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THE IMPACT OF INFORMATION TECHNOLOGY ON FIRM PERFORMANCE: AN EMPIRICAL STUDY ON ISLAMIC BANKS IN MALAYSIA

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Abstract: *One of the focus of advanced research in the fields of information management (IS) is the study of the interactions between information technology (IT) and firm performance. Drawing from the Resource-Based View theory, this paper seeks to examine the impact of information technology (IT) on firm performance in Malaysia. Resource-Based View demonstrated that the resources and capabilities possessed by competing firms may differ and these differences may be long lasting. Thus, in this study, IT infrastructure and IT skills, have been deemed as the firms' resources and capabilities that could help to improve performance. A questionnaire-based link was distributed to IT department staff in selected Islamic Banks in Malaysia. The results were analysed and modelled using Smart-PLS software. This study found that IT could significantly influence a firm's performance. The research limitation of this study is that it may not hold in different environment and industry settings as the sample size was small and within banking industry. Nevertheless, the practical implication of this study is that for IT managers in Islamic Banks of Malaysia to consider investing more in IT resources and capabilities in order to sustain competitive advantage which will thereafter improve performance against competitors of the same industry.*

Keywords: Information Technology, Resource-Based View Theory, Firm Performance, IT Capability, IT Skill, IT Infrastructure, Islamic Banking and Finance.

1. Introduction

Due to globalisation of financial markets there is a need for banks to improve their competitive advantage from many aspects in order to thrive in the climate (Razalli et. al., 2017). According to Wijayanto et al., (2019), competitive advantage is important in determining the performance of a firm. On that note, some scholars in previous studies proposed that information technology (IT) can offer a competitive advantage to a firm and thus helps to improve firm's performance against its competitors (Fadhilah & Subriadi, 2019; Mazidi et al., 2014).

Furthermore, IT is now even more relevant in the era of novel coronavirus (COVID-19) pandemic whereby social distancing and staying-at-home policy is being practiced globally (Shen et al., 2020) thus forcing firms to improve their IT capabilities in order to meet the customers' expectations.

Generally in Malaysia, conventional banks are being seen as more knowledgeable and technologically advanced than Islamic banks (Ariff, 2017). Recent study by Ibrahim (2020) has indicated that although conventional banks is more profitable than the Islamic banks, the increase presence of Islamic banks, may lower the profitable of conventional banks. This proves the prior study that opined that Islamic banks are seen as competing against conventional banks rather than among themselves in the Malaysian banking climate (Ariff, 2017).

Though our research is part of the increasing empirical literature on the performance of Islamic banking, our key contribution is to understand the direct and indirect impact of IT against the performance of Islamic banking.

2. Literature Review

Resource Based View (RBV) by Wernerfelt (1984) is a popular strategic management theory that recommends a firm to utilise and optimise its internal resources because they are the key drivers towards a firm's sustainable competitive advantage (Barney, 1991). RBV implies that a firm is a set of resources collected together in an administrative system, tangible and intangible, human and non-human (Batanony et al., 2013).

There are basically two basis of RBV argument that Kull et al., (2016) have summarised; firstly, RBV proposes that each firms has a unique set of internal resources or capabilities with their own strengths. Secondly, each firms' internal resources or capabilities are difficult to be obtained or imitated by other competitors in the industry because they are often used in combination with other resources. Based on these basis, RBV has been regularly used in the study of firm performance in various industries using numerous types of internal resources (e.g. Chuang & Lin 2016; Ferlie et al., 2015; Makhoulfi et al., 2017; Mohd Zawawi & Abdul Wahab, 2018; Taju Rahim & Zainuddin, 2017; Wijayanto et al., 2019).

Batanony et al., (2013) believed that IT related resource is a type of internal resource that is fundamental for a firm. This aligns with the suggestion by Wade & Hulland (2004), whereby IT capability is the best resource to be tested against firm's performance because it poses rarity, appropriateness, non-reproducibility and non-substitutivity characteristics that contribute to a competitive advantage of a firm. Since then, scholars such as Choi & George (2016), Mikalef & Pateli (2017) and Erkmen et al., (2020) have provided evidences that IT capabilities poses significant relationships towards firm performance.

Many empirical research studies view IT capability as consisting of three key types of resources, in line with the resource grading scheme of Grant (1991), which includes IT infrastructure, human knowledge and skills resources (Bharadwaj, 2000; Bhatt & Grover, 2005; Mikalef & Pateli, 2017). Thus, in congruence with the studies by Abdelkader & Abed (2016) and Yin & Yang (2010), the IT capability of this study comprise IT infrastructure and IT skills.

IT infrastructure is defined as the peripheral or hardware and software assets of a firm (Yin & Yang, 2010). It serves as the basis within a firm's technological framework that directs organisational work to meet the management needs (Jabbouri et al., 2016). Further, there has been a crucial need for IT infrastructure in firms in order to share information around and within their firms (Benitez-Amado & Walczuch, 2012).

Apart from the IT infrastructure as mentioned above, study by Barney (1991) has reminded us that the intangible resource or capability is as equally important with a tangible resource or capability. In regards to this, scholars such as Abdelkader & Abed (2016), Oh et al., (2014) and Yin & Yang (2010) have emphasised the importance of having human IT resources dimension in the study of firm performance such as technical IT skills and the managerial IT skills. While IT can boost business performance as a valuable resource, IT physical resource alone are not able to generate sustained business performance on its own and needs to be complemented by other factors like human resources or skill related (Abdelkader & Abed, 2016).

Yin & Yang (2010) further opined that while companies may acquire technical IT skills through the recruitment of IT professionals, IT skills are often built over long term and "learning through doing," which render these experiences quite heterogeneous across companies.

2.1 Problem Statement

This research aspires to bridge the following problems or research gaps that have been identified which is explained further in this section:

Table 1: Research Gap / Problem Analysis and current research implications

No	Item	Descriptions	Literatures (among others)	Current research implications
1	Multiple findings on the Malaysian Banking climate	While many studies show that Islamic banking has potential, there is still a proof of findings on monopoly competition by conventional banks.	Alaeddin et al., (2019); Ariff (2017); Harkati et al., (2020); Ibrahim (2020); Mohammed et al., (2015)	The results of this study could help Banking Managers to invest more in IT to improve the performance of Islamic banking in the industry and improve the equilibrium of competitions in Malaysian banking landscape.
2	Multiple arguments on IT as a source of firm performance	Despite the many studies on the effect of IT, there has been substantial discussion as to what is called an IT capability and how it influences firms' performance	Abdelkader & Abed (2016); Batanony et al., (2013); Cohen & Olsen (2013); Mata et al., (1995); Mikalef & Pateli (2017); Yin & Yang (2010)	The results of this study could help to enrich the arguments on IT as a reliable source to improve firm performance.
3	Multiple arguments on IT infrastructure alone can help to improve firm performance	There have been various findings on which intangible resource can be complemented with IT to improve firm performance	Abdelkader & Abed (2016); Cohen & Olsen (2013); Bharadwaj (2000); Bhatt & Grover (2005); Karimi et al., (2007); Wade & Hulland (2004)	The results of this study could help to enrich the arguments on both intangible and tangible aspects of IT can improve firm performance.
4	Inconclusive findings on the grouping and segregation of types of performance	Most studies only use financial performance as the measure, especially in banking performance.	(Budiarto, 2014)	The results of this study could help to enrich the arguments on IT can as well improve firm non-financial performance.

The recent study by Harkati et al., (2020) has found out that the Malaysian banking sector has been functioning under a monopoly competition, and that its long-term equilibrium is more competitive with traditional banks than the Islamic banks. Further, that has not been many studies that has focused on the impact of IT against Islamic banking performance. Thus, taking the cue from prior scholars such as Alaeddin et al., (2019), Harkati et al., (2020) and Ibrahim (2020) that have proven the potentials of Islamic banking despite it being under-estimated, this research intends to understand the relationship between IT and the Islamic bank's performance through the hypothesis as stated below:

H₀: IT has a significant relationship on the Islamic bank's performance

Management was challenged to consider how businesses achieve and retain competitive advantages but it remains uncertain how best to use IT to gain a competitive advantage (Batanony et al., 2013) . This was iterated by Mikalef & Pateli (2017) that although RBV sets out the requisite criteria for the achievement of a sustained competitive advantage, it does not explain how competitive advantage is accomplished towards performance of a firm. In other words, despite the many studies on the effect of IT, there has been substantial discussion as to what is called an IT capability and how it influences firms' performance (Mikalef & Pateli, 2017). Thus, this study has been put forth to contribute to understand further the impact of IT towards performance.

Since IT systems can be easily purchased or duplicated by competitors, it is often argued that IT infrastructure is unlikely to have a competitive advantage (Mata et al., 1995) . Further, many tends to value infrastructure exclusively in terms of its individual components of IT assets for example, hardware, network, platform and database thus ignores the synergistic advantages of IT infrastructure as a whole (Yin & Yang, 2010).

Pursuant to this issue, this research focuses primarily on three aspects: (i) the ability to provide users with acceptable levels of precision, timeliness, reliability and confidentiality; (ii) the ability to provide universal communication and access with ample breadth and reach; and (iii) the ability to tailor infrastructure to the growing business needs and directions. Hence, this research positions IT infrastructure as an independent variable to be tested against firm performance. Below would be the hypothesis:

H₁: IT infrastructure has a significant relationship on the Islamic bank's performance

To achieve and maintain competitive advantage which can help improve firm performance, IT infrastructure resources needs to be complemented with intangible resources that resides in the firm (Cohen & Olsen, 2013). However, there has been an arguments that the combination of various supplementary resources will create a synergy to boost performance (Abdelkader & Abed, 2016; Karimi et al., 2007; Wade & Hulland, 2004). Organisational capabilities argue that IT resources will enhance vital organisational capabilities to boost firm efficiency (Bharadwaj, 2000; Bhatt & Grover, 2005).

Thus, in alignment with Abdelkader & Abed (2016), this research sees IT skills as an intangible resource that is defined as IT staff's ability to handle, conceive, grow and leverage IT applications in order to help and improve other business functions. This has drawn the last hypothesis of this research which is outlined as below:

H₂: IT skills has a significant relationship on the Islamic bank's performance

This research is using non-financial performance measures in relative to customer-employee performance, research and development performance and strategic objective performance in alignment with Salleh, et al., (2010). This is on the basis that there has been an inconclusive finding on the grouping and segregation of types of performance. Further, according to Budiarto (2014), the financial measurements only report historical short-term results that cannot forecast future performance, lacks relevance to new technology and is inconsistent with the policy on quality and flexibility. This can raise managers' pressure to take moral hazards to optimise short-term performance.

3. Method

3.1 Materials

A survey was developed and distributed to key informants in respective firms to gather data and quantify research model constructs. The survey instrument was first tested with pre-review with two academicians and four executives who gave comments on how to enhance the clarity of the measurement and questions. It was then evaluated in a small-scale analysis with 200 executives of 8 Islamic bank to analyse the statistical properties of the measure.

3.1.1 Samples

For this research, 1500 respondents have been identified across 14 selected Islamic banks in Malaysia. Out of the 1500 respondents, 1108 respondents have responded with no missing data. These respondents were all working in IT department with multiple portfolios particularly, Project Management Office, IT Governance, IT Business Analysis, IT Operations Support an IT Developers/Technical. Owing to their experience with the technological and business aspects of the study, high-level executives and managers were the key targets. Respondents were asked to evaluate on a 5-point Likert scale (1 – Strongly Disagree, 5 – Strongly Agree).

3.1.2 Site

The site chosen for this research is particularly in Malaysia, using Google form application and distributed via the WhatsApp application and emails. Due to the COVID-19 pandemic restrictions, online platform is the only reliable medium to collect the response from the respondents.

3.1.3 Procedures

Based on the hypotheses identified in the earlier section, illustrated below would be the research model of this study:

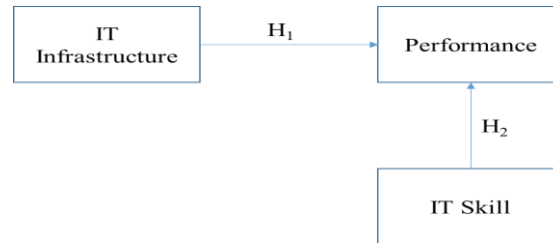


Figure 1: Research Model

The first step in data analytics is the conversion of raw data to a format that can promote decision-making and closure which involves editing, coding, cleaning and subsequently transferred into a mathematical computer programme (Samani, 2016). Table 2 shows the explicit definitions and uses of each of the latent variables:

Table 2: Variables and definitions

No	Latent Variable	Definition
1	IT Infrastructure (Independent Variable)	The ability of firm to provide: (i) Systems or products with acceptable levels of precision, timeliness, reliability and confidentiality. (ii) Universal communication and access with ample breadth and reach; and (iii) Tailored infrastructure to growing business needs and directions.
2	IT Skills (Independent Variable)	IT staff's ability to handle, conceive, grow and leverage IT applications in order to help and improve other business functions.
3	Performance (Dependent Variable)	Non-financial performance of firm that is in the combination of customer-employee performance, research and development of products or services performance and meeting the strategic objective of firm.

3.2 Measurement

Hypotheses are tested using partial least squares structural equation modelling (PLS-SEM) and specifically through the SmartPLS software package. For this research, PLS-SEM is considered suitable because it allows several causal relationships between one or more independent variables and one or more dependent variables to be simultaneously calculated (Hair et al., 2014).

All the coded indicators for every latent variable have been analysed with model and structural measurements according to its reflective and formative dimensions, accordingly. The algorithm of path weighting is used to derive path coefficients, which provide standardised regression coefficients. Further, the bootstrap technique tests the structural route's statistical significance. This is aligned with the PLS-SEM research process guideline as summarised by Samani (2016). The descriptions of the coded indicators are as outline on table 3 below:

Table 3: Indicators and their respective measurements

No	Indicator Coding	Description	Model	Latent Variable
1	ITI1	Most of systems/ applications in the firm can be easily launched via web-access (easy to reach)	Reflective	IT Infrastructure (Independent Variable)
2	ITI2	The firm can easily handle any variations / difference in data formats and standards for most of applications and systems (flexible)		
3	ITS1	Most IT staff have the skill in project planning and control	Reflective	IT Skills (Independent Variable)
4	ITS2	Most IT staff have the skill in requirement analysis		
5	ITS3	Most IT staff have the skill in project budget and cost control		
6	ITS4	Most IT staff have the skill in monitoring of the performance of IT system		
7	ITS5	Most IT staff have the skill in optimising a system's performance		
8	ITS6	Most IT staff have the skill in managing the security management and network		
9	ITS7	Most IT staff have fair knowledge of the firm's strategy and plan		
10	ITS8	Most IT staff have fair knowledge of the firm's business problems and able to propose the appropriate technical solutions.		
11	PCE	The staff acknowledge that personnel development and learning curve has been steep for him/her.	Formative	Performance (Dependent Variable)

No	Indicator Coding	Description	Model	Latent Variable
12	PRD	The current IT products and service quality has improved.		
13	PSO	The firm has performed well in improving customer loyalty.		

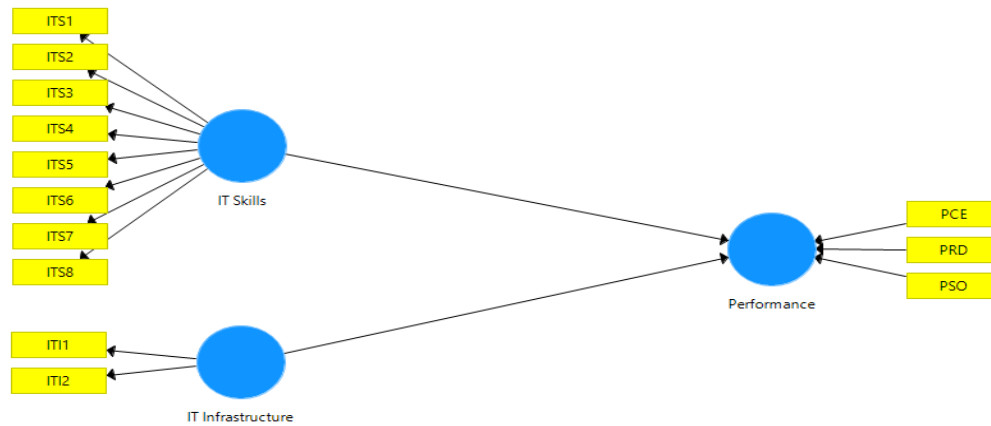


Figure 2: Illustration on the model

3.3 Data Analysis

The descriptive analysis of this research comprises the name of the Islamic bank where the respondents currently reside, their age, work position, IT department and tenure with the current bank, respectively. The details of distribution can be tabulated as per table 4 below:

Table 4: Descriptive analysis of the data

Item	No of Returned Respondents
Name of Islamic bank	
Affin Islamic Bank Berhad	104
Alliance Islamic Bank Berhad	56
AmBank Islamic Berhad	96
Bank Islam Malaysia Berhad	68
Bank Kerjasama Rakyat Malaysia Berhad	128
CIMB Islamic Bank Berhad	116
Hong Leong Islamic Bank Berhad	64
HSBC Amanah Malaysia Berhad	48
Kuwait Finance House Malaysia Berhad	64
Maybank Islamic Berhad	132
MBSB Bank Berhad	48
OCBC Al-Amin Bank Berhad	96
Public Islamic Bank Berhad	48
Standard Chartered Saadiq Berhad	40
Age	
20-25	40
26-30	260
31-35	332
36-40	268
41-50	136
51-60	72
Work Position	
Senior Executive	480
Manager	316
Senior Manager and above	312
IT Department	
Project Management Office	184
IT - Developers/Technical	352
IT - Operation Support	20
IT- Business Analysis	244
IT Governance	308
Tenure	
1-10 years	1036
11-20 years	64
20 years above	8

Further, this research has perform an analysis on the normality of its data distribution based on the suggestion from Sarstedt, et al., (2017) whereby the data distribution can be interpreted from the excess kurtosis and skewness results. Although PLS-SEM doesn't require the test of data normality and can tolerate with non-normal distribution of data, it is encourage for researchers to understand the distribution to ensure that there's no extreme non-normal distribution that could disrupt the results of relationship analysis of the variables (Hair et al., 2014). The guidance given by Sarstedt, et al., (2017) is that, if both skewness and kurtosis reading are zero (plus/minus), then the data is considered a normal distribution. Broadly, the data distribution for this research is acceptable. Table 5 below shows the skewness and kurtosis reading of the data of this research:

Table 5: Data distribution using excess kurtosis and skewness results

No	Indicators	Excess Kurtosis	Skewness
1	ITI1	-0.53	-0.418
2	ITI2	-0.587	-0.478
3	ITS1	-0.832	-0.239
4	ITS2	-0.503	-0.382
5	ITS3	-0.886	-0.256
6	ITS4	-0.679	-0.376
7	ITS5	-0.728	-0.299
8	ITS6	-0.699	-0.311
9	ITS7	-0.745	-0.451
10	ITS8	-0.59	-0.48
11	PCE	-0.684	-0.307
12	PRD	-0.395	-0.709
13	PSO	-0.482	-0.327

3.3.1 Validity and Reliability

For the indicators of independent variables namely IT Infrastructure and IT Skills respectively, the model measurements to understand validity and reliability is via outer loadings, composite reliability and average variance extracted (AVE). Hair et al., (2019) recommended loadings above 0.708 as it shows that construct describes more than 50% indicator's variance, thus providing acceptable item reliability. However, in this study, removing the constructs that are having loadings below 0.708 do not increase the results of its respective AVE. According to Hair et al., (2014) it is hence acceptable for the constructs to be retained.

Further, to analyse internal consistency reliability of the reflective indicators or constructs, the composite reliability readings is used. The values between 0.70 and 0.90 are acceptable in this research as recommended by Hair et al., (2014). To test the convergent validity of the reflective constructs or indicators, AVE must not be lower than 0.5 (Hair et al., 2019), however in this study, the AVE reading for IT Skills is still acceptable although below 0.5 due to the reading of composite reliability is more than 0.6 as suggested by Fornell & Larcker (1981). Table 6 summarised the validity and reliability analysis for IT Infrastructure and IT Skills latent variables.

Table 6: Validity and reliability analysis for the reflective indicators/constructs

No	Indicators	Outer Loadings	Composite Reliability	AVE
1	ITI1	0.786	0.744	0.592
2	ITI2	0.753		
3	ITS1	0.602	0.791	0.325
4	ITS2	0.469		
5	ITS3	0.479		
6	ITS4	0.493		
7	ITS5	0.560		
8	ITS6	0.625		
9	ITS7	0.649		
10	ITS8	0.647		

For the indicators of dependent variables namely Performance, the model measurements to understand validity and reliability is via the indicator collinearity, statistical significance, and relevance of the indicator weights (Hair et al., 2019). The indicator collinearity was tested using the variance inflation factor (VIF). The VIF readings for all the indicators or constructs under performance is lower than 5 as recommended by Hair et al., (2019). The statistical significance (T-test) are all showing above 0.7 (Hair et al., 2019). Two of the outer weight readings for the constructs or indicators are zero, however, looking at the loadings, there is no necessities to remove the indicators because the loadings are almost equivalent to 1 (+1/-1) as recommended by Hair et al., (2019). Table 7 summarised the validity and reliability analysis for Performance latent variable.

Table 7: Validity and reliability analysis for the formative indicators/constructs

No	Indicators	Outer Weights	VIF	T-Test
1	PCE8 -> Performance	0.302	1.025	4.451
2	PRD3 -> Performance	0.458	1.026	6.173
3	PSO6 -> Performance	0.721	1.038	13.458

4. Results and Discussion

After the validity and reliability of the variables were satisfied, the structural model was tested. Table 8 summarises the results of the structural model that helps with the hypotheses testing.

Table 8: Results of the hypotheses testing

Hypotheses	Relationship	Std Beta	Std Error	t value	Decision	f ²	R ²
H ₁	IT Infrastructure -> Performance	0.292	0.020	7.525**	Supported	0.068	0.196
H ₂	IT Skills -> Performance	0.206	0.014	4.922**	Supported	0.031	0.196

** P>0.01

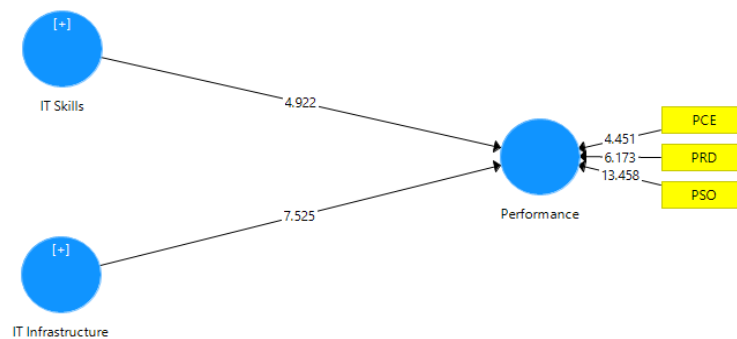


Figure 3: Illustration on the results

There has been a strong significant relationship between IT infrastructures towards the Islamic banking performance and IT skills towards the Islamic banking performance which supported the H₁ and H₂ with p value of more than 0.01, respectively.

The effect size of the endogenous/dependent variable (measured as R²) shows that the relationships are considered substantial which complements the high t value that shows significant relationship in this hypotheses testing (Hair et al., 2014).

Although the effect sizes of the exogenous/independent variables (measured as f²) shows that the relationships are considered weak, the high t value that shows significant relationship should suffice the hypotheses testing (Hair et al., 2014).

Thus, with the positive and significant relationships of the variables, it is now proven that IT does have significant relationships with the Islamic banking performance as hypothesised in H₀.

5. Conclusion

In general, this research has contributed in the empirical studies of IT and firm performance by stipulating its significant positive relationships of IT infrastructures and IT skills towards firm performance as depicted by previous literatures among others are Abdelkader & Abed (2016), Batanony et al., (2013), Cohen & Olsen (2013), Mata et al., (1995), Mikalef & Pateli (2017) and Yin & Yang (2010).

It needs to be noted that this research was done with limitations. Firstly, it was based on a full-fledge Islamic banking as well as the Islamic window of conventional banks in Malaysia, making the sample rather small. Nevertheless, the result of this study could be useful to be adopted at other relevant countries such as Indonesia, who was reported having major challenge in getting customers for Islamic banks (Masnita et al., 2019). Secondly, the performance was measured based on non-financial only on the basis that financial performance have several inconsistencies or flaws in previous studies as reported by Budiarto (2014).

It is recommended that further study on IT performance is done in comparison with Islamic and conventional banking as a whole using both financial and non-financial performance measures.

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