002).

The growing number of theoretical studies on IT led-performance through the use of IT suggests a positive correlation between IT capital intensity and performance scores (Daoud, 2010). Acharya et al. (2007) estimate online banking intensity and bank performance indices using a combination of primary and secondary data. An empirical profit function of a non-standard Fourier flexible form is estimated using banks' financial data to derive a theoretically consistent performance measure. The results indicate that the increasing use of the internet as an additional way to market banking services significantly improves the financial performance (FP) of community banks.

Empirical evidence indicates that a relationship exists between IT project success and conducting a ROI evaluation before and after project completion, as well as "organisational" attributes of policy, procedures, and leadership (Czerwinski, 2008). To establish a relationship between investments in information and communication technology, Beccalli (2006) considers whether investment in IT (software, hardware and other services) affects the performance of banks. The examination of bank performance is assessed using traditional financial profitability measures. The investigation covers a sample of 737 commercial banks located in five European countries (France, Germany, Italy, Spain and the UK) over the period 1995–2000, and covering a total of 3456 observations. The author finds that there is a positive and statistically significant correlation between profit efficiency and ROA, and a negative and statistically significant correlation between cost efficiency and both ROA and ROE. The correlations between profit efficiency and IT investment have been found negative and statistically significant. Another study by Gunsel et al. (2011) tests whether the IT ability of a bank can create economic value and competitive advantage. Based on a sample of 15 banking sectors in Turkey, the authors find that human capital support contributes directly to the performance of banking sectors. Similarly, Kim (2004) examines the effect of IT investment on Korean sector performance in 1996–2000. The author finds that IT investment enhances

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productivity by growing value added and saving ordinary capital and labour. He also finds that the installed IT capital is estimated in the financial market to be worth about 6.8 times its acquisition price, and concludes that IT investment accompanies the creation of intangible assets. Considering this, the contribution of IT investment to aggregate economic growth would be much greater than the figures provided by conventional growth accounting. Gideon et al. (2011) study the extensive panel dataset of 15 banks from the Ghanaian banking industry over the period 1998 – 2007and find that banks which maintain high levels of investments in IT increase both ROA and ROE.

Sangjoon (2008) estimates the profitability equation to measure the effects of IT investment by domestic banks on their management performance in Korea, using panel regression. The study exploits annual panel data in the financial statements of individual firms of the Korean Information Service, and financial information data from the Bank of Korea. The data used in his study spans 1991 to 2001, and come from 26 domestic banks comprising 16 city and 10 local banks. The results indicate that IT investment by large banks shows a stronger positive influence on bank returns than that of small banks. In addition, the IT investment of wholesale banks specialising in corporate loans produces greater positive effects on bank profitability than that of retail banks. Similarly, Luca and Giorgio (2007) analyse the effects of investment in IT in the financial sector using micro-data from a panel of 600 Italian banks over the period 1989–2000. The results indicate that both cost and profit frontier shifts are strongly correlated with (IT) capital accumulation; in addition, banks adopting IT capital-intensive techniques are more efficient. They also find a positive correlation between IT capital intensity and both frontier shifts and efficiency scores. The IT investment to growth ratio of the Italian banking industry can be estimated between 1.3% and 1.8% per year.

A number of studies have examined the impact of online banking intensity on the financial performance of banks. According to Acharya et al. (2008), the actual impact of online banking on performance is measured by regressing the profit efficiency index against a number of correlates, including online banking intensity measures. Jallath et al. (2001) analyse the implementation of an electronic inter-bank payment network adopted by all Mexican commercial banks. They find that early adopters of the electronic network, with a low ratio of electronic to overall operations, experienced growing opportunity and penalty costs, but that as more banks join the network, the ratio of electronic operations increases, and costs decrease. When all banks had adopted the electronic network, they found a reduction equivalent to 9.9% in each bank's opportunity and penalty costs; the aggregated savings for all banks equalled $5.3 million in the next six months. They conclude that the electronic inter-bank payment network provides a significant positive net present value, findings that support the network externalities theory. Similarly, Acharya et al. (2008) find that the increasing use of the internet as an additional channel of marketing banking services has significantly improved the financial performance of community banks. They argue that online banking improves financial performance, and community banks should be encouraged to adopt new ITs and offer targeted online services. This study utilises the estimated index in measuring the impact of internet banking intensity on bank performance.

Berger (2003) examines technological progress and its effects in the banking industry. The results suggest that improvements in costs and lending capacity are due to improvements in "back-office" technologies, as well as consumer benefits derived from improved "front-office" technologies. The results suggest significant overall productivity increases in terms of improved quality and variety of banking services. In addition, the research indicates that technological progress likely helps facilitate consolidation of the industry. Bradley et al. (2002) investigate the drivers and inhibitors of adoption of internet banking and the future level of adoption In Delhi. The study finds that external factors are the most important drivers in the overall decision to adopt. These include competitive forces, consumer demand, and technological availability. The factors affecting the decision to adopt are new revenue potential, cost reduction, and access through other distribution channels. They also find that the key inhibitors are mainly internal issues such as lack of enhanced ability to deal with customers, resistance to change, negative attitudes within the bank to technical innovation, the resources available, and the existing legacy system. Costs also became a strong inhibitor, especially when retail banks feel that returns are not evident and consumer demand is not sufficient.

In Jordan the banking industry has shown great interest in modern technical applications. It is one of the economic sectors that has benefited from the rapid changes in the field of information technology. One such innovation is a system that connects the ATMs of licensed banks through a network (JONET) which enables customers to receive banking services at any time. Some Jordanian banks provide banking services via a number of e-channels, including home banking and phone and mobile banking. Other banks provide banking and financial services through a number of automated banks and internet banking. The application of IT has made it possible to provide more rapid responses to variations in demand, and more efficient alignment of resources to prepare for uncertainty. Not only has IT made global markets more accessible, it

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also allows banks to provide better services that meet customer needs.

This research attempts to find to what extent IT investment (ITI) is expected to enhance a bank's performance. The research problem lies in answering the following main question: "Do IT resources (levels) increase banks' performance in Jordan?"

The objective of this research is to examine the association between IT resources and profit performance in the Jordanian Banking Sector. IT in this study includes (a) IT infrastructure, (b) IT human resources, (c) IT technological knowledge, and (d) customer relationship.

Based on the above discussion, this research focuses on the following questions:

- What is the degree of the application of IT levels in Jordanian banks from the viewpoint of the study sample?
- What is the level of performance of Jordanian banks according to the sample study?

Within the previously described framework, three variables are explored. The dependent variable is bank performance. The independent variable is IT resources (levels), and the control variable is bank assets and IT size. The variables are measured on a Likert-type scale with 1 = strongly disagree and 5 = strongly agree.

Dependent Variable: Bank Performance

We proposed a bank performance measure with three components: Financial performance (FP), strategic performance, and satisfaction with ventures. The FP includes profit and cost; strategic performance includes competitiveness, positions, and branches; satisfaction with customers includes satisfaction and meeting expectations. Banks performances were measured on a 25-item scale.

Independent Variable: IT Resources (Levels)

IT resources were measured on four levels: IT infrastructure, IT human resources, IT technological knowledge, and customer relationships. IT resources were measured on a 44-item scale; 18 of the items were related to IT infrastructure, 6 to IT human resources, 12 to IT technological knowledge, and 8 to the customer relationship.

Control Variable: Bank Size

Bank size is often related to performance success (Daoud, 2010). A number of studies use size alone to predict business performance. This study measured a bank's size by the size of its assets[1] and its IT ratio[2].

As discussed above, banks may compete effectively by using IT resources that generate sustainable performance advantages that have an impact on efficiency and profit. This study, therefore, posits 4 hypotheses:

H_{01}: There is no statistically significant correlation at the level ($\alpha \leq 0.05$) between the performance of Jordanian banks and each level of IT[3].

H_{02}: There will be no statistically significant effect at the level ($\alpha \leq 0.05$) for IT level on the performance of Jordanian banks.

H_{03}: There is no statistically significant difference at the level of ($\alpha \leq 0.05$), between the mean responses of the sample study on the application IT levels in Jordanian banks, caused to the variable asset size, and to ITI ratio.

H_{04}: There is no statistically significant difference at the level ($\alpha \leq 0.05$), between the mean responses of a sample study on their assessment of the performance of Jordanian banks that can be attributed to the variables of asset size and ITI ratio.

[1] The alternative hypothesis suggests that the large-asset bank has more resources, technical expertise, and capital to achieve greater performance success. Studies have argued that most small- and medium-sized enterprises "lack technical expertise, lack adequate capital to undertake technical enhancements, lack adequate bank *planning, and have a limited service range available to customers" (Barry & Milner, 2002).*

[2] The alternative hypothesis suggests that the ITI ratio (high or low) significantly influences a bank's cost and profitability performance. Banks with high ITI ratios have better resources, greater technical expertise, and more capital to achieve efficiency success. Sangjoon (2006) argues that the ITI of large banks shows a stronger positive influence on improving bank returns than that of small banks.

[3] The alternative hypothesis there is a positive relationship between IT resources and performance. When a bank improves its IT infrastructure and IT finances, these will have a positive influence on its performance (Duncan, 1995).

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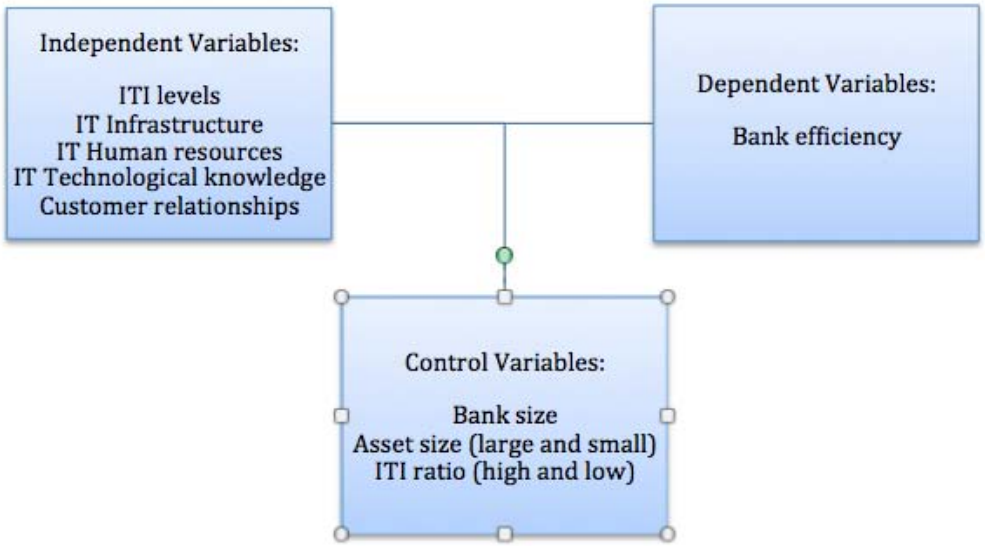
Proposed Research Model[4]



II. Methodology

The researcher chose survey methods. The advantage of using surveys is the ability to calculate non-parameter variables; and this method is considered the most appropriate for this study.

This study focused on Jordan's bank sector, the nations' fastest growing IT market segment (Alhawary, 2004). The sample for this study was restricted to 22 banks (16 national banks and 6 international banks), representing a large proportion of the total banks (22/26).

A questionnaire with 69 questions was designed to examine IT resources. The estimated time for completing the questionnaire was 15–20 minutes. Anticipating difficulty in obtaining responses from managers, the questions were framed as 5-point Likert scale items in order to minimise response time and encourage a reply (Fowler, 1993). On the Likert scale, 1 indicated strongly disagree and 5 strongly agree.

Traditionally, bank performance has been measured by three components: cost and profit performance, strategic IT performance, and satisfaction with customers and meeting expectations (Daoud, 2010).

Survey data was collect from Jordan's banking sector. As this study used surveys, the G-Power program was used to determine the number of responses required to obtain an acceptable response. The degree of correlation with the effect size of 0.20, alpha at 5%, power 0.80, shows the total sample size should be 240. Based on the results of the G-Power, 240 samples were selected; of these, 232 surveys are included in this study.

Using SPSS analysis, each item's measurement was examined by comparing the structures, loadings, and inter-item correlations. In order to simplify the overall model being tested and to reduce the potential for bias associated with multicollinearity, statistical analysis was conducted. In addition, descriptive statistics including the percentage, mean, median, and standard deviation for each item were employed. The multiple stepwise regression analysis was used as it was expected to predict the relationship between the independent (IT resources and capabilities) and the dependent variables (bank performance).

To test the study's hypotheses, multiple stepwise regression analyses were conducted to predict relationships between the independent variables and the dependent variable. It was predicted that all four levels of IT would have a significant influence on bank performance and be positively related; and that bank size would influence performance. The data from the questionnaire was analysed using SPSS. The initial part of the analysis focused on the descriptions of the respondents. Path analysis was used to test the hypotheses.

III. Results

This section presents the study population, study tool, validity, the reliability of the statistical process, and conclusions related to the research hypotheses.

[4] This model is taken from Wong (2007).

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Table 1 : Characteristics of the study sample

No.	Variables	Classes	Frequency	Percentage%
1	Sex	Male	184	79. 3
		Female	48	20. 7
2	Age	Less than 30	36	15. 5
		30 – 40	80	34. 5
		40 – 50	84	36. 2
		and more□50	32	13. 8
3	Experience	Less than 5	19	8. 2
		5 – 10	52	22. 4
		10 – 15	75	32. 3
		15 and more	86	37. 1
4	Qualification	Diploma	12	5. 2
		Bachelor	120	51. 7
		Master	85	36. 6
		Ph.D.	15	6. 5
5	Functional Level	Manager	95	41. 0
		Dep. President	98	42. 2
		Employee	39	16. 8
6	Asset Size	Small	90	38. 8
		Large	142	61. 2
7	ITI Ratio	Low	51	22. 0
		High	181	78. 0

a) Study Population and its Sample

As shown in Table1, the respondents were 79.3% male and 20.7% female. Their ages were categorised as less than 30, between 30 and 40, between 40 and 50, and above 50. 'Experience' was defined as less than 5 years, between 5 and 10 years, between 10 and 15 years, and above 15 years. Qualifications were Diploma, Bachelor, Master, and PhD. Functional levels were manager, president, and employee. Control variables were, first, small- and large-asset banks; second, low- and high-IT ratio.

b) Study Tool

To achieve the objectives of this research, and after reviewing to the literature concerning the possible use of information technology, we devised a tool to measure the impact of IT on the efficiency of banks in Jordan. The tool consisted of three parts: personal information, public (sex, age, and years of experience, qualifications, and the functional level, the size of assets, and the percentage of ITI). The second part dealt with IT levels with 69 items distributed over four levels: 18 relating to infrastructure, 6 to human resources, 11 to technological knowledge, and 8 to customer relationships. The third variable, efficiency of banks, consisted of 26 items. A five-stage Likert-scale was adopted to measure the level of application of IT and of bank efficiency. This latter was divided into three levels, with cut-off calculated by dividing the difference between the highest value of the scale (5) and least value (1) at three levels: i.e., the cut-off grade is {(5-1)/3 = 1.33}.

Thus, the three levels as follows:

- Low-grade application (1–2.33)
- Medium degree of application (2.34–3.67)
- High degree of application (3.68–5).

This was subsequently validated as a measurement tool and its reliability tested as follows:

c) Tool Validity

To test the validity of the measurement tool, it was tested on a separate group of experts and arbitrators with expertise in the field of IT in Jordanian universities. This enabled us to validate both the linguistically formulation of items, and the applicability of the items to the variables in the study. The observations of these experts and arbitrators were taken into consideration, with some items reworded some items and others deleted.

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d) Tool Reliability

To check the reliability of the questionnaire, we calculated the coefficient of reliability of the tool (measuring the internal consistency of the items) using Cronbach's Alpha. The total reliability coefficient of the tool overall (0.947) is shown in Table 2.

Table 2 : Test of study tool reliability

Variables	No. of items	Cronbach's Alpha
Infrastructure	18	0. 881
Human resources	6	0. 822
Technological knowledge	11	0. 804
Customer relationship	8	0. 842
Banks performance	26	0. 876
Total items	69	0. 947

e) Statistical Process

After completion of the data insertion in the computer software of SPSS, descriptive and analytical statistical methods were used, in order to answer the study questions and test the hypotheses. The statistical methods used for the purposes of statistical analysis of the data are: Cronbach's alpha coefficient, Frequencies and percentages, Arithmetic mean and standard deviation, Spearman correlation coefficient, Variance inflation factors test (VIF), Multiple linear stepwise regression analysis and One-way analysis of variance.

f) Statistical Analysis

This section presents the results of the statistical analysis of the data derived from the subjects' responses to the questionnaire, reached through the use of SPSS. The results were classified according to the sequence of questions and assumptions contained, as follows:

i. *Question One*

What is the degree of the application of IT levels in Jordanian banks from the viewpoint of the study sample?

Table 3 : Means and standard deviations for IT levels Application

No.	Levels	Mean	Standard deviation	Rank	Application Degree
1	Infrastructure	4. 20	0. 34	2	High
2	Human resources	3. 97	0. 49	4	High
3	Technological knowledge	4.13	0. 30	3	High
4	Customer relationship	4. 23	0. 39	1	High
-	Information technology	4.13	0. 31	-	High

To answer this question, means and standard deviations were calculated to assess the study sample on each IT level. Table 3 indicates the results of analysis of responses of a sample study on the degree of application of IT in Jordanian banks. The table includes the means for all levels in order to determine the level of intensity of answers in each part, and standard deviations for the purpose of diagnosis of the dispersal of the answers to arithmetic means.

Table 3 illustrates a tendency in all means for the IT level to rise from the viewpoint of the sample study, comparing the means of the standard (4.20, 3.97, 4.13, 4.23 respectively), all greater than the standard 3 out of 5 on the Likert scale. These results indicate that members of the study sample possess clear vision about every level of information technology, indicating that their evaluation of the application of IT in Jordanian banks was positive. This in turn means that Jordanian banks apply a high level of IT, from the viewpoint of the sample. The customer relationships fell on the first rung of the ladder of priorities for members of the study sample, followed by infrastructure, then technological knowledge, while human resources came in the fourth rank.

ii. *Question Two*

What is the level of performance of Jordanian banks according to the sample study?

To answer the second question, averages and standard deviations were calculated to assess the responses of the study sample to each section of the variable efficiency.

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Table 4 : Means and standard deviations for items of bank performance

No.	Items	Mean	Standard deviation	Rank	Evaluation Level
1	Q_1	4. 10	0. 87	26	High
2	Q_2	4. 25	0. 55	19	High
3	Q_3	4. 39	0. 52	7	High
4	Q_4	4. 35	0. 50	9	High
5	Q_5	4. 17	0. 42	21	High
6	Q_6	4. 34	0. 51	11	High
7	Q_7	4.12	0. 49	25	High
8	Q_8	4. 15	0. 48	23	High
9	Q_9	4. 14	0. 35	24	High
10	Q_{10}	4. 22	0. 47	20	High
11	Q_{11}	4. 31	0. 48	14	High
12	Q_{12}	4. 16	0. 39	22	High
13	Q_{13}	4. 25	0. 52	18	High
14	Q_{14}	4. 41	0. 50	5	High
15	Q_{15}	4. 42	0. 55	4	High
16	Q_{16}	4. 27	0. 47	16	High
17	Q_{17}	4. 40	0. 53	6	High
18	Q_{18}	4. 28	0. 50	15	High
19	Q_{19}	4. 34	0. 50	10	High
20	Q_{20}	4. 32	0. 51	13	High
21	Q_{21}	4. 43	0. 52	3	High
22	Q_{22}	4. 45	0. 53	1	High
23	Q_{23}	4. 37	0. 51	8	High
24	Q_{24}	4. 26	0. 54	17	High
25	Q_{25}	4. 34	0. 58	12	High
26	Q_{26}	4. 44	0. 59	2	High
-	Bank performance	4. 30	0. 26	-	High

Table 4 presents the results of responses from the sample study on the items of the variable performance of Jordanian banks. It displays a high arithmetic mean of the variable efficiency of the performance of Jordanian banks, at 4.30, standard deviation 0.26: greater than the standard test of 3 out of 5 on the Likert Scale. This finding suggests the members of the study sample possess a clear understanding of the efficiency of Jordanian banks, which indicates that the assessment of the efficiency variable by members of the study sample was positive; and this means that the performance appraisal high degree with respect to each portion of the variable (the performance of Jordanian banks). The results show that item 22, "Investment in IT leads to increased accuracy in work", took first place on the ladder of priorities with an arithmetic mean of 4.45 and a standard deviation of 0.53. Item 1, "Current technology is less than the return Achieved lies 26th place, last on the ladder, with an average arithmetic mean of 4.10, and a standard deviation of 0.87. This means that banks perform their services to a high degree from the viewpoint of the study sample.

iii. *Study Hypotheses Test*

Before testing the hypotheses of the study, the researcher considered to verify the absence of the Multicollinearity between the independent variables of IT levels. As shown in the Table 5).

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Table 5 : Test of multicollinearity between IT levels Multicollinearity Variables

Variables	Multicollinearity	
	Tolerance	VIF
Infrastructure	0.525	1.906
Human Resources	0.511	1.956
Technological Knowledge	0.458	2.183
Customer Relationship	0.632	1.582

Results in Table (5) illustrate, the previously the absence of (Multicollinearity) between (the IT level) which (infrastructure, human resources, technological knowledge, and the customer relationship), this is confirmed by the values of innumerable test (VIF) calculated with the criteria mentioned, and all these values are less than the critical value of the test (5). To make sure there is no (Multicollinearity) between levels, it has become possible to test hypotheses concerning the statistical assumptions (correlation analysis, regression analysis, and measuring the differences). And the hypotheses of the study will test by using the (correlation coefficient for the (Spearman), multiple linear stepwise regression, and Analysis of Variance (ANOVA)), respectively. The following is a detailed explanation of the results of hypothesis testing:

a. The First Main Hypothesis Test

H_{01}: There is no statistically significant correlation at the level ($\alpha \leq 0.05$) between the performance of Jordanian banks and each level of IT.

To test this hypothesis, the Spearman correlation coefficient was used, as shown in Table 6.

Table 6 : The correlation between bank performance and IT level

Variables	Infrastructure	Human Resources	Technological Knowledge	Customer Relationship
Bank performance	0. 587 **	0. 477 **	0. 570 **	0. 677 **
Sig.	0. 000	0. 000	0. 000	0. 000

Results in Table 6 illustrate a positive and statistically significant relationship at level ($\alpha = 0.05$) between the performance of Jordanian banks and each IT level. This is supported by the values of statistical significance (Sig.) for calculated correlation coefficients, all less than the significance level ($\alpha \leq 0.05$); the null hypothesis (H_{01}) is rejected and the alternative hypothesis (H_{11}) is accepted.

b. The Second Main Hypothesis Test

H_{02}: There will be no statistically significant effect at the level ($\alpha \leq 0.05$) for IT level on the performance of Jordanian banks.

This was tested using the multiple linear regression method. Prior to the test the validity of the model was verified, as shown in Table 7.

Table 7 : Model summary of multiple linear regressions

R	R Square	Std Error of Estimate	F- test	Sig.
0.733	0. 537	0.177	65. 895	0. 000

The value of (F) is tabulated for the degree of freedom for the numerator and denominator (4, 227) of the level ($\alpha = 0.05$) = 2. 37.

Results in Table 7 illustrate the following:

- The value of (F) calculated (65.895) is greater than the value of (F) tabulated (2.37). As well, the value of statistical significance (Sig.) (0.000) is less than the significance level ($\alpha = 0.05$). This rejects the null hypothesis (H_{02}), which means evidence of the validity of multiple linear regression model, and therefore there is no impact on IT level in the efficiency of Jordanian banks.
- The value of coefficient of Determinant (R2) (0.537) indicates that IT levels (infrastructure, human resources, technological knowledge, and customer relationships) show a change of 53.7% in the efficiency performance of Jordanian banks, with the remainder amounting to 46.3%, attributable to variables not included in the multiple linear regression model.

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Given the above results, it is now possible to use the linear regression stepwise method to measure the impact of IT in the performance of Jordanian banks.

Table 8 : Results of stepwise multiple linear regression (coefficients)

Variables	Coefficients (β)	Standardised coefficients (BETA)	t – test	Sig.
Constant(β_0)	1. 578	-	8.788	0. 000
Customer relationships	0. 326	0. 487	8. 586	0. 000
Infrastructure	0. 199	0. 264	4. 232	0. 000
Technological knowledge	0. 210	0. 242	3. 623	0. 000
Human resources	0. 091	0. 175	2. 764	0. 006

Table 8 illustrates the following:

- There are statistically significant regression coefficients (B) for all levels of IT (infrastructure, human resources, technological knowledge, and customer relationships), with significant impact at the level ($\alpha = 0.05$) in the efficiency of the banks. This is supported by the values of (t) calculated as 4.232, 2.764, 3.623, and 8.586 respectively, as well as the values of statistical significance (Sig.) of the levels listed below level (a = 0.05); in light of previous results, the null hypothesis (H_{02}) will be rejected.
- The values of the standardised coefficient (BETA) calculated for all levels at 0.264, 0.175, 0.242, and 0.487 respectively, indicating that an increased interest in each of level by one standard deviation will improve the performance of the banks, reached 48.7%, 24.2%, 17.2%, and 26.4% respectively.

c. The Third Main Hypothesis Test

H_{03}: There is no statistically significant difference at the level of ($\alpha \leq 0.05$), between the mean responses of the sample study on the application IT levels in Jordanian banks, caused to the variable asset size, and to ITI ratio.

To test this hypothesis, we use analysis of variance (ANOVA), and the means and standard deviations for both asset size and the ITI ratio. As shown in Table 9, the value of (F) is tabulated at the degree of freedom of the numerator and denominator (1,230), at the level (($\alpha = 0.05$)) = 3.84.

Table 9 : Analysis of variance (ANOVA) to test differences between the responses of the study sample about the application of IT levels

Variables	Source of variation	Sum of squares	df.	Mean squares	F-test	Sig.
Asset size	B. levels	0. 450	1	0. 450	4.737	0. 031
	Error	21. 911	230	0. 095		
	Total	22. 361	231	-		
ITI ratio	B. levels	0. 056	1	0. 056	0. 577	0. 447
	Error	22. 305	230	0. 097		
	Total	22. 361	231	-		

Comparison of the calculated means and standard deviations of the variables asset size and ITI ratio is shown in Table 10.

Table 10 : Means and standard deviations for asset size and ITI ratio)

Variables		N	Mean	Std deviation
Asset size	Small	90	4. 08	0. 24
	Large	142	4. 17	0. 34
ITI ratio	Low	51	4. 10	0. 27
	High	181	4. 14	0. 32

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Table 10 illustrates the following:

- There are statistically significant differences at the level (α = 0.05) between the mean responses of the sample study on the application of IT in Jordanian banks. These are attributed to variable size (assets), in favour of assets (large), with an arithmetic mean of 4.17. The value of (F) calculated as 4.737 is greater than the tabulated value (3.84), while the value of statistical significance (Sig.) of 0.031 is less than the significance level (α = 0.05). The null hypothesis (H_{03}) will be rejected.
- There is no statistically significant difference at the level (α = 0.05) that can be attributed to the variable of the ITI ratio. The value of (F), calculated as 0.577, is less than the tabulated value of 3.84. The value of statistical significance (Sig.) of 0.447 is greater than the significance level (α = 0.05). And it will not be reject (accept) the null hypothesis of (H_{03}).

d. The Fourth Main Hypothesis Test

H_{04}: There is no statistically significant difference at the level (α ≤0.05), between the mean responses of a sample study on their assessment of the performance of Jordanian banks that can be attributed to the variables of asset size and ITI ratio.

To test this hypothesis, we use analysis of variance (ANOVA) and the means and standard deviations for both asset size and ITI ratio, as shown in Tables 11 and 12. The Value of (F) is tabulated at the degree of freedom of the numerator and denominator (1,230) at the level of ((a = 0.05))= 3.84.

Table 11 : Analysis of variance (ANOVA) to test differences in the responses of the study sample about the evaluation of Jordanian bank performance

Variables	Source of variation	Sum of squares	df.	Mean squares	F-test	Sig.
Asset size	B. levels	2. 811	1	2. 811	52. 056	0. 000
	Error	12. 499	230	0. 054		
	Total	15. 310	231	-		
ITI ratio	B. levels	0. 564	1	0. 564	8. 813	0. 003
	Error	14. 746	230	0. 064		
	Total	15. 310	231	-		

The comparison of the calculated means and standard deviations of the variables asset size, and ITI ratio are shown in Table 12:

Table 12 : Means and standard deviations for asset size and ITI ratio

Variables		N	Mean	Std deviation
Asset size	Small	90	4. 16	0. 24
	Large	142	4. 38	0. 23
ITI ratio	Low	51	4. 20	0. 27
	High	181	4. 32	0. 25

The results in Tables (11and 12) illustrate:

- There were statistically significant differences at the level (α = 0.05) between the mean responses of the study sample on their assessment of the performance of Jordanian banks, attributed to the asset size variable, and in favour of large assets (large). The arithmetic mean is 4.38; the value of (F) calculated as 52.056 is greater than the tabulated value of 3.84. The value of statistical significance (Sig.) at 0.000 is less than the significance level (α = 0.05). The null hypothesis (H04) will be rejected.
- There are significant differences at the level of (α = 0.05) between the mean responses of study sample on their assessment of the performance of Jordanian banks, attributed to the variable ITI and the proportion of high ITI, with a mean of 4.32. This supports the value of (F), calculated as 8.813 and greater than the tabulated value (3.84). The value of statistical significance (Sig.) equals 0.003, less than the significance level (α = 0.05). The null hypothesis (H_{04}) will be rejected.

IV. Conclusion

The results of this study show that IT levels strongly affect bank performance. Four major levels of IT: IT infrastructure, IT human resources, IT technical knowledge, and customer relationships, strongly influence a bank's performance.

The results of this study were classified according to the sequence of questions and assumptions as follows:

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a) The members of the study sample possess a clear vision about the variable efficiency of the performance of Jordanian banks across every variable.
b) There is positive and statistical significance at the level ($\alpha = 0.05$) between the performance of Jordanian banks and each IT level.
c) There exist statistically significant regression coefficients (B) for all levels of IT (infrastructure, human resources, technological knowledge, and customer relationships), with significant impact at the level ($\alpha = 0.05$) to the level mentioned in the efficiency of performance of Jordanian banks.
d) There were statistically significant differences at the level ($\alpha = 0.05$) between the mean responses of a sample study on the application of IT in Jordanian banks, attributed to variable size (assets) and in favour of assets (large).
e) There were statistically significant differences at the level of ($\alpha = 0.05$), between the mean responses of the study sample, attributable to the asset size variable and in favour of large assets.
f) There are significant differences at the level of ($\alpha = 0.05$) between the mean responses of the study sample, attributed to the variable ITI and the proportion of ITI.

This analysis seemingly demonstrates that:

a) Staff developing should be in line with the development and modernisation of technology.
b) All technological means that enhance the service experience of customers should be adopted because they raise the level of satisfaction with banking services.
c) Updating IT infrastructure in banks will reflect positively on performance.

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