

## **The Effect of Information Systems on Bank Performance: A comparative study between Islamic and Commercial Banks in Jordan**

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### **Abstract:**

This study aims to explore and analyze the most important reasons for decision making within the banking sector of Jordan, which, although extremely important, is largely absent in business literature pertaining to Jordan. Essentially, the researcher poses two central questions: Does implementation of Information Systems (IS) impact on business performance, and is there any difference in this impact between the two main groups of banks in Jordan; Islamic and Commercial? Two further questions are also investigated; the extent to which banks are applying IS, and whether there are differences in business performance due to individual bank characteristics, such as extent of capital reserves, the number of years it has been operating and the type of bank. Quantitative methodology has been used to collect and analyze data, which is comprised of 583 questionnaires. Various forms of analysis were employed to examine the research assumptions; independent and one-sample t-test, multiple regression analysis and ANOVA.

The study proposes the following conclusions:

- IS is applied by banks in Jordan; however, there is variation in application of equipment and software, with Commercial Banks exhibiting positive implementation and Islamic Banks negative implementation.
- The only significant positive effect of IS was on marketing performance.
- The relationship does not differ when a comparison between two samples is progressed.
- Economic performance of a bank is related to the sector (Commercial or Islamic) to which it belongs.

### **Keywords:**

Information Systems, Business Performance, Bank Features, Jordan Banking Sector

### **Citation:**

Al-Nsour, Belal Hashem; Shobaki, Zeyadal; Alizoubidi, Mohamad (2019); The Effect of Information Systems on Bank Performance: A comparative study between Islamic and Commercial Banks in Jordan; Journal of Social Sciences (COES&RJ-JSS), Vol.8, No.3, pp:526-543; <https://doi.org/10.25255/jss.2019.8.3.526.543>.

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## INTRODUCTION

A new trend in the field of bank digitization is the tendency towards more strategic implementation of IS. In today's corporate environment, with global competition operating across the system, and an open, competitive market, managers face many challenges. The wider aims of IS are designed to provide better services for consumers, while preserving profitability of a corporation, for stakeholders both inside and outside the firm (Sun et al., 2016). Since implementing IS involves cost to an organization, it should therefore generate benefit, in order to be a sustainable business practice in the business and public sectors (Hannan et al., 2018). However, the banking sector has debated whether business performance is affected by the extent to which IS is implemented.

In view of this, the main purpose of this study is to discover and examine whether IS has an effect on the business performance of banks. It also aims to discover if there are any differences in the effect of IS on business performance between Islamic and Commercial banks, and if there are differences in business performance due to individual bank features. This study is particularly significant for several reasons; although IS is a common practice in Jordan, few studies exist regarding its effect on the banking sector. Talal and Abu Khadra's (2008) results suggest that Jordanian legislation, as a major factor of IS implementation in Jordan, may be the cause behind inefficient implementation of IS by some banks. They suggest that some banks may be implementing IS applications without being aware that these practices are actually aspects of what is known as "IS". Furthermore, Jordan has received increased investment from all over the world, but particularly from developed countries; in these instances, IS practices are obviously built into the policies of the donor banks. Consequently, this study focuses on IS practices of Commercial Banks in Jordan, in comparison to Islamic Banks. By comparing the practices of these two samples, the study has attempted to determine the extent of difference, to understand why it occurs (Saheer and Chris, 2003).

### The Study Problem

This study aims to determine the effect of IS on the business performance of individual banks. The Literature Review has elicited studies which are both similar and dissimilar in their findings (Hichem and Kachtouli, 2014). Some have determined affirmative results, supporting the relationship between IS and business performance, while others find little relationship between these variables (Cengiz et al., 2014). Talal and Abu Khadra's (2008) study detects that IS in Jordan is, for the most part, driven by increased competition between Commercial and Islamic Banks, due to international globalization and liberalization, in addition to increasing concerns with efficiency and productivity. Unlike most of the countries assessed in the literature, there are no classification standards which must be used to assess IS in Jordan.

In view of the findings above, the study proposes to answer the following questions:

1. To what extents are Islamic and Commercial Banks in Jordan implementing IS?
2. Are there any significant differences between the application of IS within the two samples in the study; Islamic and Commercial Banks in Jordan?
3. Does implementation of IS have any effect on a bank's business performance?
4. Are there any significant differences in the relationship between IS and business performance concerning the two samples in the study; Islamic and Commercial Banks?
5. Are there any differences in business performance due to features of individual banks?

### Definition of Information Systems Management

Different definitions exist for IS within the literature. It has been defined as the development and use of an information system which helps businesses achieve their goals and objectives. This definition has three key elements: development and use, information system, and business goals and objectives. Therefore, a model of the components of an information system include: computer hardware and software, data, procedures and people (Hafid and Bill, 2006).

IS is used by families and the business sector to improve business conditions so that both business and development is improved. However, IS does not only mean fulfilling the requirements of an information system operation (Min et al., 2018), it also means to arrange procedures to provide agreement between operators, and provide that all components required are present for every IS procedure, such as hardware (the computer, storage disk, keyboard, and monitor) and software, people, and structural factors related to important elements in the internal environment for the organization, which can be used to support the transformation from manual to electronic. Stakeholders can be defined as a broader group of interested parties. These include not only shareholders, but also employees, clients, partners, suppliers, and communities, who reproduce, exchange, transfer, refine, analyze, interpret, synthesize, and generate information. Many such processes turn information into knowledge (Rahmatollah and Ebrahim, 2006).

IS typically refers to hardware and software used to manage the information and data processing requirements of an organization. Software includes employee record keeping, positions and risks, and financial instrument sales, invoicing, inventory management, project planning, customer relationship management, and business analysis (Roger, 2001). Uma and Collins (1997) state that IS results from interconnection of several factors, which include information, knowledge, products and services, methodology, and standards which result from the growing production of information within banking organizations. These organizations are required to contribute to the business goals and objectives of the stakeholders who produce the IS; who are becoming more aware of their business requirements. Based on the varied definitions of IS in the literature, this study defines IS as the connected link between information systems and organizational management and performance, where the organization demonstrates characteristics of information quality consisting of accurate data, which is produced in a timely manner, relevant context, sufficient purpose, and efficiency of cost (Mukhopadhyay et al., 1995).

**Reasons for different IS methodology in the banking sector**

1. *IS practices are legally obligated:* Banks in the different financial sectors of Jordan implement a variety of IS activities (for example, troban) which increase the value of IS on business practices, and which can be categorized as legally binding through systematically organized records of banking operations, such as individual e-banking, e-business banking, digital banking and loans, and e-services for business and customers (Umesh and Gupta, 2011).
2. *IS involves cost but provides significant benefits:* Implementing IS involves cost, such as purchasing hard or software, structural changes, or implementing stricter quality control. However, it also reduces time, errors and costs associated with processing information, increases productivity and permits customers to process their own operations by means of Customer-Integrated Systems (CIS; David, 1995). In most cases, implementing IS also increases a bank's overall value, as it enhances quality of the decision-making processes at all administration levels, by improving the identification of solutions to problems and opportunities (Livio et al., 2014). Another benefit is the ability to analyze the environmental situation, by providing relevant information and assisting staff to predict the best decision to make. Therefore, IS in banks enriches the ability to manage information, improves the communication process between various levels, both in-house and with stakeholders, to boost the success of operations. Finally, IS can facilitate organizational change and structural transformation (Suhaimi et al., 2007).
3. The cost of establishing an online site is not comparable to the cost of establishing a new branch, which entails sourcing a structural environment (either stand-alone or as part of a complex), equipment and providing efficient administrative staff. Marketing a bank's online

services enables it to have a competitive advantage which enhances its position with regards to other local banks, and qualifies it as a global business in terms of transactions (Mark, 1998).

4. Using the internet for marketing and services contributes to the promotion of intellectual capital, the development of information technology, and the utilization of new innovations which reflect on the perception of a bank (Todd, 2009). In view of this, customers compare the services of alternative banks to choose the most appropriate, with the ability to use the internet a strong competitive factor in attracting customers. Furthermore, the internet helps to introduce and promote banking services in the media, which contributes to improving the quality of banking services provided (Arezo, 2018).

#### **Types of IS used in Jordan**

Some banks utilize the Transaction Processing System (TPS) to observe the status of internal bank operations and the bank's relationship with the external environment. Management Information Systems (MIS) provide management with reports, often including online access to the organization's current performance. Decision Support Systems (DSS) enhance the ability of management to make decisions using internal information, and transfer information from external sources to a central bank, the stock exchange, or a central market (Ming et al., 2005; Abu Shanab and Pearson, 2007). Executive Support Systems (ESS) operate at the strategic level of an organization, informing senior managers of viable alternatives in order to enhance the decision making process. Electronic Communications Systems (ECS) provides email, voice mail, and facsimiles which allow an organization to send messages in text, video, or voice format, or to transmit copies of documents in seconds, rather than hours or days (Salma and Younes, 2015).

#### **Performance Management**

Performance Management is a systematic operation designed to develop organizational performance, by improving the performance of individuals and teams. It is a means to increase results by recognition and managing performance within an agreed framework of planned goals, criteria and specialization requirements (Cengiz et al., 2014).

Donald and Mark (2010) have measured marketing performance using dimensions including Brand Awareness, Lead Generation, Thought Leadership and Engagement, but the measures used in this study are Reputation, Sales, and Market Share. Kabir et al.'s (2013) study found that the adoption of IS may assist managers' perceptions of the effect IS has with regards to a bank's reputation. Finally, Financial Performance Management is much more than appraising individuals; it contributes to the achievement of business in terms of change, and is integrated within other key activities. Also, researchers called for more research on the enabling factors of applying electronic services (e.g. Alenezi et al., 2017; Altamony and Gharaibeh, 2017; Tarhini et al., 2017; Bajnaid et al., 2018; Obeidat et al., 2019), thus, prospect research is vital to explore new electronic venues the relationship between various e-services within the financial performance management contexts.

Awwad et al. (2011) analyze the correlation between IS and one perspective of marketing performance; namely, reputation. However, results were inconclusive, with a positive effect found between IS and reputation in some sectors, and a negative effect in others. As noted above, few studies have addressed IS in the Jordan situation. Future studies could be classified into two groups; one assessing the nature of IS in Jordan, examining to what extent IS is actually practiced in the country, and a second which assessed the relationship between IS and business performance. Suraya and Abdul Rahim (2012) and Hichem and Kachtouli (2014) investigate Islamic and commercial banks from various economic countries at pointing the range of operations and practices in Jordan. It came to the conclusion that there is no systematic application of IS by Jordanian banks; a number of banks within both types (Islamic

and commercial) have adopted a variety of IS practices, for a variety of purposes, and towards a number of individual solutions and sources.

More specifically, performance management is designed to achieve the organizational objectives while supporting individuals, in order to boost corporate IS values. When conducted according to standardized specifications, it enables expectations to be defined and discussed in terms of role responsibilities, accountability, skillfulness and behavior, and provides opportunities for individuals to identify their personal goals and improve their skills, competencies, and abilities.

**STUDY METHODOLOGY**

**The Measuring Instrument**

A three-section questionnaire was created and sent to participants either by email or personal delivery. The first section concentrates on bank features, with regard to capital and the number of years it had been operating. One question about bank type was included for comparative analysis objectives. The second section includes questions about business performance, using a three-point scale to measure each specific business performance element. A horizontal analysis was performed between the comparison types (Islamic, commercial) existing in the market, and a vertical analysis compared the performance of individual banks in the current year to that of the previous two years. Respondents were provided with guided steps to ensure their measurements for each question were valid in terms of performance.

**Research Sample**

The study analyzed two types of banks using a comparative technique. They are Islamic banks which were registered at the Central Government Bank in the period between 2010-2018, and Commercial banks, which were registered at the Central Government Bank of their choice; many international banks are operating in Jordan, which are registered in their country of origin. Some of the commercial and Islamic banks which operate in Jordan have a large number of stakeholders. It needs to be pointed out here that there are considerable differences between commercial and Islamic banks in their use of modern technology; there are detailed religious laws regarding banking operations which must be adhered to by the Islamic banks, which means they are unable to keep pace with technological developments. The study recognizes these factors, and has designed the study so as to be able to analyze these differences

There were 4 Islamic banks and 16 Commercial banks in the target sample. The survey concluded that all variables of the questionnaires were usable, questionnaires categorized as invalid because they were not complete. The bank performance questions were left blank or partially blank by four participants; however, each of these participants answered most of the questions in the IS segment. Therefore, these four questionnaires were included only in the descriptive analysis and the evaluation of the first two hypotheses, and were not included with regards to determining Hypotheses (3), (4) and (5); performance in this analysis was limited as a dependent variable.

Table 1: Categorization of samples by type

NUMBER	TYPE	FREQUENCY	PERCENTAGE %
1	Islamic	4	20%
2	Commercial	16	80%
<b>Total</b>		<b>20</b>	<b>100</b>

*Bank Features:* In order to investigate differences in the study sample, banks were divided into a number of segments, according to the firm's capital and years of operation (See Table 2 below).

Most of the Islamic and Commercial banks in the study sample had a large capital, which is linked to the inflation of the banking sector in Jordan and also associated with Jordan's Muslim population. With regards to the number of years of operation, some of the Islamic banks were pioneers in the industry, but the decline in level of services has affected the number of current customers. The measurement "between 5-10 years" has the highest percentage for both groups. The Commercial banks operate with a larger working capital (70%) compared to Islamic banks. The figures for years in operation are fairly similar, with a small percentage (52% opposed to 45.1%) illustrating that Islamic banks have been operating more than 10 years. The researcher noted that the main factor regarding Commercial banks is that they are generally more flexible, and responsive to customer needs; however, this is due to the fact that Islamic banks must adhere to religious laws, and not for any other reason.

Table 2: Characteristics of banks analyzed in the study

Banking Type:	Islamic		Commercial	
	Frequency	Percent	Frequency	Percent
<b>Capital: (Jordan Dinar)</b>				
100 - 200 million	2	50	3	30
201 - 300 million	1	25	2	20
301 - 400 million			2	20
401 - 500 million			1	10
501 - 600 million	1	25	1	10
601 million or more			1	10
<b>Total:</b>	<b>4</b>	<b>100%</b>	<b>10</b>	<b>100%</b>
<b>Number of years in Business:</b>				
Less than 5 years	2	4	2	6.5
5-10 years	20	40	13	41.9
11-15 years	11	22	5	16.1
More than 15 years	15	30	9	29.0
Missing Responses	2	4	2	6.5
<b>Total</b>		<b>100</b>		<b>100</b>

**Research Model**

The review of theoretical literature and previous studies was used as a solid and fundamental basis for the development of the study model and research hypotheses.

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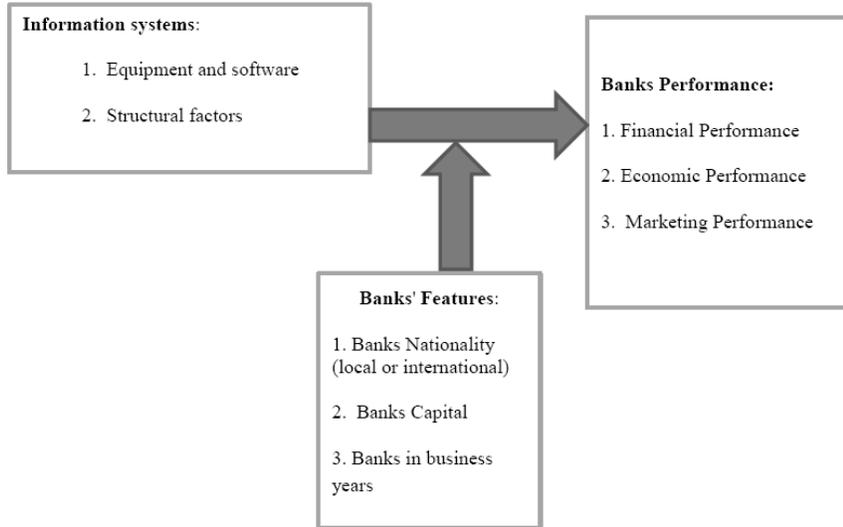


Figure 1: Search Model IV: Independent Variables

*Research Hypotheses:* based on the literature review and previous studies, the study hypotheses are in two groups; the first examines the practices of IS, and the second evaluates the effect of IS on a bank’s performance.

*Group 1:*

**H 01:** Islamic and Commercial banks in Jordan do not practice IS.

**H 02:** There is no significant difference in the implementation of IS between Commercial and Islamic banks in Jordan.

*Group 2:*

**H 03:** There is no significant relationship between the implementation of IS and bank performance.

**H 04:** There is no significant difference in bank performance between Islamic and Commercial banks with regards to the effect of implementing IS.

**H 05:** There is no significant difference in the effect implementation of IS has on bank performance attributed to bank features (such as capital, type, and experience).

**Descriptive Analysis**

The descriptive analysis was used to evaluate the results obtained from the questionnaires (See Table 3).

Table 3: Performance

Items	Section II Vertical Analysis			Section I Horizontal Analysis		
	Mean	SD	Ranking	Mean	SD	Ranking
<i>Economic Performance</i>						
Productivity	2.536	0.501	2	2.819	0.455	1
Export percentage (%)	1.901	0.588	11	2.301	0.611	10
<i>Marketing Performance</i>						
Percentage of sales	2.099	0.710	5	2.731	0.745	2
Sales				2.698	0.600	3

Reputation	2.501	0.598	1			
Market share	2.051	0.687	7			
<i>Financial Performance</i>						
<i>Profitability Measures</i>						
Gross profit margin	2.061	0.611	6	2.489	0.585	7
Return on equity	2.099	0.636	4	2.291	0.705	9
<i>Liquidity Measures</i>						
Current ratio	2.059	0.558	8	2.602	0.598	5
Liquidity ratio	1.964	0.554	10	2.542	0.606	6
Working capital	2.132	591	3			
<i>Activity Measures</i>						
Inventory turnover	2.008	0.524	9	2.294	0.614	8
Accounts receivable turnover				2.624	0.664	4
<i>Solvency Measures</i>						
Debt Ratio				2.117	0.648	11

Four questionnaires were excluded, as they only partially responded to the business performance questions.

The majority of the answers to the questions were found to be positively and statistically significant, with most of the questions above 2, the midpoint of the three point range. The questions associated with marketing indicate that the banks demonstrate strong marketing performance overall, due to the use of IS (rather than traditional methods) in marketing processes. Financial performance is mostly above average, due to the demand for banking services in terms of loans, facilities and transfers (the critical economic conditions in Jordan may have impacted on this factor), indicating that financial condition is good. The only financial performance factor that is below average is the liquidity ratio in Section 1.

With regards to economic performance, questionnaire responses were uneven. Productivity is high, suggesting that it has improved over time, and perhaps related to the implementation of IS. Conversely, export of services is in the lowest position, with the average score lower than any of the other averages in the analysis.

Two elements in the data are slightly below average; that is, financial liquidity ratios and export of services (the latter scoring the lowest; see above). Responses to liquidity ratios are negative, thus indicating poor liquidity; this can perhaps be interpreted in terms of the general financial decline as a result of Jordan's economic situation, which has impacted on the banks. Responses to debt ratios overall were positive; this may indicate that banks are investing debt to meet declining liquidity ratios, in order to induce suitable conditions associated with psychological traits of depositors. In terms of exports (average = 1.901), the reason may be explained by the differences in bank types, (that is, Commercial or Islamic), as some commercial banks may be associated with international markets with others not. Links to international foreign markets are found in both types of bank. The researcher noted that Islamic banks are more connected to international foreign markets than trade.

Table 4: Responses to IS Questions (Equipment and Software)

Items	Total Samples		Islamic Sample	Commercial Sample
	Mean	SD	Mean	Mean
1. Hardware and software helps your bank	3.739	1.115	3.243	4.136

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reduce document usage				
2. Hardware and software helps your bank handle a large number of banking operations in a short time	3.201	1.301	2.981	3.682
3. Hardware and software helps your bank produce bank statements accurately and quickly	2.998	1.291	2.654	3.182
4. Hardware and software helps your bank write bank statements accurately and quickly	3.586	1.178	3.124	3.773
5. Hardware and software enhances analysis of financial statements for your bank	2.985	1.181	2.985	2.273
6. Hardware and software helps your bank to provide information in a timely manner	3.657	1.085	2.645	3.541
7. Hardware and software helps your bank recover stored data quickly and efficiently	3.425	1.155	3.104	3.648
8. Hardware and software helps your bank to market both electronic and paper services	3.254	1.077	3.365	3.256
9. Hardware and software helps your bank to improve its financial performance	3.251	1.125	3.145	3.241
10. Hardware and software helps your bank improve Quality Control (QC) for certificates	3.243	1.735	3.077	3.159
All diminution	3.627	1.025	2.947	3.898

Table 4 illustrates responses to questions assessing IS practices in the banking industry of Jordan. It verifies that some equipment and software practices were not implemented as specified in the descriptors, with the mean value of five of these questions below the scale mean of 3.

Table 5: Responses to IS Questions (Structural factors)

Items	Total		Islamic Banks	Commercial Banks
	Mean	SD	Mean	Mean
<i>Structural factors</i>				
1. Structural factors of IS assist your bank to increase motivation of employees	3.864	1.156	3.310	3.365
2. Structural factors of IS help your bank to be an independent thinker.	3.946	1.157	3.077	3.636
3. Structural factors of IS help your bank to increase employee training.	3.527	1.230	3.018	3.546
4. Structural factors of IS improve your bank's systems and processes	3.689	1.204	3.352	3.364
5. Structural factors of IS develop your bank's ability to develop new products and services	3.581	1.147	2.692	3.318
6. Structural factors of IS improve your bank's accountability	3.270	1.150	3.269	3.273

Items	Total		Islamic Banks	Commercial Banks
	Mean	SD	Mean	Mean
7. Structural factors of IS develop your bank's rationality in the decision making process	2.689	1.271	2.558	3.000
8. Structural factors of IS improve your bank's legal accountability	4.392	0.889	4.539	4.046
9. Structural factors of IS enhances your bank's communication	4.189	1.002	2.308	3.909
10. Structural factors of IS increases the ability of your bank's team to develop solutions	<b>4.291</b>	<b>1.003</b>	<b>2.424</b>	<b>3.978</b>
11. Structural factors of IS support your bank's ability to collaborate	4.216	0.983	2.346	3.909
All diminutions	3.710	1.004	3.329	3.862

Questions relating to Structural factors elicited responses which were mostly above average. This indicates that the respondents were implementing IS. Questions relating to hardware and software all elicited responses which were above average, reflecting their positive impact on bank performance. However, the researcher noted that Islamic banks always initiates new products after they are already in use by Commercial banks. Rationality of the decision making process increased, which confirms that the role of corporate governance and accounting in the banking sector has been strengthened.

Structural factors are a sensitive issue, and are linked to collective procedures through systems which fulfill a range of responsibilities. Although the two types of banks have different systems and responsibilities, (the Islamic bank system must implement labor protocols in accordance with Islamic law, while Commercial banks are not bound by this system), all banks must comply with the standards set by the Central Bank of Jordan, which are in accordance with international standards, in particular COBIT.

The questions relating to hardware and software recorded the highest variable average for questions relating to IS. This substantiates the fact that technology is a basic requirement of any modern banking system, particularly the provision of solid technological infrastructure. Respondents stressed that software is important for banking operations in order to reduce expenses and increase the effectiveness of operations. Many banking services can only be affected by software. Therefore, based on the above, it can be confirmed that Commercial and Islamic banks both rely on electronic banking operations which cannot be implemented without the availability of hardware and software.

A comparison between Islamic and Commercial responses in Tables 4 and 5 attest that most of the responses indicating weakness were from Islamic banks.

**Hypothesis Testing Results**

To assess the first hypothesis, a one-sample t-test was used. According to statistical decision making rules, a null hypothesis would be rejected if Type I error was 0.05 or less than the p-value.

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Table 6: T-Test: Implementation of IS

Variables		Test Value = 3						
H's	Variables	T	df	Sig. (2-tailed)	Mean	Mean difference	95% Confidence interval of the difference	
							Lower	Upper
H01	IS as a whole	9.193	80	0.000	3.627	0.627	0.491	0.762
H01-1	Equipment and software	8.251	80	0.000	2.947	0.632	0.245	0.139
H01-2	Structural factors	12.785	80	0.000	3.898	0.898	0.759	1.038

Based on this rule, the first main hypotheses in the null form and the sub-hypothesis H01-2 are rejected, whereas sub-hypothesis Ho is accepted, which indicates the following: the banking sector as a whole implements IS and the structural factors associated with IS. The above is also true for hardware and software.

**Testing Hypothesis 2**

This hypothesis aims to assess if Commercial and Islamic banks in Jordan implement the two variables IS: structural factors and hardware and software. To test this hypothesis, the findings of Table 4 and 5, together with an independent sample t-test were used. Table 7 below illustrates the results of the analysis.

Table 7: T-Test: The level of implementation of IS: Commercial vs. Islamic banks

H's	Variables	t calc.	Sig. t	Mean Islamic	Mean Commercial
H02	IS overall	-1.125	0.298	3.551	3.710
H02-1	Equipment and software	-2.842	0.003	2.706	3.329
H02-2	Structural factors	0.136	0.756	3.889	3.862

The significance value of equipment and software is at a lower level (0.05), which indicates there were variances in the equipment and software used to implement IS. With regard to the findings of Table 4, respondents from the Islamic banking sector demonstrate negative responses to 50% of the questions, with a below average value in all areas; this indicates there are differences between Islamic and Commercial banks in equipment and software practices, which in turn supports the results of the independent t-test.

**Testing Hypothesis 3**

The third hypothesis is designed to assess the effect of IS on the business performance of banks. Multiple regression analysis was used to examine the potential effect of IS on business performance and its related sub-variables. The results are illustrated in Table 8 below.

Table 8: Regression analysis. Dependent variable: Financial performance

Multiple R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Standard Error of Estimate	Analysis of Variance		H Result
				F Value	Sig. F	
0.608	0.369	0.039	0.30125	1.105	0.001	Rejected
<i>Independent variables in the Multiple Regression equation</i>						
Independent Variables	Unstandardized Coefficients		Standardized Coefficients	T Value	Sig. T	
	B	Std. Error	Beta			

Structural factors	0.081	0.071	0.179	1.285	0.001
Equipment and software	0.002	0.049	0.007	0.0512	0.000

Table 8 presents the results for the Multiple Regression analysis of all the independent variables on financial performance as a dependent variable. As indicated in the multiple regression models, the p-value is 0.001, indicating there is a relationship between the total independence variable and financial performance, because significance value is greater than 0.05.  $R^2$  is 0.369, verifying that 0.369 of variation in economic performance can be explained by the independent variables. (See Table 9 below for further details)

Table 9: Regression Analysis. Dependent variable: Economic performance

Multiple R	$R^2$	Adjusted $R^2$	Standard Error Estimate	Analysis of variance		H0 Result
				F Value	Sig. F	
0.395	0.156	0.018	0.30158	1.385	0.001	Rejected
<i>Independent Variable in the Multiple Regression Equation</i>						
Independent Variables	Unstandardized Coefficients		Standardized Coefficients	T-Value	Sig. T	
	B	Std. Error	Beta			
Structural factors	0.111	0.069	0.210	1.872	0.000	
Hardware and software	-0.029	0.049	-0.119	-0.989	0.001	

Table 9 demonstrates the results of the multiple regression analysis between the total number of IS variables with economic performance as a dependent variable. The findings indicate there is a relationship between all the independent variables and economic performance, because the p-value is  $>0.05$ . Thus, the null hypothesis is rejected.  $R^2$  is 0.156, which indicates the variation in economic performance which can be explained by the independent variables.

Table 10: Regression Analysis. Dependent variable: Marketing performance

Multiple R	$R^2$	Adjusted $R^2$	Standard Error of the Estimate	Analysis of Variance		H0 Result
				F Value	Sig. F	
0.357	0.127	0.078	0.41582	3.996	0.018	Rejected
<i>Independent Variables in the Multiple Regression Equation</i>						
Independent Variables	Unstandardized Coefficients		Standardized Coefficients	T Value	Sig. T	
	B	Std. Error	Beta			
Structural factors	0.198	0.086	0.304	2.526	0.011	
Hardware and software	0.002	0.061	0.225	-0.042	0.967	

With regards to the relationship between the independent variables and marketing performance, Table 10 illustrates the results of the multiple regression analysis, which proves that the p-value is 0.018, and  $R^2 = 0.127$ . As the significance value is less than 0.05, the null hypothesis is rejected, with the alternate hypothesis accepted. Accordingly, the findings indicate there is a significant relationship between all independent variables (IS as a whole) and marketing performance. The T-value verifies that Structural factors, as a dimension of IS,

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have a significant positive relationship with marketing performance (Sig. = 0.011; beta = 0.304). In terms of hardware and software, the results again confirm a significant relationship with IS; in spite of this, t-value is close to zero and beta = 0.225. Finally, Table 10 verifies that 12.7% of variation in marketing performance can be explained by the independent variables as a whole. These findings could possibly be interpreted as follows: Structural factor questions constituted the largest segment of the IV measurement scale. The study substantiates that Structural factors are implemented by the banks in the study. Marketing performance scored the highest mean of all measures. The responses to these two distinct sub-variables are almost entirely positive, with the highest mean values, which could be interpreted as the reason for this significant positive relationship.

The results of this hypothesis are similar to Alnadari’s (2016) study, where a relationship is attested between IS and marketing performance, and to the results of Aljabli’s (2012) research, which proved the relationship between Structural factors, marketing performance, and marketing reputation.

**Testing Hypothesis 4**

The fourth hypothesis was designed to complete a comparative analysis between the two target samples in the study; Islamic and Commercial banks. An ANOVA analysis was used to test the hypothesis, with results shown in Table 11.

Table 11: ANOVA Analysis. Testing Hypothesis 4

Mode rating Variable	Variable		Financial Performance	Economic Performance	Marketing Performance
Differences in effect between Islamic and Commercial banks					
Bank type as a moderating variable					
Islamic vs. Commercial	IS: Hardware & software Structural factors	R <sup>2</sup>	0.0852	0.732	0.609
		F-test	1.121	2.125	0.445
		Significance	0.001	0.002	0.001
	Hardware & software	R <sup>2</sup>	0.635	0.524	0.421
		F-test	0.856	1.414	0.658
		Significance	0.004	0.002	0.000
	Structural factors	R <sup>2</sup>	0.552	0.608	0.692
		F-test	0.745	0.310	0.951
		Significance	0.002	0.003	0.004

The relationship between IS and business performance did not differ between the two samples (Commercial and Islamic banks), nor did the relationship between any of the IS factors with any of the performance dimensions; Significance "F" was less than 0.05 for all of them. Accordingly, the null hypothesis is rejected, and the interrelation between variables substantiated.

Although IS activities are implemented differently in Commercial and Islamic banks, the relationship between IS and performance does not differ; these results are in accordance with the literature review, which determined the relationship between IS and business performance. The effect of IS activities is the same for both samples, even though Commercial banks demonstrated more awareness of their usefulness. IS activities were seen to have a similar effect on the financial, economic and marketing performance of both samples.

*Testing Hypothesis 5:*

The final hypothesis assesses the difference in business performance attributable to bank features such as capital holdings, number of years of operation, and nationality. A two-way ANOVA analysis was used to assess relationship, with the results illustrated in Table 12.

Table 12: ANOVA Analysis. Testing Hypothesis 5:

Moderating Variables	Financial Performance	Economic Performance	Marketing Performance	Result of H0
	F calc.; Sig. F	F calc.; Sig. F	F calc.; Sig. F	
Capital	2.759; 0.082	0.615; 0.662	1.528; 0.291	Accepted: Null
Years of Operation	1.301; 0.352	0.603; 0.798	0.852; 0.552	Accepted: Null
Nationality	0.501; 0.791	0.718; 0.694	1.138; 0.510	Accepted: Null

\* Significant differences at 0.05

"F" should be >0.05 to be statistically significant; accordingly, all of the null hypotheses were accepted (Sig <0.05). Measures of economic performance may vary depending on the nationality of the bank, as some of the banks in the sample are linked to business groups outside Jordan. The researcher proposes that the problems facing the banking sector in Jordan, caused by the national economic crisis, are related to the following factors; closures of national borders as a result of the wars in Iraq and Syria, the migration of more than two million refugees to Jordan, a rise in taxes initiated by World Bank policies, weakness in international investment, and corruption.

#### CONCLUSIONS, RECOMMENDATIONS AND IMPLICATIONS

The study findings confirm the existence of IS practices in the banking sector in Jordan, although the literature available indicates the opposite. The literature substantiates that the concept of IS is not unfamiliar in Jordan, and that banks are implementing IS for both structural factors and hardware and software. However, the effect is limited, due to the fact they only implement those activities which can be categorized as legally binding. For this reason, the Central Bank of Jordan has obligated all banks to apply COBIT to ensure accuracy and governance for all operations.

The results substantiated that, for the most part, Commercial banks are more advanced in terms of IS application than Islamic banks, and more aware of its advantages. Despite this, the study does not reveal significant differences in IS practice between Islamic and Commercial banks. In terms of the two segments Structural factors and Hardware and software, the only differences occurred in Hardware and software, which probably indicates that Commercial banks are more concerned with effective hardware and software stability than with Structural factors. Furthermore, any development which does occur is a result of the necessities of competition in the local market, rather than a desire to develop existing infrastructure.

There has been some discussion among scholars regarding the cost of IS, and whether it affects banking sector performance. This study establishes a positive effect on financial, economic and marketing performance as a result of implementing IS; this positive relationship is true for both samples in the study. It has not substantiated that differences in financial or marketing performance are related to the advantages held by a particular bank. However, it does appear that economic performance is related to the amount of capital available (which provides a bank with an opportunity to develop), but that the number of years of operation does not have a significant effect on business performance.

The study confirms the relationship between bank type and economic performance is important for banks with international operations.

#### As a consequence of the findings, the study recommends the following:

1. There is a need for public sector cooperation with the Central Bank of Jordan; to increase the application of IS software, which contributes to increased transparency and clarity in banking operations. It is also essential that information technology is used to further develop

the decision-making process in order to enhance reliability, by implementing IS for the decision making process, both for individuals and teams.

2. The relationship between IS and marketing performance should encourage companies to work on augmenting software development, hardware and IT infrastructure, and Structural factors by developing decision making protocols, improving communication processes, and improving the performance of accounting systems in the e-structure. Evaluation of marketing performance is very important for banks, with an increased reliance on electronic marketing, especially in terms of social networks. Market share, the second measure of marketing performance, refers to how successful banks are in the market compared to their competitors. The reputation of companies is also an important measurement of marketing performance. It is recognized that an intangible asset is of great importance. In terms of the competition between Islamic and Commercial banks, the results of this study corroborate those of Smaiziene, (2008), who found that the main source of bank profit is linked to loans due to difficult economic conditions, rather than to investment support.

3. The Central Bank of Jordan should offer an incentive scheme for banks which are implementing up to date hardware and software applications, as well as processes related to Structural factors. Hindieye (2007) suggests a set of proposals and procedures which could be applied by the Central Bank of Jordan in order to improve IS applications in banks operating within the country. She believes that the Central Bank is responsible for creating corporate policies in order to build a national IS protocol which would assist to raise awareness of the concept of IS within the banking sector, and assist them to implement IS effectively. An added bonus would be that implementing such a protocol would also encourage banks to become more competitive within international markets.

4. There is a significant statistical relationship between IS variables and bank performance. Hence, it is recommended that banks adopt clear strategies to systematically improve responsibility for Structural factors. Al-Ghaliby and Al-Amery (2008) have proposed an IS platform which could be implemented within the banking sector. If adopted, it would require banks in Jordan to develop a clear ARE strategy, in order to enhance performance, and increase benefits from current Human Resource capabilities. An effective IS strategy would include clear tactical objectives, which, in the current economic conditions, are necessary to face an increasingly competitive market. This study recommends that executive managers in the Jordan banking sector adopt a participative IS philosophy; modifying stakeholder perceptions by implementing an effective IS strategy, would contribute to higher performance.

#### **Implications and Future Research**

The results of this study are significant for the decision makers and stakeholders for most of the banks operating in Jordan, as they provide specific pointers on how marketing performance would be improved if IS was applied, particularly in regards to enhancing employee competence, and augmenting the financial and productive performance of projects which receive financial assistance from a bank. In addition, these results are particularly useful as banks are facing increased competition in the market. Jordan is now part of the international banking sector, and, as are all banks in the current global economic climate, becoming increasingly aware of issues effecting economic performance, and more interested in dealing with structural factors. Implementing effective IS systems as a marketing strategy would increase a bank's competitive advantage, by enhancing customer perception and increasing customer satisfaction.

The results are also important for banks (or other organizations) which are considering updating technology, particularly with regards to hardware and software, structural factors, operating conditions and modern workplace software. This study has verified that, if senior

management encourages employees to use technology efficiently, while developing their skills and knowledge base, decision-making is more effective and timely.

In terms of future research, this study has only examined the perspective from the point of view of the banking industry, that is, data provided by management. Further research is required which would broaden the results by gathering data from lower level employees and bank customers. Customer perception of a bank and its services is extremely important in order to clarify the role of IS in bank performance; therefore, future research is required to determine their opinion, by means of a survey or interviews.

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