Strategic Information Systems Sophistication and Strategic Performances of Islamic Banks: The Role of User Information Systems Expertise

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Abstract: To date, the Islamic banking industry is very competitive. As a result many banks are using strategic tools such as information systems to reduce cost. The purpose of this paper are two folds: a) to determine whether strategic information systems sophistication leads to multiple strategic performances in terms of cost reduction and flexibility of operations in the case of Islamic Banks and b) to examine the mediating effect of user information systems expertise (UISE) on the relationship between strategic information system sophistication (SSIS) and strategic performance (SP). The study used self-administered questionnaires to the randomly selected executives of the Islamic banks in Terengganu, Malaysia. The study employed the Structural Equation Modeling (SEM) in AMOS 21.0. The study found the strategic information systems sophistication (SISS) has a positive effect on strategic performance of Islamic banks especially in terms of flexibility and cost reduction. The results also revealed that user information system expertise (UISE) has partial mediating effect in the relationship between strategic information system sophistication (SSIS) and strategic performance (SP). The research revealed that Islamic bank managers and stakeholders must understand the importance of strategic information systems sophistication (SISS) and its impact on strategic performance.

Key words: Sophisticated strategic information systems · User information systems expertise · Contingency theory · Strategic performance

INTRODUCTION

Information systems in organizations provides numerous evidences of benefits for both organizations and employees working for them [1]. These benefits include improved profitability and improved organizational performance, as well as efficient and effective business processes or working routines on an individual level [1]. Organizations adopt sophisticated information systems, which provide managers and other executive staff with the requisite range of information to achieve multiple strategic performances, although organizations differ in the extent to which they improve their performances [2]. However, one of the problems of information systems adoption by Islamic banks is closely related to the managements inability to fully understand the benefits of its adoption and the expertise of its usage in relation to strategic performances [3].

Most organizations find the sophisticated strategic information system as a significant support for the human resource (employee) in order to improve operations and performances [4]. Therefore, this study is conducted an empirical analyses of the relationship between strategic information systems sophistication and strategic performances in the Malaysian Islamic banks.

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Notwithstanding, the study adopted the contingency theory, as it asserts that performance of an organization is dependent on several factors such as information systems, organizational structure and strategy.

This study is organized as follows. Section 2 provides literature review focuses on the relationship between strategic information systems sophistication, users information expertise and strategic performance. Meanwhile, Section 3 discusses the methodology. Section 4 provides results and discussions and the last section provides conclusion.

Literature Review

The Relationship Between Strategic Information Systems Sophistications and Strategic Performance: Current research in information system have increasingly focus on the relationashipp between information systems and organisational performance. Yildirim [5] shows that information systems sophistication have positive impact on organizational performance. In addition, Salleh *et al.* [6] indicates that information system sophistication influence organisation performance. Kharuddin, Ashhari and Nassir [7] conducted an empirical study on 205 Malaysian small and medium enterprises (SMEs) and the findings indicates that SME's that use information systems have increased performance as compared to those that do not. However, several studies on the relationship between information systems and organisation performance indicates mixed results [4].

In addition, management accounting researchers are actively involved in studying performance measurement systems (PMS), such studies have received only limited attention in the information systems literature [8]. However, Gil-Padilla and Rodriguez [9] reveal that the more valuable, non-substitutable and inimitable the information systems area is, the better the non-financial performance. Studies also show that the resources and capabilities that most affect performance are the internal and external technical resources and the capabilities of the information systems area to strengthen and influence relations with users [9].

Furthermore, Resca and D'Atri [10], reveal that strategic information systems can be useful instruments not only for reformulating business models but also dynamics that characterize entire business sectors, consequently, on the issue of bottom–line performance (profitability). In a study on the firm-level performance impact of strategic information systems support for product innovation [11] reveal that providing information systems support for product innovation alone does not improve profitability as measured by returns on sales and returns on assets but confirms that only when complemented by firm-specific information and knowledge would strategic information systems support for product innovation lead to profitability gains and strategic performances.

Naranjo-Gil [2] analyses how different team compositions interact with a sophisticated information system and how this interaction affects strategic performances, which are focused on cost reduction and flexibility. The findings show how the effect of information system on strategic performance (focused on flexibility). Palanisamy [12] reveal that information systems success and organizational flexibility could be achieved through information system flexibility, which could be generated by involving users in information system planning. Also, the study results have shown that user expectations, perceived personal usefulness and users' internal flexibility possess a high driver power for user involvement. However, research on the impact of information systems adoption and utilization on banks performance is insufficient and the available studies are more of US, European and Australian banking industry [13].

Furst *et al.*, [14], reveal that federally chartered US banks had higher return on equity (ROE) by using the conventional business model, strategic information systems was one of the major factors that affect banks financial performance within the period under study and they also observe that more profitable banks adopt information systems after 1998 but yet they are not the first movers. Nevertheless, Becalli [15] revealed that the relationship between strategic information systems investments and improved bank performance in terms of profitability or efficiency was not effective as it indicated a profitability paradox. However, the impact of different type of strategic information systems or information technology investments (hardware, software and services) on banks performance is heterogeneous [15]. Investments in strategic informaion systems services from external providers (consulting services, implementation services, training and education, support services) appears to have a positive influence on accounting profits and profit efficiency, while the acquisition of hardware and software seems to reduce banks performance as argued by Becalli [15]. Thus, investment in strategic information systems poses some problems in terms of hardware and software

incompatability, information overload and job insecurity among the workers due to the fear that they may be replaced by machines [3].

The above discussions indicate that strategic information system sophistication has critical implication to organization performance. Thus, Maghoul [16] argues that research on the relationship between strategic information system sophistication and organisational performance has considerable attention in the information system literature.

The Relationship Between User Information System Expertise and Strategic Performance: There are basically three strategic information system resources which include people or employee or otherwise known as the users of the information system, technology and information or decision making [17]. Although this study will focus on the three, but it will lay more emphasis on the first resource which is the "people or employee". Thus, in an effort to show the relationship between constructs in the study. However, the employee or the users of the information system require training, competency, skills or learning in order to ensure that the sophisticated information system meets up the desired performance in terms of the strategic management of any organization [4].

Virtually everyone has recognized the relevance of training on the success and growth of organizations and their performance as well as a positive relationship was found between the employees training and the outcome of their performance in achieving various tasks such as utilization of the strategic information systems of firms in order to achieve multiple strategic objectives, such as flexibility of operations [18]. It is thus important for organizations to make strategic choice of investing in capabilities and talents, manage and develop human capitals which could help firms to drive overall organizational strategic performance and compete in today's turbulent business environment [19]. This point of deliberation is also deeply included in the resource-based view of strategic human resource management [19].

However, it was discovered that those employees who have engaged trainings were more capable in performing multiple task and duties [18]. Training has a direct relationship with the employees' performance because training is a formal and systematic reformation of behavior via learning which occurs as result of education, instruction, development and planned experience

(Michael Armstrong, [18] as cited in Jagero, Komba and Mlingi, 2012). Because of the practical implications of training, it is crucial to train effectively. Studies have proven that more costly but effective training can lead to cost reduction that is wasted on cheap but inefficient training (Ginsberg, [18] as cited in Jagero, Komba and Mlingi, 2012). However, in terms of measurement of the mediating variable, the study adopted from Bacha [4] measures for determining user information system expertise, by asking the respondents on their utilization of the sophisticated applications of information system and to what extent do their level of training and knowledge on information system applications improve their skills, effective and efficient utilization of the sophisticated strategic information systems of the organization in ways that lead to cost reduction or flexibility based strategic performances.

The Relationship Between Strategic Information Systems Sophistication, User Information Systems Expertise and Strategic Performance: The potential usefulness of information system for environmental management is well recognized [20]. When organizations perform their operations with strategic information system they see greater pay-offs in terms of organizational quality and improved financial performance [9]. Information system have a vital role in business operation and financial and non-financial aspects such as decision making as a big role of management [2] and they further assert that strategic information systems helps an organization gain an advantage through its contribution to the strategic goals. Also, strategic information systems offers information that is needed to administer organizations efficiently and effectively [17].

However, following Porter [22] and Miller [23], strategic goals can be distinguished into two, such as cost reduction and flexibility strategic goals. A cost based strategic objective focuses on internal efficiency and cost control and thus tends to emphasize current organizational structures rather than adopt new ones [22, 23]. Consequently, the research on strategic flexibility has attracted more attention in the strategic management field [24]. Strategic flexibility is regarded as the vital source of competitive advantage in a volatile and consistently changing environment [25]. Along with the globalization and the revolution of technologies, corporations are facing greater environmental uncertainty and more attention is paid to strategic flexibility [24].

Zhou and Wu [26], however define strategic flexibility as one kind of the firm's dynamic capabilities that help firms to achieve competitive advantage in the dynamic environment through rapid adjustment of strategies and speedy allocation of flexible resources. Further, according to [24] prior studies mainly discuss the antecedents of strategic flexibility from technique level, organization level and individual level however, advanced manufacturing technology, input of information system, technological capability, flexibility of information system and technology innovation have been proven to significantly affect strategic flexibility [12, 26].

At the organization level, the effects of organization structure and corporate culture on strategic flexibility have also been found [27] as cited in (Lin *et al,.* 2013). Also, at the individual level, more attention has been paid to management's influence on strategic flexibility, while only effects of CEO personality and their social networks on strategic flexibility have been confirmed [28, 29] as cited in (Lin *et al,.* 2013). However, a flexibility-based strategic goal focuses on diversification, coordination and decentralization within the organization [22]. Hence organizations are unlikely to achieve one strategic performance (e.g. cost reduction) to the extent of excluding the other [22]. Furthermore, organizations may often perform better on one strategic objective than the other since they have different organizational capabilities [23].

Moreover, managers and subordinate staff strategic information system training, education knowledge and past experience is an important factor that influences the adoption and actual usage of strategic information system, adoption of new information system and attainment of strategic goals [2]. Although, information system provides the same information to each manager in the management team and other organizational staff, but the actual selection and use of information is determined by personal preferences [2]. Hence, Bacha [4] argues that If the employees have a good technical level, training, knowledge, experience and use well computer applications, the performance will be better since these activities use information system in their daily work. On the other hand, Bacha [4] adds by asserting that the user expertise in information system will not have a significant impact on the performance of the core competence which uses sophisticated and complex computer applications.

Hence, the employees need to have a certain technical knowledge and experiences to use this type of applications. Upper echelon literature argues that these preferences are based on managers or executives characteristics, such as age, tenure, experience and educational background [30]. One important determinant of managers to process information and optimize decision making is the managers' diversity in terms of demographic background as argued by the upper echelons literature [31].

From the above discussions, the following conceptual framework is proposed for this study.
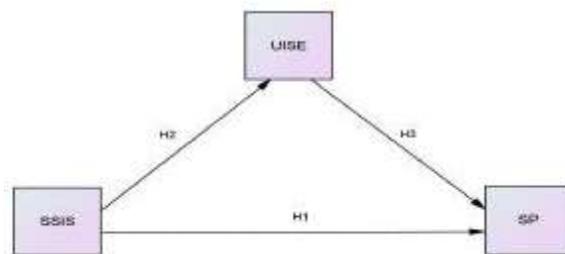
SSIS: Strategic Information System Sophistication,
UISE: User Information System Expertise,
SP: Strategic Performance

Fig. 2: The Conceptual Framework

Hypothesis Development:

- H_1. Strategic Information Systems Sophistication (SSIS) provides positive effects on the Strategic Performance (SP) of the Islamic Banks.
- H_2. Strategic Information Systems Sophistication (SSIS) provides postive effects on User Information Systems Expertise (UISE) of the Islamic Banks.
- H_3. User Information Systems Expertise (UISE) provides positive effetcs on Strategic Performance of Islamic Banks.
- H_4. User Information Systems Expertise (UISE) mediates the relationship between Strategic Information Systems Sophistication (SSIS) and Strategic Performance (SP) of Islamic Banks.

METHODOLOGY

The Measuring Instruments for the Constructs: All constructs involved in the study are measured using multiple items in a questionnaire. Respondents were asked the extent to which they perceived that their bank's information system provided [21].

The information systems expertise was measured on the basis of knowledge, experience, education and user IT skills as adopted from Bacha [4]. Finally, the strategic performance was measured on the bases of flexibility and cost reduction as adopted from Porter [22] and Miller [23].

Procedure for Sampling, Data Collection and Data Analysis: The unit of analysis in this study consists of the Islamic banks in Terengganu, Malaysia. The population consists of all bank executives including that of Strategic Information Systems. The study employed the simple random sampling technique in order to ensure the representativeness of the respondents [32, 33]. The study follows the Krejcie and Morgan [34] in determining the sample size. The sampling frame was obtained from the banks' headquarter in Terengganu. Data collection was conducted via self-administered questionnaires. The study sent 313 self-administered questionnaires to the randomly selected respondents. The respondents could respond the questionnaires at their own convenient time and send back the questionnaire using the self-addressed envelope. A total of 302 returned and usable responses received for analysis. The analysis was conducted using Structural Equation Modeling (SEM) in IBM-SPSS-Amos 21.0 since the traditional Ordinary Least Square (OLS) Regression has several limitations when dealing with the latent constructs measured using multiple items (Awang, 2012; 2013; 2015). The Structural Equation Modeling (SEM) is a second generation method of data analysis which is much more efficient, accurate and robust compared to the Ordinary Least Squares (OLS) Regression approach.

Validating the Latent Constructs using Confirmatory Factor Analysis (CFA): Prior to modelling the structural model and executing Structural Equation Modelling (SEM), the study needs to validate all latent constructs involved in the model [35-37]. The validation procedure is Confirmatory Factor Analysis (CFA). There are two methods available to execute CFA namely the single construct CFA and Pooled-CFA for all constructs. In the Pooled-CFA, all constructs are pooled and being assessed together at once. The study decided to employ the Pooled-CFA since it is more efficient, thorough and can avoid the model identification problem especially if some of the constructs have less than four measuring items [33, 36-38]. Using this method, all constructs are

pooled together and linked using the double-headed arrows to assess the correlation among the constructs. The CFA output is shown in Figure 3.
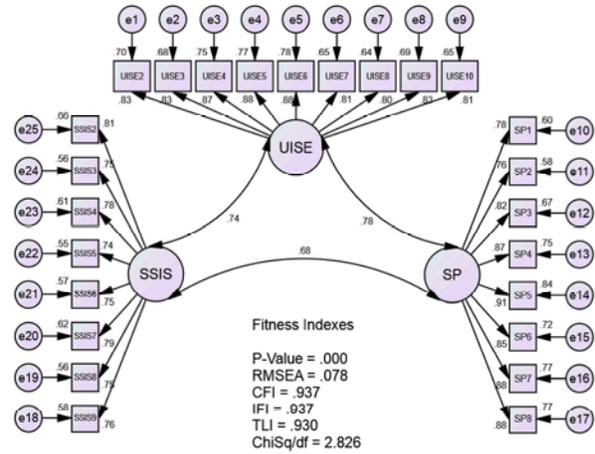

Fig. 3: The CFA Results indicate Factor Loading together with R^2 for every item.

From the CFA results, the researcher needs to look for the Fitness Indexes for the measurement model, the Factor Loading for every item and also the correlation between constructs. The Fitness Indexes reflect the Construct Validity [36, 37], while the Factor Loading indicates the importance of the respective item in measuring its construct. The assessment for Construct Validity is made based on Fitness Indexes and is shown in Table 1.

Table 1: The Fitness Indexes indicate the fitness of the construct to the data from the field

Name of category	Name of index	Index value	Comments
1.Absolute fit	RMSEA	0.078	The required level is achieved
2.Incremental fit	CFI	0.937	The required level is achieved
3.Parsimonious fit	Chisq/df	2.826	The required level is achieved

The Fitness Indexes in Table 1 have achieved the required level for Construct Validity as proposed by Awang [36-39]. Thus the measurement model in Figure 3 has achieved the threshold of Construct Validity.

The assessment for Convergent Validity is made based on the value of Average Variance Extracted (AVE) and is shown in Table 2. The assessment for Composite

Reliability is also shown in Table 2. The study computes the value of Average Variance Extracted (AVE) for every construct to assess its Convergent Validity. The study also needs to compute the Composite Reliability (CR) for every construct to assess the reliability of items in measuring the particular construct. The minimum threshold value for AVE is 0.5, while the minimum threshold value for CR is 0.6 [36, 39, 40].

Table 2: The AVE and CR for all constructs in the model

Item	SSIS	UISE	SP
1	0.81	0.83	0.78
2	0.75	0.83	0.76
3	0.78	0.87	0.82
4	0.74	0.88	0.87
5	0.75	0.88	0.91
6	0.79	0.81	0.85
7	0.75	0.80	0.88
8	0.76	0.83	0.88
9		0.81	
AVE	0.59	0.70	0.71
CR	0.92	0.96	0.95

The results in Table 2 show the Average Variance Extracted (AVE) and the value of Composite Reliability (CR) for all constructs exceed the threshold value of 0.5 and 0.6 respectively. Thus, the study concludes that the Convergent Validity and Composite Reliability for all constructs in the model have been achieved [35, 39, 40].

In the last steps of CFA report, the study needs to assess the Discriminant Validity of the constructs in order to clarify that they are not redundant of each other. The Discriminant Validity for the construct is achieved if the correlation among the exogenous constructs in the model does not exceed 0.85 [36-38]. The study also needs to develop the Discriminant Validity Index Summary for all constructs involved in the model in order to ensure that they are discriminant among each other. The Discriminant Validity Index Summary is shown in Table 3.

Table 3: The discriminant validity index summary

	SSIS	UISE	SP
SSIS	0.77		
UISE	0.74	0.84	
SP	0.68	0.78	0.84

The diagonal values in bold are the square root of the AVE of the respective constructs while other values are the correlation between the respective pair of constructs. The Discriminant Validity of the respective construct is achieved if the diagonal value exceeds the values in its row and column. Thus, the study concludes that the Discriminant Validity for all constructs is achieved.

RESULTS AND DISCUSSIONS

Modeling the Structural Model and Execute Structural Equation Modeling (SEM): Once CFA procedure completed, the researcher can model the constructs into the structural model based on the theoretical framework of the study. The Structural Equation Modeling (SEM) output is shown in Figure 4 (graphic output) and the text output is shown in Table 4.
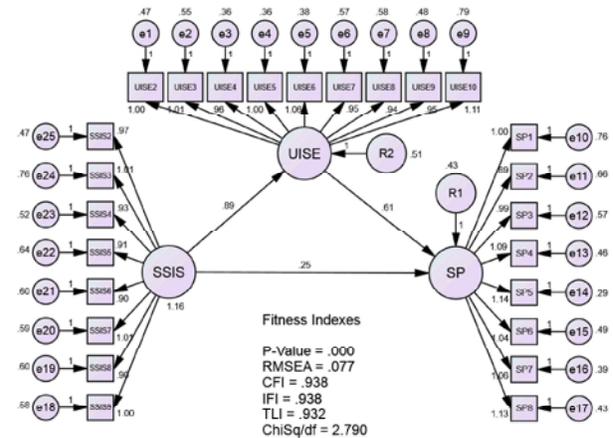

Fig. 4: The Regression Path Coefficient between Constructs in the Model

The text output from Figure is presented in Table 4 which indicates the path coefficient between the respective constructs and its significance.

Table 4: The Regression Path Coefficient and its Significance

			Beta Estimate	S.E.	C.R.	P	Result
UISE	<---	SSIS	.887	.063	14.112	.001	Significant
SP	<---	UISE	.611	.071	8.722	.001	Significant
SP	<---	SSIS	.250	.073	3.445	.001	Significant

The result of hypothesis testing for direct effect hypothesis is shown in Table 5 while the hypothesis for the mediation effects is shown in Table 6.

Table 5: The Testing of Hypothesis

	Hypothesis Statement	P-Value	Result
H1	Strategic Information Systems Sophistication (SSIS) relates positively to the Strategic Performance (SP) of the Islamic Banks.	.001	Supported
H2	Strategic Information Systems Sophistication (SSIS) relates postively to the User Information Systems Expertise (UISE) of the Islamic Banks.	.001	Supported
H3	User Information Systems Expertise (UISE) relates positively to Strategic Performance of Islamic Banks.	.001	Supported

Table 6: The Testing oh Hypothesis for Mediator (UISE)

	Hypothesis Statement
H4	User Information Systems Expertise (UISE) mediates the relationship between Strategic Information Systems Sophistication (SSIS) and Strategic Performance of Islamic Banks.

In order to analyze hypothesis 4, the study would use the standardized path coefficient between constructs as shown in Figure 5. The study employed the procedure for testing the mediator suggested by Awang [36, 40] as shown in Figure 6.
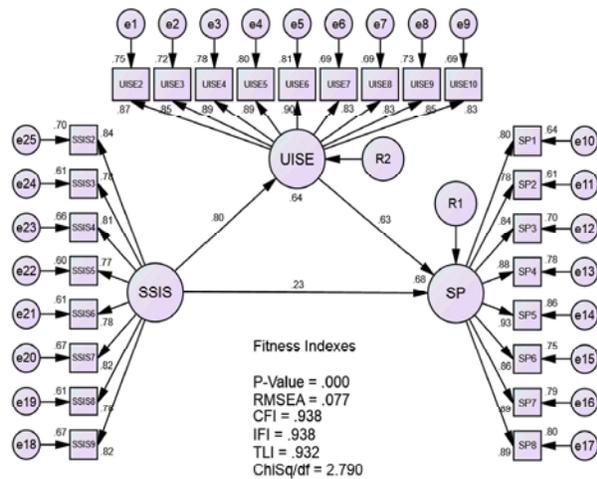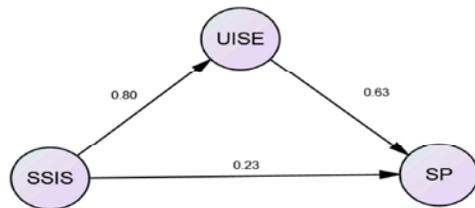

Fig. 5: The Standardized Regression Path Coefficient between Constructs

The study employed the method by Awang (2015) for testing the mediator in the model.
1. The Indirect Effect = (0.80)(0.63) = 0.504
2. The Direct Effect (DE) = 0.23
3. The Mediation Occurs since IE > DE
4. Type of Mediation is Partial Mediation
Since the Direct Effect is also significant

Fig. 6: The Analysis Procedure for Testing the Mediator

The study found UISE mediates the relationship between SSIS and SP since the indirect effect is higher than the direct effect (Figure 6). The type of mediation is partial mediation since hypothesis 4 testing the direct effect from SSIS to SP is still significant after the mediator (UISE) entered the model [33, 36-38].

Confirming the Mediation Test Through Bootstrapping: Unlike the direct effect hypothesis, the study needs to confirm the results of mediation effect hypothesis through the resampling procedure called Bootstrapping [33, 36-38]. Bootstrapping is the method of sampling with replacement whereby one instructs the algorithm to take the sample of size n from the existing dataset. The number of re-sampling could be between 500 to 1000 times.

From the sampling distribution, the total effect, the direct effect and also the indirect effect between constructs are estimated. Finally the 95% confidence interval values for total effect, direct effect and indirect effect will be tabulated. The algorithm would tabulate the lower limit and the upper limit as well as the two-tailed significant values for the effects. Using these values, the researcher could compare the mediation test results with the bootstrapping results. Most of the times, the results are equivalent. However, for any contradictory, the bootstrapping result will be applicable. This study executes the bootstrapping procedure with 1000 sample and the bias corrected at 0.95. The result is shown in Table 7.

The result in Table 7 shows that the indirect effect is greater than direct effect, which indicates the mediation of UISE occurs. The type of mediation is partial mediation since the direct effect of SSIS on SP is also significant. Thus, user information expertise plays some role in the relationship between strategic information systems sophistication and strategic performance of Malaysian Islamic banks.

Table 7: The Bootstrapping Results for Testing Mediator

	Indirect Effect (SSIS-UISE-SP)	Direct Effect (SSIS-SP)
Bootstrapping Results	0.507	0.230
Bootstrapping P-Value	0.001	0.015
Result	Significant	Significant
Mediation Occurs	Yes since the indirect effect is greater than direct effect	
Type of Mediation	Partial Mediation since the direct effect is also significant	

CONCLUSION

Several studies have been conducted in examining the impact or relationship of strategic information systems on strategic performance. In this study, we examined the relationship between strategic information systems sophistication, user information systems expertise and strategic performance in the Islamic banking sector, a subject not yet explored. We showed that there is a strong and positive relationship between strategic information systems sophistication and strategic performances in an organization and hence the executives, managers and other stakeholders in the Islamic bank must be aware of the impact of strategic information systems sophistication and how it affects performance. Moreover, leaders must also be aware of the relevance of training sessions for employees in order to improve their technical IT skills and expertise in the usage of more advanced and sophisticated strategic information systems. Conclusively, if proper utilized, strategic information systems will give the Islamic banks the ability to gain a competitive advantage and to be able to differ from competitors. Although, we discovered a partial mediating effect of user information systems expertise, yet we found out its relationship with strategic performance to be positive and hence an indispensible organizational strategic capability.

Just like any empirical study, this study also has its limitations. The first is related to the nature of the sample of the study. Thus, we recommend that our findings to be replicated across a sample of organizations as this study only restricted its findings within the context of the Islamic banking industry. Also, it would be important to exploit a larger sample that constitutes more number of Islamic banks that operate internationally. The study also failed to distinguish which of the measures of strategic performance is more related to information systems sophistication. Finally, our study is based on the subjective judgement of the staff or users of the strategic information systems and can serve as a bedrock for more extensive research. In particular, it would be suitable to use technical IT skills to measure the strategic performance.

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