Article

Information Technology Governance and Bank Performance: A Situational Approach

Basheer Ahmad Khamees (ID)

Abstract: The aim of this paper is to provide empirical evidence about the effect of organizational competition (*OC*) as a contextual factor on the relationship between the effectiveness of information technology governance (*ITG*), which informs accounting information systems, and the financial performance of banks. Financial performance is identified by return on investment (ROI), return on equity (ROE), and Tobin's Q. Averages of these variables were calculated for five years from 2015 to 2019. In fact, there is evidence for the general argument that banks will improve their performance by implementing *ITG*. Specifically speaking, the basic idea presented in this study is that the relation between *ITG* and bank performance depends on the appropriate interaction and matching between *ITG* and the *OC*. The study population includes the senior managers of banks in Jordan. Accordingly, a questionnaire consisting of 16 paragraphs was developed and distributed to senior managers in 23 banks during January to May 2021. As a result, 142 valid questionnaires were collected, which represented 61.7% of the questionnaires expected to be collected. Data are analyzed and processed by using descriptive statistical measures, *t*-test, exploratory factor analysis, along with multiple regression. The results show that despite the significant effect of *OC* on *ITG*, no relation exists between the interaction of *ITG* and *OC*, and bank performance in the three proxies of performance. The results of the study suggest that either banks do not benefit from *ITG* to improve their performance or that the chief executive officers' perceptions about *ITG* in their banks is erroneous. However, it should be clarified that the respondents could have been affected by their values and beliefs when evaluating effective *ITG* use in their banks.

Keywords: accounting information systems; information technology governance; effectiveness; financial performance; banks; Jordan; organizational competition

1. Introduction

The banking sector in Jordan witnessed great development since the 1970s, whether by increasing the number of banks operating in the sector, increasing the number of operating bank branches, or increasing the number of services provided by these banks. According to the Association of Banks in Jordan, the number of ATMs belonging to the Jordanian banking sector increased from 377 at the end of 2000 to 1023 at the end of 2009. The number of ATMs continued to increase until it reached 2038 ATMs at the end of 2019. In addition, banks operated through 862 branches at the end of 2019. The total number of branches was 446 at the end of 2000 and 619 at the end of 2009. In addition, there is a remarkable growth in the volume of deposits with banks, an increase in credit facilities, and an increase in the volume of their assets. Additionally, not only that, but the sector witnessed a development in financial policies and a shift towards liberalizing the interest rate, which is expected to lead to an increase in the demand for savings and in turn an increase in deposits with banks, which may increase the investment ability of these banks. Hopefully this will improve banking performance.

Much of the empirical work shows that market concentration leads to high profitability, and highly concentrated markets tend to be less competitive than markets in which many small organizations operate. Moreover, a concentrated market enables market practices

to collude and to protect their market position with strategic behavior (Khan and Hanif 2019). Therefore, competition is particularly important in the banking sector because it affects the performance of practices. According to the structure-performance hypothesis, the structure of the market determines the degree of competition in the market and the degree of competition affects the performance of banks.

Information technology is expected to help banks by reducing costs, managing risks, predicting crises, achieving customer satisfaction, and promoting and diversifying services, this in turn would positively affect the financial performance of banks. However, to achieve the desired goals of information technology, there must be rules, procedures, and mechanisms that govern this technology, which are called information technology governance. It aims to ensure effective utilization of information technology (IT) by focusing on performance measurement, strategic alignment, resource management, risk management, and value delivery (Wilkin and Chenhall 2010), and this goes beyond focusing on investing in information technology only. It is worth noting that there is no consensus about the definition of *ITG*, although studies in the area, such as Simonsson and Johnson (2005) and Wu et al. (2015), include several definitions of *ITG*.

There is evidence for the general argument that banks will improve their performance by implementing *ITG* (Lunardi et al. 2014; Prasad et al. 2010; Weill and Ross 2004; Weill 2004). However, empirical evidence supporting this relation between *ITG* and bank performance is quite limited especially in emerging markets. In addition, performance impact may be affected by the proper match between *ITG* and the situational factors that exist in the environment of the corporation. These factors play critical roles in affecting how *ITG* impacts bank performance. An example that supports this perspective is the literature of the field of IT value in which it is well documented that situational factors affect the relationship between IT and the bank performance (e.g., Cao 2010; Kohli and Grover 2008; Grant 2005; Tanriverdi 2005; Melville et al. 2004; Brynjolfsson 2003; Barney 2001). It should be emphasized that using IT guarantees neither the existence of *ITG* nor the effectiveness of *ITG* (if it exists). Therefore, one may wonder how performance is affected by *ITG* when taking into account the situational variables of the corporation.

The current study relies heavily on the contingency theory. Based on the contingency theory, it can be argued that for *ITG* to be effective in achieving the organization goals, it should be designed in a way that takes into consideration the effect of the external environment factors. Specifically speaking, an organization or a bank should adjust its system to establish an appropriate fit between *ITG* and its competitive environment, as is the case in the current study. A situational factor that is expected to influence the relationship between the effectiveness of *ITG* and bank performance, is the bank organizational competition (*OC*). It is assumed in this study that the appropriate match between the effectiveness of *ITG* and *OC* affects the corporate performance positively. Therefore, the aim of this study is to examine the validity of this assumption. To make things easier, it examines how the market power of an individual bank affects its behavior toward establishing a proper *ITG* to improve its performance. It aims to investigate the relationship between competition and *ITG*. Then, the effect of the appropriate match between competition and *ITG* on the performance of banks in Jordan is examined.

The remainder of the paper is organized as follows: In addition to the previous introduction, the next section presents the relevant background and prior research, it also includes the study hypotheses. The third section explains the research methodology. Results are reported in the fourth section. The last section includes the conclusions, limitations, and suggestions for further research.

2. Background and Prior Research

The market sector in Jordan as well as in many countries can be described as an oligopoly market (Dong et al. 2021; Wadi and Saqfalhait 2016). It is worth noting that concentration level plays a major role in forming an idea about the level of competition in a particular sector. Concerning concentration in the Jordanian banking sector, its ratios show

a considerable decline over time, especially during the last 25 years. This reduction in the concentration level could be attributed to the increase in the number of banks operating during that period. However, despite the decrease in concentration level, which is expected to lead to an increase in competition, Demirgüç-Kunt and Martínez Pería (2010) found that competition has also decreased. The concentration level was decreased from 53.2% in 2000 to 47.5% in 2009 (Association of Banks in Jordan 2010) and to 39.83% in 2019 (Association of Banks in Jordan 2020), for the first three banks based on their total assets. In developed countries, previous literature showed a statistically negative relationship between market concentration and performance (see as examples: Delorme et al. 2002; Berger and Hannan 1989; Clarke et al. 1984; Connolly and Hirschey 1984).

2.1. ITG and Performance

It is presumed that banks that seek to improve their performance are working hard to develop their capabilities in line with the level of competition they are exposed to in the market. That is, there should be a match between these resources and the level of competition to improve their performance. One of the important resources that banks depend on, to improve their competitive position in the market, is information technology. However, in order for this technology to be mature and helpful in achieving goals, it must be in harmony with the business, which can be achieved by setting the foundations and standards for the governance of information technology. De Haes and Van Grembergen (2009) found that there is a positive relationship between *ITG* and business/IT alignment. It is also assumed that the existence of proper governance to these capabilities aids in maximizing the utilization of these capabilities. Furthermore, in the same context, Dixit and Panigrahi (2014) show that the effect of increasing investment in information technology leads to higher profits for enterprises with higher exports. Dadoukis et al. (2021) show that banks with high IT investment performed better, in terms of market returns, Tobin's q and lending, than other banks during the COVID-19 pandemic. Arora and Arora and Arora (2013) found that investment in information technology has had a significant positive impact on the profitability of the Indian public sector. Ho and Mallick (2010) found that although investment in information technology improves the work of banks, it may increase the level of competition between banks.

However, it should be emphasized that improving performance requires not only the use of IT capabilities but also having the suitable *ITG* that is composed of these capabilities. Zhang et al. (2016) states that the stronger the *ITG* is, the more likely that the bank becomes an IT leader. Soliman and Zaky (2017) found that *ITG* mediates the effect of IT investment on the financial and non-financial performance of Egyptian banks. It is worth noting that having the ability to measure *ITG* helps achieve this goal, such as the methodology of Weill and Ross (2004), which depends on measuring governance by linking the importance of the desired goals of using information technology and the success of companies in achieving these goals. In this context, the extent to which managers are aware of the importance of these goals for their companies and the success of these companies in achieving these goals can be questioned, and this is one of several things that the current study seeks to test. This argument leads to the formation of Hypothesis 1 as follows:

Hypothesis 1 (H1). *There is a significant difference between managers' awareness of the importance of ITG and their awareness of the success of it in achieving the objectives of the organization.*

Ko and Fink (2010) found that one of the large gaps between theory and practice that needs attention is increasing the awareness and understanding of the concept of *ITG* among senior managers. They consider that chief information officers (CIOs) or information technology directors of organizations are the key personnel involved in *ITG*. They argue that *ITG* can be seen as an integral part of corporate governance that needs the attention and care of senior management. This argument demands that there is a coherence between IT directors and the other senior managers in banks in dealing with *ITG* in order for the

bank to achieve its desired objective. In addition, Weill and Hoffmann (2007) referred to measuring the awareness of CIO compared to the other senior managers in a regional New England bank concerning the importance of *ITG* elements. Inspired by these studies, the following hypothesis can be formulated:

Hypothesis 2 (H2). *There is no significant difference between the perception of chief technology officers (CTOs) and other executive managers toward ITG effectiveness in their organizations.*

2.2. Banks Performance

Interest in the performance of banks has been the focus of researchers around the world. Among this interest is the focus on the factors that could improve it, which has led to the emergence of many studies that seek to accomplish this task. For example, Muller and Watkins-Fassler (2021) found that banks' performance, in Curacao, is negatively affected by gender diversity and board size and it is positively affected by multiple directorships. Baugh et al. (2021) found that material weaknesses in internal control are negatively associated with future bank performance, which means that internal control quality improves the bank's performance. Hoang et al. (2021) found that bank performance in Vietnam is improved by both geographic and income diversification strategies. However, their results showed that the interaction of these two variables together leads to a negative impact on the performance of banks. That is because adapting geographical diversification with diversification in income leads to increased competition which in turn reduces performance.

2.3. Competition and Performance

It is well established, conceptually and empirically, within the previous literature that intensity of competition is a fundamental problem for corporations. It plays an active role in the design of a company's accounting information system (Wallace 2013). In addition, it urges the bank to be efficient in the business it carries out. Arrawatia et al. (2015) found that increased competition in the Indian market can positively affect efficiency levels in the banking industry and vice-versa. Tian et al. (2020) found that an increase in competition leads to an improvement in innovation efficiencies, whether through the investment in R&D or in terms of the resulted patents and profits generated by R&D. Căpraru et al. (2021) also state that when competition is at a low level, this leads to an increase in the tendency of banks to take risks, which destabilizes the banking sector. This result agrees with the study of Aldomy et al. (2020), which found that increase concentration leads to higher risk in the Jordanian banking sector. However, it is necessary here to emphasize that the decrease in concentration may not necessarily lead to an increase in competition. The result of Demirgüç-Kunt and Martínez Pería's (2010) study should be recalled here, which found that a decrease in concentration did not lead to an increase in competition in the same sector.

In the study by Alhassan and Ohene-Asare (2016), which was conducted on the Ghanaian banking industry, it was found that competition improves the cost efficiency of banks positively. This result is consistent with the results of El Moussawi and Mansour (2022), who found that competition increases both cost efficiency and stability of commercial banks operating in the Middle East and North Africa (MENA) region. Wibowo (2017) reveals that banking competition in ASEAN countries, especially in Indonesia, tend to be a monopolistic competition. Wibo found that banking competition decreases banking profitability while it does not affect banking efficiency. Carlson and Mitchener (2006) found that branch banking increases competition, which in turn improves the stability of the banking system by removing inefficient and weak banks. Canta et al. (2020) found that competition affects risk exposure positively. In addition, they found that competition decreases interest rates and increases loan volumes. However, they found that competition leads to difficulty in obtaining loans for small and newly established companies.

It can be seen from the literature above that there has been no attempt to empirically examine the effect of a competitive environment on *ITG*, let alone the effect of the matching

between *ITG* and company's competitive intensity on the bank's performance. It is expected that the effectiveness of *ITG* will increase when the bank's competitive intensity is high because banks nowadays rely heavily on electronic services to increase their market share and thus increase their competitiveness, it is presumed that a greater interest in *ITG* should accompany this. On the contrary, the expansion in using IT could lead to a lack of control of it. Accordingly, the following hypothesis can be formulated to judge how bank competitiveness affects *ITG*:

Hypothesis 3 (H3). *The level of OC has a significant impact on the level ITG effectiveness.*

2.4. The Role of Situational Factors

Based on this presumption, in Section 2.1 above, we can say that banks are trying to not only increase their investment in IT, but also to have the proper *ITG* that enables them to maximize IT utilization. It can be said that the effect of *ITG* on bank performance may also be affected by contingency factors, of which competition is one. Concerning this situational factor, banks are assumed to achieve a proper match between competition that they face in the market and the level of *ITG* to improve their financial performance. Therefore, this Sub-section of the paper will review the literature that is related to situational factors affecting banks' performances.

It is well known that AIS is concerned with providing accurate, relevant, and cost-effective information in a timely manner to support business activities and processes. In this way AIS enables banks to be economically and socially effective in their competitive environment (Wilkin and Chenhall 2010). Mia and Clarke (1999) found that information mediates the relationship between competition and performance. By using information, organizations can face competition in the market effectively, and in turn improve their performance. Furthermore, the proper utilization of IT in improving the efficiency and the effectiveness of AIS, and in turn the proper *ITG*, will enable banks to be competitive. This is what Boso et al. (2013) confirm, although they talk about variables that differ from the variables covered by the current study, but they emphasize the need for a link between innovations within the company and the external environmental conditions of the company. They show that the extent to which companies benefit from innovations varies according to the company's competitive environment, as this benefit increases when competition is high, while these innovations do not work when competition is weak. Kobelsky et al. (2008) found that the effect of IT investments on performance is contingent upon three situational factors, which are size, unrelated diversification, and sales growth. They suggest that their results may help explain the productivity paradox of IT investments. Gordon et al. (2009) found that the relation between enterprise risk management and firm performance is contingent upon five factors, which are environmental uncertainty, industry competition, firm size, firm complexity, and board of directors monitoring. Their basic argument depends on examining the effect of the appropriate match between these contingent variables and enterprise risk management on firm performance. Sirisomboonsuk et al. (2018) found that *ITG*, project governance, and the alignment between *ITG* and project governance have a positive effect on project performance.

Zhouhua (2021) reviewed previous literature on situational factors that affect bank performance in China. He found that business strategy and organizational structure positively and significantly affect bank performance. However, regarding competition, Zhouhua found a negative and insignificant effect of competition on bank performance. Saiful (2017) found that the effect of enterprise risk management and credit risk management on Indonesian bank performance is strengthened in large banks and in banks operating in higher environmental uncertainty. In addition, Sailul found that this effect is also strengthened by higher complexity and lower independent board monitoring. Jungo et al. (2022) examined how the effect of financial regulation on competitiveness and financial inclusion is moderated by financial stability in the banking sector in 15 countries in the South Africa Development Community region and eight countries in the South Asian Association for

Regional Cooperation region. They found that financial regulation obstructs financial inclusion and negatively affects competitiveness. They also found that financial stability strengthened the negative effect of financial regulation on competitiveness and financial inclusion. Finally, Wu et al. (2015) found that the strategic alignment mediates the relationship between *ITG* and performance. Maji and Hazarika (2018) examined the influence of competition on the association between regulatory capital of Indian banks and their risk-taking behavior. They found a negative effect of competition on risk, which suggests that improving operational efficiency is vital in competitive markets.

Therefore, it is expected that the effect of *ITG* on a bank's performance will increase when the company's *ITG* is highly matched with its competitive intensity. That is because competitive intensity should motivate the company to increase its *ITG* effectiveness in order to be competitive, and it should affect the design of the bank's *ITG* system in a way that improves its performance.

Based on the literature reviewed above, it seems that a bank's performance is affected by the bank's competition and *ITG*. However, will the interaction between them have an impact on performance? To answer such a question, we may hypothesize that:

Hypothesis 4 (H4). *The proper match between OC and ITG has a significant positive impact on ROI.*

Hypothesis 5 (H5). *The proper match between OC and ITG has a significant positive impact on ROE.*

Hypothesis 6 (H6). *The proper match between OC and ITG has a significant positive impact on Tobin's q.*

This study makes several contributions. First, it provides evidence about how bank organizational competition as a situational factor affects the relationship between *ITG* effectiveness and the bank performance, which is a distinctive feature of it from the literature in the area, not only on the national but also on the international level. This knowledge is expected to help IT governors while managing IT issues by understanding the contextual conditions under which *ITG* is effective in influencing bank performance. Second, it is the first study to investigate the effect of banks' *ITG* effectiveness on banks' performances in Jordan, which is expected to help relate *ITG* effectiveness with its ultimate goal of the corporation that demands improving its performance. In addition, it will hint at the direction of banks in Jordan toward matching the competition it faces in the market with *ITG* practices in order to improve their performance. Finally, this study is important for *ITG* decision makers to take the contingent factors that interact with the design of information systems into consideration to maximize the effect of these systems on bank performance.

3. Research Methodology

This section represents the study design, which reveals how the relationship between *ITG* and bank performance is examined by taking into consideration the effect of *OC*. It also explains how the variables of the study, including *ITG*, are calculated. In addition, it clarifies how data are collected and how the sample is chosen. Finally, it represents a diagram that depicts the relationships among the study variables.

3.1. Study Design

In this study, it is presumed that the proper fit between (*ITG*) and the bank competition would affect the bank's performance. It is expected that the more the fit between *ITG* and bank competition, the better the performance achieved would be. In other words, what matters is not the level of *ITG* as much as the proper match between *ITG* and competition, which requires a proper analysis. It is worth clarifying that there are several perspectives of fit along with several mathematical and statistical tests to examine the appropriate match

between two variables (Venkatraman 1989). In this study, residual analysis is used to examine the appropriate match between *ITG* and competition.

Building upon that, two basic equations will be used to test the hypotheses of the study. Equation (1) examines the relationship between *OC* and the *ITG* effectiveness. It describes what the matching is like between *ITG* effectiveness and *OC*.

$$ITG_i = \alpha_0 + \alpha_1 OC_i + \varepsilon_i \tag{1}$$

where:

ITG_i = information technology governance effectiveness of bank *i*,
OC_i = organizational competition of bank *i* during 2015–5019,
ε_i = residuals (error term).

Equation (2) investigates the relationship between the appropriate match and a bank's performance by regressing the absolute values of the residuals calculated in Equation (1) on the bank's performance. The relationship between the bank's performance and the residual values is controlled by two variables that are expected to affect performance, which are the bank size and the bank age. This procedure is consistent with the perspective that bank performance is affected by its size and age, which is a well-established procedure in the literature regarding bank performance (Dias et al. 2020).

$$BP = \beta_0 + \beta_1\ ARES_i + \beta_2 Log\ Size_i + \beta_3 Age_i + \varepsilon_i \tag{2}$$

where:

BP = bank's performance of bank *i* during 2015–2019,
$ARES_i$ = absolute value of residuals from Equation (1),
$Log\ Size_i$ = logarithm total assets of bank *i* during 2015–2019,
Age_i = age of bank *i* in 2017 "the middle of the study period",
ε_i = residuals (error term).

According to the residual analysis, it is presumed that the lower the residuals derived from Equation (1) the higher the proper fit is between (*ITG*) and the bank competition, and hence higher performance is expected (Gordon et al. 2009; Gordon and Smith 1992; Duncan and Moores 1989; Venkatraman 1989; and Drazin and Van de Ven 1985). This means that the absolute values of residuals have an inverse effect on bank performance. To judge that *ITG* level affects bank's performance, one can rely upon the performance of one year only, However, measuring the performance of banks over a period of five years instead of one year, for example, results in an indicator that is less biased and less affected by the circumstances of one year regarding the bank's performance. However, the model will be rerun with one year, which is 2019, to check the consistency of the study results.

3.2. Measurement of Variables

This section of the study provides information about the variables used to examine the hypotheses of the study, which are *ITG*, *OC*, and bank performance.

Regarding *ITG*, a review of the literature on *ITG* effectiveness shows lack of consensus on the definition of *ITG* as well as on how to measure *ITG* effectiveness. Simonsson and Johnson (2005) and Wu et al. (2015), as examples, include several definitions of *ITG*. In the current study the definition of Weill and Ross (2004, p. 2) is adopted, which defines *ITG* as "*specifying the decision rights and accountability framework to encourage desirable behaviour in using IT*". Concerning measuring *ITG*, Goodhue and Thompson (1995), for example, suggest that *ITG* can be assessed based on the utilization of IT and the fit of IT with the tasks it supports. Van Grembergen and Haes (2005) developed an *ITG*-balanced scorecard to evaluate *ITG*. Bowen et al. (2007) found that *ITG* can be assessed based on the understanding of both business and IT objectives, business and IT personnel involvement in IT decisions, communicating IT strategies and policies, and on business and IT personnel involvement in IT decisions. Prasad et al. (2010) measured *ITG* effectiveness through the

effectiveness of an IT steering committee. Weill and Ross (2004) focus on the external quality of *ITG* by showing how *ITG* is successful in achieving four outcomes by using information technology, which are the cost-effective use of information technology, the effective use of information technology for growth, the effective use of information technology for asset utilization, and the effective use of information technology for business flexibility. The success in achieving these four outcomes is weighted by the importance of each outcome for the organization. This approach measures the performance of information technology governance through the value of the services provided by information technology from the point of view of the organization, and in a manner is characterized by direct understanding and simplicity. This approach is well accepted and used by researchers, and it is considered by the Information Systems Audit and Control Association and the Information Technology Governance Institute. Therefore, this approach is adopted in the current study. However, a fifth objective of (*ITG*) is also added to calculate *ITG* in this study, which is the compliance of the company with legal and regulatory requirements. This objective was introduced by Bowen et al. (2007).

Based on the foregoing definition and objectives and using a seven-point Likert scale, *ITG* will be calculated according to the following equation:

$$ITG = \frac{\sum_{n=1}^{5}(outcome\ importance \times outcome\ success) \times 100}{\sum_{n=1}^{5}(7 \times outcome\ imprtance)} \tag{3}$$

where:

n_1: cost effective use of IT,
n_2: the effective use of IT for growth,
n_3: the effective use of IT for asset utilization,
n_4: the effective use of IT for business flexibility,
n_5: the use of IT for compliance of the bank with legal and regulatory requirements.

Given that there are five objectives, the maximum score is 100 and the minimum score is 14.29. Compared to Weill and Ross (2004) and Bowen et al. (2007), their maximum scores were 100 and minimum scores were 20. The difference between the minimum score in this study and the minimum scores in the former two studies is due to using a seven-point Likert scale in this study instead of a five-point Likert scale.

As for the measurement of organizational competition of banks, the competition situational factor involvement in the relationship between *ITG* and bank performance is evaluated by the concentration ratio of each bank. These types of measures are suitable for testing the hypotheses of the current study because they can be calculated on the bank level. They result in a score for each bank (i.e., they measure the intra competitiveness of each bank). The concentration ratio or the market share of each bank is calculated based on the averages of five variables during the period 2015–2019, which are the percentages of total assets (TA%), credit facilities (CF%), total deposits (TD%), number of branches of each bank to the total of all banks (Branches%), and the number of ATMs of each bank to the total of all banks (ATMs%). The five variables will be condensed into one construct using exploratory factor analysis. In this study, the five observed variables above are used to extract or to develop the competition variable, which is a dimension or a latent variable. Factor analysis is a technique that can be used in order to extract latent variables. Under this analysis, the variance of each ratio is not taken as it is, but only the common variance of all ratios is taken. In addition, this analysis requires that these ratios are loaded on one construct or factor, which will be tested in the Results section. Factor analysis is followed in many fields of knowledge, especially in the field of financial ratios (see, for example, the model of Hasan et al. (2020, p. 55).

The higher value of concentration ratio represented by the factor score indicates higher market power of an individual bank, and thus its higher ability to create a higher price by differentiating products from those of other competitor banks. The ability of banks these days depends largely on information technology to distinguish their products in the

banking sector, and the possibility of benefiting from information technology increases with the presence of a system that defines the rights and responsibilities assigned to users of this technology, that is, the existence of a system for IT governance. Therefore, it is expected that the presence of an adequate level of IT governance in these banks, in a manner commensurate with their market power, will increase the chances of improving the financial performance of these banks.

In addition to measuring competition on a bank level, it will also be measured at the level of the banking industry as a whole to provide a brief description about the level of competition in the study sample and during the study period. It is worth noting that some sectors have begun to appear in the market, such as eFAWATEERcom and mutual fund companies, which would compete with banks in some services. To achieve this goal, the concentration ratio is calculated on the industry level based on the market share of the largest three banks along with another measure, which is Hirchman–Herfindahl Index (*HHI*). This type of measure results in one score for all banks. The concentration ratio is calculated as follows:

$$CR_3 = \sum_{i=1}^{3} MS_i \tag{4}$$

where, CR_3 = concentration ratio based on the market share (*MS*) of the largest three banks based on total assets, credit facilities, and total deposits. The higher value of concentration ratio on the industry level indicates higher monopoly power. Meanwhile, Hirchman-Herfindahl Index (*HHI*) is calculated as follows:

$$HHI = \sum_{i=1}^{23} MS_i^2 \tag{5}$$

where *HHI* = Hirchman–Herfindahl Index of the market shares (*MS*) for all banks in the market based on total assets, credit facilities, and total deposits. The upper level of the *HHI* is 1, while its lower level is 1/n. The higher value of *HHI* indicates the lower level of competition.

The bank performance is evaluated by three measures, which are return on investment (ROI), return on equity (ROE), and Tobin's q. These measures are used in the study because they are the most common measures of a bank's financial performance. ROI ratio can be calculated in different forms depending on what return means and what investment means. In general, this ratio measures the efficiency of the management in utilizing its assets to generate income despite the financial position of the bank. Therefore, and to isolate the effect of financial expenses, returns would mean net income before interest, and to isolate the effect of tax, return would mean net income before tax. However, in the current study, ROI ratio is calculated by dividing net income after interest and before tax by average assets during the year, because the nature of the work of banks results in the interest expense being within the operating expenses of the bank and not a financing expense outside the basic work of it, as, for example, the situation of the manufacturing banks. ROE ratio, which measures the return on the investments of shareholders, is calculated by dividing net income after interest and tax by average shareholders' equity during the year. Finally, Tobin's q, which measures the ability of management to improve the market value of the bank through the operations of the business, is calculate by dividing the sum of market capitalization and the book value of total liabilities by the book value of total assets.

3.3. Data and Sample

To test the hypotheses of the study, data were collected to measure the three study variables, which are: *ITG*, organizational competition, and bank performance. To build the *ITG* construct, a survey was carried out to investigate the views of senior managers of banks in Jordan. Strictly speaking, the survey was used to collect data that enable the researcher to calculate the effectiveness of information technology governance. A carefully designed questionnaire was prepared through careful study of previous research and then constructs were developed to measure the effectiveness of information technology governance (Weill and Ross 2004). Several concerns have been expressed for the use of

perceptual measures that require respondents to evaluate the effective use of IT in the five objectives of (*ITG*) that are mentioned in the subsection above. The key issues center on the use of a single informant, which is the case in this study. When relying on only one informant there is a risk of underestimating the true parameters due to dishonesty and/or systematic bias (Ketokivi and Schroeder 2004). It should be clarified that the respondents could be affected by their own values and beliefs when evaluating the effective use of *ITG*. Although it is acknowledged that there is such a risk in this study, and thus this is a potential limitation, any risk of bias has been minimized by ensuring that the questionnaire was answered by senior managers including chief technology officers (CTOs) in charge of *ITG* who knows about the systems of their banks. Then the questionnaire was sent to a number of specialists in this field, and modified into its final form in light of the suggestions made by the arbitrators. The reliability of the questionnaire was also checked using Cronbach's α-values, which amounted to 90%, indicating that there was internal consistency between the items, and confirming the reliability of the constructs employed (Hair et al. 2006). The value of alpha was also calculated for each part of the questionnaire as shown in Table 1.

Table 1. The degree of reliability of the study tool.

Part of the Study Tool	Calculated Alpha Value
ITG Importance	85.9%
ITG Success	84.5%
For the two parts as a whole	90.0%

Regarding the data of organizational competition, corporate performance variables, and the control variables, they were collected from the annual reports of banks and from the pamphlet series of the Association of Banks in Jordan (2022) (https://www.abj.org.jo/AR/List/%D9%83% D8%B1%D8%A7%D8%B3%D8%A7%D8%AA_%D8%A7%D9%84%D8%AC%D9%85%D8%B9 %D9%8A%D8%A9 (accessed on 3 October 2022).

It is worth noting that the population of the study consists of all senior managers working in the licensed banks operating in Jordan during 2021. These banks are distributed into 13 Jordanian commercial banks, 4 Jordanian Islamic banks, and 6 foreign commercial banks. This definition of licensed banks does not include the financial institutions operating in Jordan. By virtue of a letter from the Association of Banks in Jordan, each operating bank in Jordan was requested to fill out 10 copies of the questionnaire by its senior managers, provided that the director of information technology was among them. The banking sector in Jordan was chosen among other sectors in this study due to the increasing interest of this sector in *ITG*. This growing interest in *ITG* in banks operating in Jordan led to the issuance of the instructions of governance pertaining to information and related technologies No. 65/2016 on the 25 of October 2016 (Central Bank of Jordan 2016b). This is based on the interest of the Central Bank of Jordan to implement the rules and foundations of institutional governance in order to reduce the risks of banks and to protect them from involving useless investments and unjustified expenses in information technology that may lead to huge losses. These instructions are consistent with the instructions of institutional governance of banks including the instructions of institutional governance in Islamic banks. According to these instructions, every bank must send an achievement report to the Central Bank of Jordan related to compliance with these instructions every six months, indicating the level of achievement for each item of the instructions. They are also required to publish guidance of governance pertaining to information and related technologies on their electronic sites and they should disclose the existence of this guidance in their annual reports. The instructions also require that banks form ITG committees, IT steering committees, and IT auditing committees.

3.4. Study Model

Figure 1 below summarizes the effect of the proper match between *ITG* effectiveness and the company's competitive environment on the bank performance:
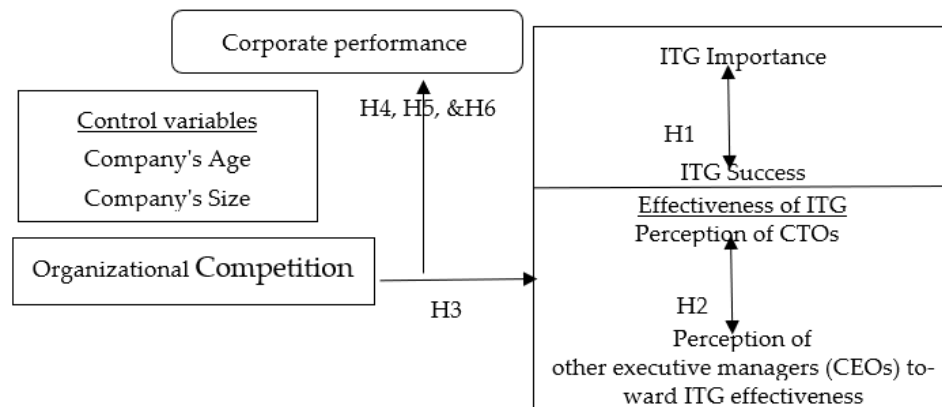

Figure 1. Theoretical model of the study.

4. Results

This section of the study reveals the characteristics of the study sample along with the description of *ITG* questions used in the study survey. In addition, it presents the percentages of concentration ratio and *HHI* scores. Moreover, the variables of the study will be statistically described. Finally, it discusses the results of testing the study's hypotheses.

4.1. Characteristics of the Study Sample

Table 2 shows that CTOs in all banks (23) responded to the survey. It also shows that the respondents are qualified to answer the study's questions, as almost all of them hold at least a bachelor degree, with one third of them hold a master's or doctoral degree. As for the area of qualification, Table 2 reveals that one third of the respondents are IT specialists. In addition to that, two thirds of the respondents hold professional certificates in their field of work. They also have long years of experience, as the percentage of those with 10 years of experience or more reached 89.4%, which gives the impression that their answers to the questionnaire questions were more realistic and objective. The experience in this field is of an important nature because it indicates that the highest percentage of respondents in this study were present during the stages of development of information technology governance in their banks, which increases the objectivity of this study that has a role in studying the performance of information technology governance in banks. It can also be seen from Table 2 that 90% of respondents are over 30 years of age. Finally, the survey shows that 10% of the respondents are specialized in more than one area, and 11% of them hold more than one professional certificate.

To find out how senior managers perceive the effectiveness, importance, and success of *ITG* in their banks, each of the 23 banks working in Jordan was kindly asked to fill in the questionnaire of the study by 10 executive managers including the chief technology officer (CTO). The actual responses of banks were 142 (61.7% response rate), that is with an average of six responses including the CTO in each bank. As for measuring *ITG* effectiveness, the survey includes ten questions, five of them to measure the importance of *ITG* and the other five to measure the success of *ITG* in achieving the bank goals. It is worth noting that the approach taken in the current study to measure the effectiveness of *ITG* depends on the achievement of five goals, which are the cost-effective use of information technology, the effective use of information technology for growth, the effective use of information technology for asset utilization, the effective use of information technology for business flexibility, and the compliance of the bank with legal and regulatory requirements. The measurement of *ITG* effectiveness links the success of *ITG* in achieving these goals and the

importance of using *ITG* to achieve them. As long as the success of *ITG* is in line with its importance in achieving these objectives, this will lead to effective *ITG*. So, the managers' perception about both importance and success of *ITG*, determines the effectiveness of *ITG*. Therefore, to explore how managers perceive the success and importance of *ITG* in their banks, a comparison was made between these two dimensions. The results show that the managers' perception of the *ITG* importance is higher than that of *ITG* success. The results reveal that there is significant evidence ($p < 0.01$) that supports this finding. This shows the extent to which executive managers perceive the importance of *ITG* in their banks. It means that the first hypothesis, which states that there is a significant difference between managers' awareness of the importance of *ITG* and their awareness of the success of it in achieving the objectives of the organization, is accepted. This result agrees with the argument of Lunardi et al. (2007), who state that although managers agree on the importance of *ITG*, implementing corporate governance procedures remains a challenge for their companies.

Table 2. The characteristics of the study sample.

Question Number	Question Explanation	Category	Frequency	%
1	Position of respondent	CTO	23	16.2
		Other senior officer	119	83.8
2	Current qualification	Two-year diploma or less	2	1.4
		Bachelor degree	92	64.8
		Master degree	45	31.7
		PhD	3	2.1
3	Area of current qualification	Accounting	21	14.8
		Information technology	50	35.2
		Management information systems	6	4.2
		Other	65	45.8
4	hold professional certificate(s) in field of work	Yes	92	64.8
		No	50	35.2
5	Years of professional experience	9 years or less	15	10.6
		10–14 years	24	16.9
		15 19 years	34	23.9
		20 years and above	69	48.6
6	Age	30 years or less	14	9.9
		31–40	48	33.8
		41–50	60	42.2
		51 years or above	20	14.1
	Total frequency of each question		142	100

4.2. Banking Sector Competition

In order to identify the extent of the consensus of the impressions of managers in the upper management about *ITG* in their banks, the responses were divided into two parts, which are the CTOs' responses and the responses of the other executive managers (CEOs). Then a comparison was made between them. The results indicate that there is a coherence between the views of CTOs and the other executive managers toward the effectiveness level of *ITG*. The results of a non-parametric test reveal that there is significant evidence ($p = 0.23$) that supports this finding. This harmony in the views of managers is not only limited to *ITG* performance, but also includes their assessment of *ITG* importance along with its success in achieving its objectives. The p values of a non-parametric test reveals that there is no difference between the conceptions of CTOs and the other executives toward the importance and the success of *ITG* ($p = 0.76$ and 0.24, respectively). It is this

alignment that leads to the consistent assessment of the effectiveness of IT governance between CTOs and other executive managers in banks. This intuition was supported by the statistical test, which showed that there were no differences between the CTOs and the other executive managers in evaluating *ITG* performance, which reflects the coherence among all executive managers including CTOs upon their evaluation of *ITG* effectiveness. This means that the second hypothesis, which states that there is no significant difference between the perception of CTOs and other executive managers toward *ITG* effectiveness in their organizations, is accepted. Table 3 shows the averages of the respondents' answers to the ten questions related to the importance and success of *ITG* in their banks.

Table 3. Importance and success of *ITG* in the respondents' banks [a].

Question 1	How important is that the benefits and uses of information technology are at least equal to what is being paid to acquire this technology?	6.10
Question 2	How important is it to use information technology effectively to achieve organizational growth?	5.60
Question 3	How important is it to use information technology to increase the percentage of resources utilized in the organizational operations?	6.20
Question 4	How important is it to use information technology effectively to increase business flexibility?	5.80
Question 5	How important is it to use information technology effectively to increase the compliance of the bank with legal and regulatory requirements?	5.85
Question 6	How successful is information technology governance in assuring that the benefits and uses of information technology are at least equal to what is being paid to acquire this technology?	5.51
Question 7	How successful is information technology in helping your organization to achieve organizational growth?	6.02
Question 8	How successful is information technology in helping your organization to increase the percentage of resources utilized in the organizational operations?	5.60
Question 9	How successfully is information technology used in helping your organization to increase business flexibility?	6.07
Question 10	How successfully is information technology used in helping your organization to increase the compliance of the bank with legal and regulatory requirements?	5.8

[a] Averages using a seven-point Likert scale.

Table 4 reveals the values of concentration ratio of the largest three banks (CR_3) and Hirchman–Herfindahl Index (*HHI*) during the periods from 2015 to 2019 based on total assets, credit facilities, and deposits. It is clear from the concentration ratios that the banking sector is characterized by monopolistic power during these five years. At the same time, the *HHI* shows that the market is unconcentrated, according to The US Department of Justice (2010) interpretation of *HHI*, which is presented in Table 5.

Table 4. Percentages of concentration ratio and *HHI* for all banks operating in Jordan.

	2015	2016	2017	2018	2019	Average
CR_3 Total assets	43.03	44.22	43.24	42.61	42.51	43.12
CR_3 Credit facilities	41.03	41.73	42.64	41.81	41.42	41.73
CR_3 Deposits	44.17	45.58	44.96	43.78	43.60	44.42
HHI Total assets	8.83	9.30	9.02	8.84	8.83	8.96
HHI Credit facilities	8.01	8.37	8.59	8.26	8.12	8.27
HHI Deposits	9.10	9.49	9.23	9.12	9.10	9.21

Table 5. Interpretation of "*HHI*" [a].

Unconcentrated Markets	$HHI < 15\%$
Moderately Concentrated Markets	$15\% \leq HHI \leq 25\%$
Highly Concentrated Markets	$HHI > 25\%$

[a] Reference: The US Department of Justice (2010).

4.3. Descriptive Statistics of the Study Variables

The sample of the study varied in size in terms of total assets and in age. Banks ranged in size from small (total assets = JOD 138,316,000) to large (total assets = JOD 9,340,600,000), with most banks being of intermediate size (mean = JOD 2,108,912,174 and median = JOD 1,779,440,000). More than two thirds of the banks (16 banks) were Jordanian banks, and the rest of the sample were foreign banks and work in Jordan (7 banks). As for the descriptive statistics related to the measurement of the dependent variable and the independent study variables, they are shown for each variable separately in Table 6.

Table 6. Descriptive statistics of the study variables.

	Minimum	Maximum	Mean	Median	Std. Deviation
ITG	51.60%	100.00%	82.57%	82.86%	9.3426
TA%	0.29%	19.72%	4.07%	3.06%	3.7214
CF%	0.00%	14.75%	4.26%	3.07%	3.7376
TD%	0.16%	20.16%	4.04%	3.24%	3.7797
Branches%	0.22%	14.15%	4.63%	3.40%	3.9183
ATMs%	0.00%	13.03%	4.65%	3.13%	3.9455
ROI	0.48%	1.77%	1.08%	1.14%	0.3655
ROE	2.26%	15.83%	7.95%	7.42%	3.2788
Tobin's q	0.92	1.16	0.99	0.98	0.0577
Log Size	8.14	9.97	9.16	9.26	0.3915
Age	6.00	83.00	34.91	28.00	18.6262

It can be seen from Table 6 that banks ranged in age from 6 to 83 years old in 2017, the middle of the study period. The mean of *ITG* is 82.57%, which is close to the result of Barbosa et al. (2014) with an average of 79.6. It is worth emphasizing that they used almost the same methodology as in the current study.

4.4. Impact of the Relationship between OC and ITG on Banks' Performance

This section reports the results related to the relationship between *OC* and *ITG*, and in turn the results of examining the effect of this relationship on bank performance.

In order to examine the effect of *OC* on *ITG*, a construct called *OC* was firstly built using factor analysis as explained in the Measurement of Variables subsection. The results reveal that the five concentration ratios, which are the percentages of total assets, credit facilities, total deposits, branches, and ATMs, are loaded on one factor. Table 7 reveals the factor loadings of the five concentration ratios that quantify the extent to which each ratio is related to the *OC* construct. It can be seen from Table 7 that the loadings are high, since a loading of 0.7 is usually accepted to report that an observed variable is related to a latent variable. It is argued that observed variables with less than 50% common variation with the latent variable, which equals the square of 0.7 times 100, are considered too weak to report (Pinches et al. 1973; Ezzamel et al. 1987). In addition, the results show that the *OC* factor accounts for 93.4% of the total variance in the original five concentration ratios. This suggests that these five observed variables reflect one latent variable, which is the *OC* in the current study.

Secondly, to test the effect of *OC* on *ITG*, a regression model was run after deleting outliers. In this model, *ITG* was regressed on the *OC* factor. The results in Table 8 reveal that the *OC* variable in the regression model explains 3.1% of the variation of the variance in *ITG* as shown by (adjusted R^2). The results also show that the Durbin–Watson statistic is 1.837, which indicates that the autocorrelation in the sample is positive, but it does not raise an alarm that there is an auto-correlation in the data because the value is above 1.5. In

addition, the Durbin–Watson statistic is more than the upper value for the Durbin–Watson static in this study sample, which equals 1.74 at level of significance equal to 0.05. This indicates that there is no statistical evidence that the data are positively correlated and thus the standard error is not undervalued, which means there is no reason to believe that competition is not actually important in the event that it is statistically significant.

Table 7. Concentration ratios and factor loadings defining the *OC* construct.

Concentration Ratios	Factor Loadings
TA%	0.978
CF%	0.974
TD%	0.977
Branches%	0.958
ATMs%	0.944

Table 8. *OC* and the *ITG* model summary [b].

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.195 [a]	0.038	0.031	9.1133	1.837

[a] Predictors: (constant), organizational competition (*OC*). [b] Dependent variable: Effectiveness of information technology governance (*ITG*).

The results in Table 9 reveal that *OC* has an effect on *ITG*. The unstandardized coefficient of *OC* is negative and significant at 0.05 evidence level ($p = 0.02$). This means that (*OC*) has a negative effect on *ITG*. This result leads to accepting Hypothesis 3, which states that the level of *OC* has a significant impact on the *ITG* effectiveness level. It can be inferred from this result that the greater the competitiveness of the bank and the greater its market share, the less effective its *ITG*. This result can be explained by the fact that banks rely heavily on electronic services to increase their market share and thus increase their competitiveness, which requires an increase in the use of information technology. To obtain a closer look at this result, the relationships between *ITG* and the five concentration ratios are examined individually. The results reveal that the relationships between *ITG* and each concentration ratio is statistically significant and negative. These results suggest that each of the five concentration ratios affects the effectiveness of *ITG* negatively.

Table 9. Results of regression between *OC* and the effectiveness of *ITG* [a].

	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	82.451	0.767		107.431	0.000
1	Organizational Competition (*OC*)	−1.807	0.770	−0.195	−2.346	0.020

[a] Dependent variable: Effectiveness of information technology governance (*ITG*).

Finally, to investigate the effect of the appropriate match between *OC* and *ITG* on a bank's performance, three regressions are run. In each regression performance is regressed on the absolute values of the residuals calculated in the equation that examines the effect of *OC* on *ITG*. The bank's performance is expressed by one of three proxies in each regression, which are ROI, ROE, and Tobin's q. The relationship between the bank's performance and the residual values is controlled by two variables that are expected to affect performance, which are the bank size and the bank's age. The results showed that there was no statistically significant effect of the compatibility between the bank's competitive strength (*OC*) and

the effectiveness of information technology governance (*ITG*) on the bank's performance as measured by the aforementioned measures. This results in that the fourth hypothesis, which states that the proper match between *OC* and *ITG* has a significant impact on ROI, the fifth hypothesis, which states that the proper match between *OC* and *ITG* has a significant impact on ROE, and the sixth hypothesis, which states that the proper match between *OC* and *ITG* has a significant impact on Tobin's q, are rejected. Table 10 below reveals the statistical results of the three regressions. It can be noticed from the results that the three models are significant at 0.05 level, which means that there are significant relationships between all the independent variables together and performance.

Table 10. Absolute values of residuals and banks' performance model (ANOVA).

Model	Sum of Squares [a]	df	Mean Square	F	Sig.
1 [b]	1.247	3	0.416	3.255	0.024
2 [c]	601.017	3	200.339	30.940	0.000
3 [d]	0.183	3	0.061	37.541	0.000

[a] Predictors: (constant), absolute values of residuals, size, age. [b] Dependent variable: (ROI). [c] Dependent variable: (ROE). [d] Dependent variable: (Tobin's q).

It can be also seen from Table 11 that size in terms of total assets is significantly and positively related to performance, which indicates that the larger the bank is the higher its performance. The age variable is also significant and negatively related to performance in terms of ROE.

Table 11. Results of regressions between absolute values of residuals and banks' performance.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1 [a]	(constant)	−1.011	0.724		−1.397	0.165
	absolute values of residuals	0.001	0.005	0.011	0.133	0.894
	Size	0.223	0.080	0.236	2.780	0.006
	Age	0.001	0.002	0.064	0.759	0.449
2 [b]	(constant)	−41.290	5.153		−8.012	0.000
	absolute values of residuals	0.024	0.038	0.041	0.625	0.533
	Size	5.472	0.571	0.649	9.590	0.000
	Age	−0.031	0.012	−0.173	−2.547	0.012
3 [c]	(constant)	−0.711	0.173		−4.118	0.000
	absolute values of residuals	0.001	0.001	0.095	1.366	0.175
	Size	0.183	0.019	0.725	9.632	0.000
	Age	0.000	0.000	−0.016	−0.218	0.828

[a] Dependent variable: (ROI). [b] Dependent variable: (ROE). [c] Dependent variable: (Tobin's q).

The results of rerunning the model with one year, which was 2019, showed consistency with the above study results. The unstandardized coefficient of regressing *OC* on *ITG* is negative and significant at 0.05 evidence level ($p = 0.02$). The results also revealed that there is no statistically significant effect of the compatibility between the bank's competitive strength (*OC*) and the effectiveness of information technology governance (*ITG*) on the bank's performance as measured by the aforementioned measures.

4.5. Bank Type Robustness Test

It is worth noting that, if we talk about a bank's performance in general, bank type matters. However, in this study it is argued that whatever the bank type is, *ITG* should be set out to suit bank competition if banks want to improve their performance. Thus, it is a matter of the appropriate match between *ITG* and competition rather than *ITG* or competition on performance. Nevertheless, and to confirm that bank type does not matter, a robustness test was applied on the commercial banks only. The results confirm the above argument. The results of Tables 8–10 are reproduced below in Tables 12–14. It can be noticed from these results that there is no material change in the solution.

Table 12. *OC* and the *ITG* model summary [b].

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.207 [a]	0.043	0.032	8.6008	1.624

[a] Predictors: (constant), organizational competition (*OC*). [b] Dependent variable: Effectiveness of information technology governance (*ITG*).

Table 13. Results of regression between *OC* and the effectiveness of *ITG* [a].

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(constant)	82.228	0.933		88.125	0.000
	Organizational Competition (*OC*)	−1.883	0.947	−0.207	−1.988	0.050

[a.] Dependent variable: Effectiveness of information technology governance (*ITG*).

Table 14. Absolute values of residuals and banks performance model (ANOVA).

Model	Sum of Squares [a]	df	Mean Square	F	Sig.
1 [b]	4.666	3	1.555	14.883	0.000
2 [c]	119.237	3	39.746	14.158	0.000
3 [d]	0.185	3	0.062	35.778	0.000

[a] Predictors: (constant), absolute values of residuals, size, age. [b] Dependent variable: (ROI). [c] Dependent variable: (ROE). [d] Dependent variable: (Tobin's q).

5. Conclusions and Recommendations

The banking sector in Jordan is characterized as an oligopoly market in which banks are able to determine the prices of their revenues and services, but nowadays banks are forced to use information technology heavily to be competitive in the market and to comply with the instructions issued by the authorities concerned with the work of banks such as the Central Bank of Jordan. Additionally, in turn this usage of information technology requires that banks are able to control it and to determine the appropriate procedures to manage it and thus be able to obtain the desired benefits from this technology. That is, this usage requires that information technology is accompanied by governance measures, processes, and mechanisms. It is expected that the interaction between the bank's competitive ability and effectiveness of its *ITG* has a positive effect on its performance. Therefore, the current study aimed at examining the effect of the alignment between competition and the effectiveness of *ITG* on a bank's performance.

It can be concluded from the results that there is a synergy between the efforts of all executive managers, including CTOs, in the bank to raise the level of *ITG* in their banks and this indicates that coordination exists between them. In addition, it seems that this expansion of the use of information technology is not accompanied by an increase in *ITG* commensurate with this expansion. This conclusion is supported by another result of the study, which shows that bank executives consider that *ITG* helps to achieve the goals of

banks successfully, but their level of awareness of the importance of this governance to achieve the goals of the banks exceeds the level of their success in achieving these goals. When it comes to the alignment between a bank's competitive ability and its performance, it was shown that the alignment between competition and *ITG* does not affect the bank's performance, whether it is expressed in terms of ROI, ROE, or Tobin's q. The results of the study suggest that either banks do not benefit from *ITG* to improve their performance or that the chief executive officers' perception about *ITG* in their banks is erroneous. Another explanation is that the respondents could have been affected by their values and beliefs when evaluating effective *ITG* use in their banks.

Therefore, a major limitation of the study was the inability to measure *ITG* in a more objective manner than relying on the awareness of senior management only to measure *ITG*, such as developing an index to measure it using the content of the annual reports of banks as is the case when measuring corporate governance and disclosure. It was also not possible to use the results of reports related to the assessment (risks-controls) of information and associated technology that banks must periodically submit to the Central Bank because the Central Bank is not allowed to publish any individual bank-level data according to article No. 45/b of the Central Bank of Jordan (2016a), law No. 24. Finally, it was not possible to take into consideration all of the factors that may affect a bank's performance either because they are not known or because they cannot be quantified.

Based on the results of the study, it can be recommended that:

- Practitioners should work harder at increasing the level of *ITG* success to match the level of feeling perceived by managers that *ITG* is important to achieve the objectives of using information technology.
- It can also be recommended that policymakers in banks should keep and support the coherence that exists between all of the executive managers including CTOs, which is expected to improve the performance of *ITG*.
- The design of information technology governance systems in banks be reconsidered by practitioners to suit their competitive environment, which may improve the bank's financial performance.
- Concerning competition, we are here before a dilemma that causes confusion for legislators. Will the field for banking work be opened to a larger number of banks, which would increase competition, but at the same time it might lead to setbacks in this sector with unimaginable consequences? Or to support the large banks, which may lead to a decrease in competition and thus a decrease in the efficiency of the banking sector.
- Finally, future research could be directed towards examining the effect of other situational factors that can affect the relationship between *ITG* and bank performance such as the organizational culture or the organizational structure.

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