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Enhancing Knowledge of Shariah-Compliant Online Business among Student Entrepreneurs: Integrating Teaching and Learning Using AI Technology Tools

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ABSTRACT

This study investigates the relationship between the essential elements of Shariah contracts and understanding Shariah compliance. In particular, it seeks to evaluate the extent of knowledge among student entrepreneurs regarding Shariah-Compliant (SC) online businesses. It also explores the integration of Artificial Intelligence (AI) technology in teaching and learning to boost the knowledge and understanding of SC in online business. Accordingly, the study adopted a quantitative research design to measure variables using numerical data and utilised an explanatory design to gain a better understanding of the problem. The self-administered survey questionnaires were distributed to 1,060 students enrolled in an entrepreneurship programme at a Malaysian university, all of whom had registered their businesses. After filtering for eligibility, the total number of samples left was 227. Findings from the structural model revealed that four of five fundamental components, Sihha, Nafath, Ilzham, and Delivery, positively correlated with student entrepreneurs' knowledge of SC online business at Universiti Teknologi MARA (UiTM) Kedah. Only Al-Ta'aqud did not impact their understanding of SC online business. Notably, by offering personalised learning experiences, real-time feedback, and fostering collaboration, AI helps students build a strong foundation in the technical and ethical aspects of online business. However, the research was limited to student entrepreneurs at UiTM Kedah, restricting the generalisability of findings to entrepreneurs or students from diverse backgrounds. Nevertheless, this study primarily focuses on understanding Shariah in the context of internet-based businesses, potentially overlooking other Shariah concepts relevant to entrepreneurship. This study analyses Shariah's knowledge in the context of online business among UiTM Kedah student entrepreneurs using a novel approach. In addition, the study may provide practical guidance on integrating SC practices and AI technology into their ventures, fostering ethical and sustainable entrepreneurship.

Keywords: student entrepreneur, online business, Shariah-compliant, knowledge, Artificial Intelligence

INTRODUCTION

The government prioritises creating entrepreneurs among university students to address the challenges of the 4th Industrial Revolution. Notably, entrepreneurship is a key agenda under Malaysia's Strategic Plan for Higher Learning Institutes. Accordingly, rapid technological progress enables virtual transactions and borderless business. In the contemporary landscape of global commerce, online business has revolutionised entrepreneurial opportunities, providing a

platform for diverse ventures to thrive. For instance, online or internet-based business is one of the most popular business methods today. The 4th Industrial Revolution saw traditional methods being replaced by the latest technologies. This is attributable to the fact that business conducted via the Internet can be undertaken by anyone without the need for high costs, large capital, or even extensive experience in business (Saari, 2015). Within this dynamic environment, entrepreneurs among students called "siswapreneurs" play a crucial role. The intersection of Shariah principles and online business practices has, therefore, emerged as a pivotal area of study. Note that understanding the depth of Shariah knowledge among university students engaged in online entrepreneurship is academically pertinent. It also holds practical implications for fostering ethical and sustainable business practices within the Islamic framework. Specifically, the association acknowledges numerous fraud issues, misconceptions or sales confusion. This includes invalid product information, abuse of marketing psychology, inaccurate information, and consultations by certain companies in Internet marketing, which consequently worsens the Internet business industry, specifically in Malaysia.

As the digital economy continues to grow, university students are increasingly turning to online entrepreneurship as a practical way to apply their academic knowledge in real-world ventures. However, integrating Shariah principles into these business activities presents both challenges and opportunities. The significance of Shariah compliance in business practices within Islamic contexts is well-documented. More recent studies emphasise its growing relevance in the digital entrepreneurship and financial technology sectors. For example, Alsmadi (2025) underscored the significance of Shariah compliance in the adoption of Islamic fintech services, particularly in fostering consumer trust and promoting financial inclusion. Sallemi (2025) also highlighted the role of internal governance mechanisms, such as Shariah supervisory boards, in shaping the sustainability practices of Islamic financial institutions. Additionally, Shalhoob and Babiker (2025) explored how Artificial Intelligence (AI) can be leveraged to support Shariah compliance, addressing both its potential and ethical implications. Collectively, these contemporary studies affirm the enduring significance of Shariah compliance in ensuring ethical and effective business practices in the evolving Islamic economic landscape. While universities are increasingly incorporating Shariah principles into entrepreneurship education and encouraging Shariah-Compliant (SC) ventures, a significant gap exists in empirical research that directly and systematically assesses university students' understanding of Shariah law in the context of online entrepreneurship (Halim et al., 2024; Suganda et al., 2024; Marimin et al. 2024; Putri et al. 2023; Hastuti, 2022). Thus, addressing this gap is essential to ensure that the next generation of entrepreneurs is interested in Islamic entrepreneurship and well-informed as well as capable of practising it per Shariah guidelines.

Therefore, based on the collective literature and identified gaps, this study aims to address the following research objectives: Firstly, to examine the relationship between key elements of Shariah contracts and the level of understanding of Shariah compliance among student entrepreneurs. Secondly, to assess the extent of knowledge and understanding of SC online business practices among student entrepreneurs. Finally, this study seeks to explore the integration of AI technologies into teaching and learning processes to enhance students' comprehension of Shariah compliance in online business. This objective includes investigating how AI can support personalised and adaptive learning experiences that foster a deeper and more practical understanding of SC business operations in the digital economy.

LITERATURE REVIEW

Recently, the convergence of digital entrepreneurship, SC business principles, and educational innovation has created new avenues for empowering student entrepreneurs. The SC business concept is fundamentally anchored in the tenets of Islam. Accordingly, business is perceived not merely as an economic activity but as an act of *ibadah* (worship) vital to individual and societal well-being. The SC business model encompasses dimensions such as management operations, business conduct, corporate governance, and Corporate Social Responsibility (CSR) and has gained widespread relevance across sectors, including finance, real estate, media, and healthcare (Febianto, 2011). Nonetheless, in the context of the digital economy, student entrepreneurs often encounter challenges in applying these principles due to the absence of structured guidance and practical tools. Furthermore, technological advancements, particularly the integration of AI into educational strategies, can play a transformative role in bridging this gap (Somià & Vecchiarini, 2024). Additionally, AI-based tools can facilitate personalised and interactive teaching and learning experiences, support automated Shariah compliance checks, and promote a deeper understanding of Islamic business ethics through scenario-based simulations. This is especially true among students still navigating entrepreneurship and Islamic jurisprudence.

From an Islamic perspective, economic transactions must adhere to core principles derived from the *Quran*, *Hadith*, and *ijtihad*. These sources emphasise ethical behaviour, prohibition of *riba* (usury), avoidance of fraud, transparency, and fairness in commercial dealings (Derigs & Marzban, 2009; Saputro et al., 2024). In Islam, economic activities are not solely profit-driven. Instead, they are proposed to meet personal needs, support family well-being, and extend assistance to those in need. In addition, the concept of *Hifz al-din* (protection of faith), as proposed by Abd Hamid and Mohd Yunus (2020), further stresses the significance of fulfilling religious obligations. This includes promoting *halalan tayyiban* (lawful and wholesome) products, maintaining ethical behaviour, and ensuring responsible financial management. Nonetheless, the issue of trust, particularly in online business transactions, remains a critical concern, especially considering the large and growing base of Muslim consumers. In response, scholars have proposed e-commerce models rooted in Islamic contractual principles to enhance trustworthiness.

The SC business model has gained significant traction across multiple industries, including hospitality, media, recreation, pharmaceuticals, cosmetics, real estate, and the banking and financial sectors. This growth is driven by the increasing demand from Muslim consumers, as well as its appeal to non-Muslim markets (Hashim & Fauzi, 2019; Sadeghi & Biancone, 2017). One notable contribution is the "Shariah Compliant Model of Business Entities," which comprises five key elements: management functions, business processes, corporate culture, corporate governance, and CSR. This model encompasses areas such as strategic planning, leadership, human resource and financial management, marketing, corporate ethics, governance, and CSR activities like waqf and zakat (Febianto, 2011).

In the context of e-commerce, this translates to clear contractual agreements, mutual consent, and trustworthy practices, which become especially critical in digital transactions where face-to-face interaction is absent. Scholars like Muhammad and Muhammad (2013) have proposed e-commerce models rooted in Islamic contractual laws, highlighting features such as identifiable buyers and sellers, transparent terms, and full disclosure of products and pricing. Similarly, ethical

conduct is paramount, emphasising honesty in profit-making and avoiding *riba* (usury), fraud, and other prohibited elements (Abd Hamid & Mohd Yunus, 2020; Saiman & Salleh, 2017). Furthermore, *khiyar* (right of option) has been suggested as a Shariah-based safeguard against digital fraud and misrepresentation (Fauziah & Fathimah, 2020). This principle allows both parties to continue or cancel a contract under certain conditions, offering protection against potential fraud in digital commerce. E-commerce, conceptually, is compatible with Islamic principles as it upholds fairness, transparency, and integrity in business dealings. Although online commerce did not exist during the time of Prophet Muhammad SAW, contemporary studies by Ahmad et al. (2011) explored both the benefits and challenges of online business, affirming its potential to serve societal welfare. Simultaneously, Rohmad (2015) affirmed that the principles of e-commerce could align with Shariah despite some unethical practices by certain online traders. Islam encourages business and trade as honourable means of livelihood. As such, these activities facilitate economic growth and promote social well-being and success in life and the hereafter (Ali et al., 2014). In line with this, fair treatment and protection of all parties involved, buyers, sellers, and the wider community are essential (Saeed & Baig, 2013). Given the rapid advancement of digital technology and the resulting surge in online entrepreneurship, ensuring that these ventures comply with Shariah principles is more critical than ever.

Despite these developments, the literature highlights several gaps. First, most proposed SC e-commerce models remain conceptual, with limited empirical evidence validating their effectiveness in real-world online business settings (Muhammad et al., 2013). Second, there is a lack of awareness and practical knowledge among Muslim student entrepreneurs regarding how to align digital business practices with Shariah principles. As digital entrepreneurship among students grows, particularly in the post-pandemic era, these gaps must be addressed to prevent the erosion of Islamic values in the digital marketplace. Moreover, the integration of SC entrepreneurship into higher education is essential. Concurrently, teaching and learning methods should transmit religious knowledge and equip students with the technical, ethical, and entrepreneurial skills needed to operate within Islamic boundaries (Cahyani et al., 2022).

To address these gaps effectively, it is important to anchor SC business education in the moral foundations of Islam. The moral foundations of SC business align with the overarching objectives of *Maqasid al-Shariah*, notably the preservation of faith (*hifz al-din*) and wealth (*hifz al-mal*) (Syarvina & Batubara, 2025). Business thus becomes a conduit for fulfilling both worldly and spiritual objectives. Building on this, educating future entrepreneurs with these values is crucial to fostering ethical and socially responsible enterprises. Business, in this sense, becomes a means of fulfilling both material and spiritual obligations, contributing to individual prosperity and community welfare. Importantly, Islamic teachings emphasise the dual objective of commercial activities: success in this world and salvation in the hereafter. Hence, embedding these values into the education of student entrepreneurs is critical.

However, there remains a lack of accessible and structured information regarding SC online business practices, particularly among Muslim entrepreneurs and marketers. Considering the increasing number of Muslim internet users, further research is needed to address this gap (Muhammad & Muhammad, 2013). Additionally, concerns regarding trust, security, and the overall Shariah compliance of digital business systems continue to be key considerations (Ribadu & Wan Ab. Rahman, 2019). Note that Islamic teachings strongly emphasise fairness and ethics in

daily business operations. Therefore, entrepreneurs are expected to conduct their activities with integrity to succeed in this world and attain spiritual rewards in the hereafter. Considering the current absence of specific legal regulations for Internet commerce in Malaysia, Shariah-based decision-making becomes vital in ensuring governance, ethics, legitimacy, and the overall validity of online business practices (Billah, 2006).

In conclusion, SC business practices encompass a holistic approach that integrates ethical conduct, adherence to Islamic legal principles, and fairness in all economic dealings. As digital trade expands, there is a growing need for robust frameworks and empirical research to ensure these practices are effectively integrated into modern business. Based on the reviewed literature and identified research gaps, a conceptual framework has been developed, as illustrated in Figure 1. The proposed conceptual model is adapted from Zainul et al. (2004), with insights from Mustafa Omar, a lecturer from the Kulliyyah of Economics and Management Sciences, International Islamic University Malaysia (IIUM). It illustrates a structured pathway for embedding SC principles in the education and practice of student entrepreneurs. Central to this framework are five key components that ensure the validity of Shariah compliance: Al-Ta'aqud involves initiating the contract with all required pillars (offer, acceptance, parties, subject, and expression). On the other hand, Sihha ensures the contract is free from *riba* (interest), *gharar* (uncertainty), deceit, coercion, and gambling. Nafath is the implementation phase that confirms the seller's ownership and liability-free product. Ilzham is the binding phase, where both parties formalise and retain the contract, while Delivery involves the exchange of goods and payment, allowing the buyer to verify that the product meets the agreed terms.

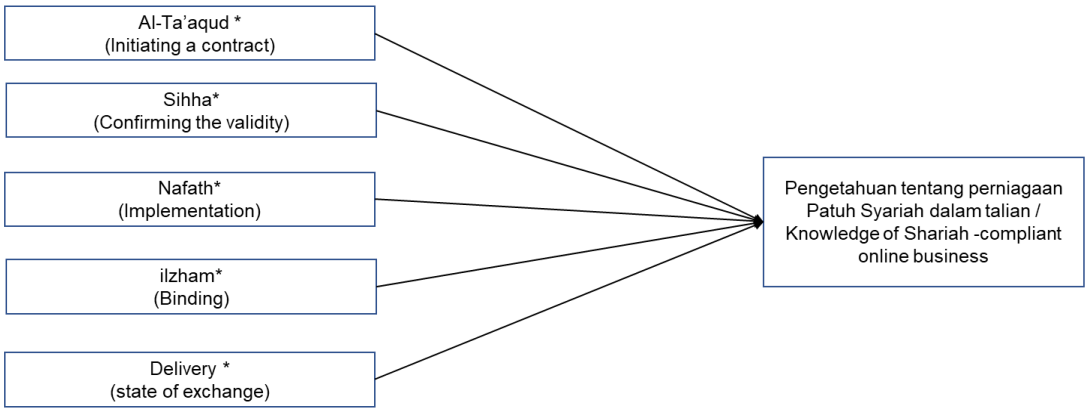

Figure 1. Conceptual Framework
(Source: Zainul et al., 2004, insights from an interview with Mustafa Omar)

RESEARCH METHODOLOGY

This study adopts a positivist research philosophy and follows a deductive approach, employing a quantitative survey method to assess its hypotheses among university students who had registered their businesses. Initially involving 1,040 respondents, a final total of 227 valid responses were retained after data screening based on eligibility criteria, such as being a registered student entrepreneur and completing all survey items. This sample size is considered adequate for the

selected analysis technique. According to the rule of thumb by Hair et al. (2014), Partial Least Squares Structural Equation Modeling (PLS-SEM) requires a minimum sample size of ten times the number of predictors for the most complex construct in the model. As this study involved five predictors, the required minimum was 50. Therefore, the sample of 227 exceeds this threshold, ensuring sufficient statistical power for model estimation and hypothesis testing. Prior to data collection, ethical approval was obtained from the Universiti Teknologi MARA (UiTM) Research Ethics Committee (REC), under reference number REC/08/2021 (MR/636), for the research entitled "A Study on Shariah-Compliant Online Business Among Siswapreneurs in Malaysian Public Higher Education Institutions."

The descriptive statistics were conducted using Statistical Package for Social Sciences (SPSS) software to analyse demographic data comprising personal and business-related information. In particular, personal data covered aspects such as gender, age, and faculty. Meanwhile, business-related data included product types and online platforms used for operations. To analyse the research model, Partial Least Squares (PLS) analysis was conducted using SmartPLS software, following the recommendations of Ringle et al. (2015). In line with the two-stage analytical procedure outlined by Anderson and Gerbing (1988) and Hair et al. (2014), the study first evaluated the measurement model to determine the validity and reliability of the constructs. This was followed by assessing the structural model to evaluate the hypothesised relationships.

RESULTS AND ANALYSIS

Demographic Information

This study gathered 227 eligible samples, representing 227 undergraduate students who operated online businesses. The respondents were all Malay since the data was collected from the UiTM Kedah population, which only enrolled Malay students. The demographic section in the survey form requested the respondents to provide information regarding their gender, age, faculty, education level, source of education funding, and monthly income gained from their online business. The demographic characteristics of the participants in the study are as follows. The majority of participants are female, comprising 80.2% (182 participants) of the total sample, while 19.8% (45 participants) are male. Meanwhile, the age distribution suggests that the largest group falls within the 21 to 22-year-old range, representing 70.0% (159 participants) of the sample. Participants aged 23 to 24 account for 18.9% (43 participants), while 7.5% (17 participants) are 20 years and below, and 3.5% (8 participants) are 25 years and above.

The faculty the participants belong to are from various faculties, with the highest proportion being Business and Management (37.4%, 85 participants), followed by Administration Science and Policy Studies (32.6%, 74 participants). Other faculties include Information Management (19.4%, 44 participants), Accountancy (4.4%, 10 participants), Computer Science and Mathematics (3.5%, 8 participants), Applied Science (1.8%, 4 participants), and Education (0.9%, 2 participants). Furthermore, their education level is fairly evenly split between those with a Bachelor's degree (53.7%, 122 participants) and those with a Diploma (46.3%, 105 participants).

Next is their source of education funding. Most participants rely on loans for their education funding, making up 68.3% (155 participants). In addition, self-funding is the source for 29.5% (67 participants), while 2.2% (5 participants) receive a scholarship. Finally, in terms of business income, the largest group (46.7%, 106 participants) earns less than RM100 monthly, followed by 33.9% (77 participants) earning between RM100 to 300. In contrast, smaller percentages report earning between RM301 to 500 (10.6%, 24 participants), RM501 to 700 (5.3%, 12 participants), and more than RM700 (3.5%, 8 participants).

Measurement Model Analysis

The measurement model presents the relationship between indicators (items) and their respective constructs (Hair et al., 2017). In this study, a measurement model analysis was performed using a PLS algorithm procedure in SmartPLS 3.3.9 software (Ringle et al. 2015) to assess construct reliability and validity. The measurement model of this study is illustrated in Figure 2.

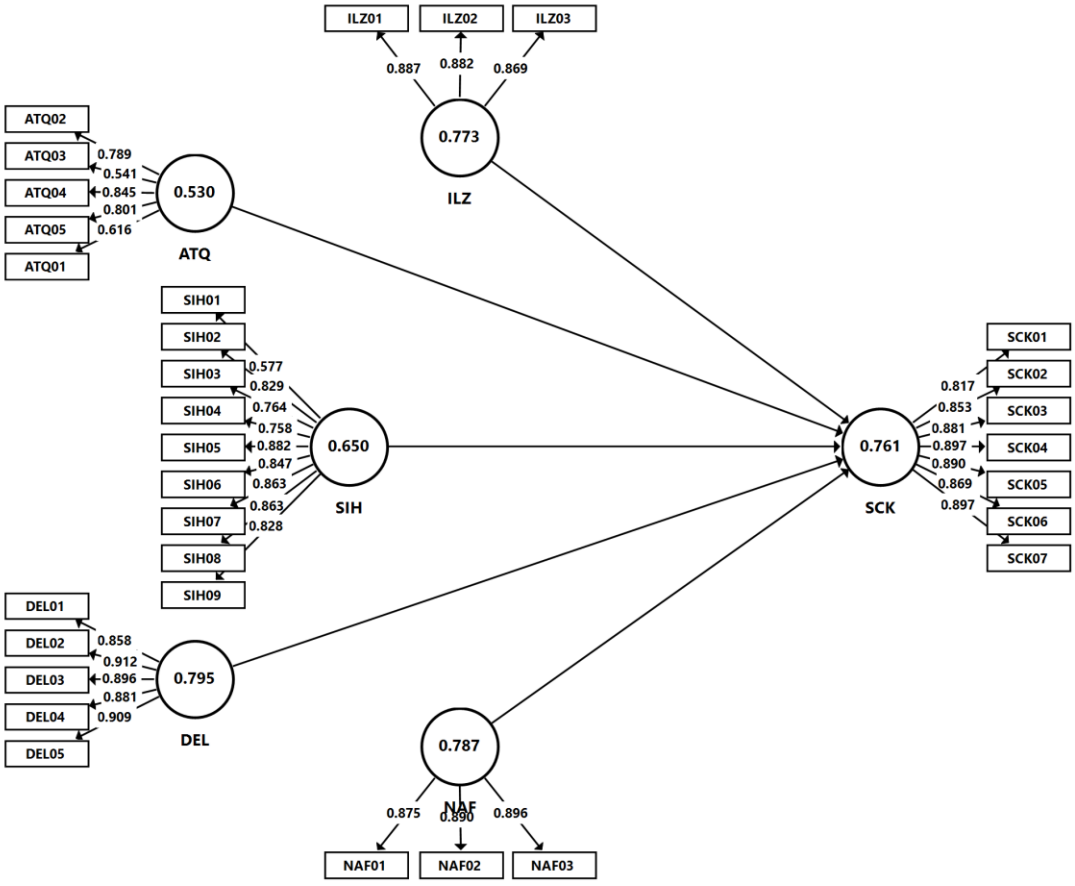

Figure 2. Measurement model
Note. Values on arrows = factor loadings. Values on constructs = average variance extracted (AVE)

Figure 2 illustrates the measurement model, whereby there were six latent variables or constructs, namely Shariah-Compliant Knowledge (SCK) as the dependent variable and the remaining five constructs as the independent variables. Accordingly, the independent variables are the

fundamental components of Shariah contracts in online business that include Al-Ta'aqud (ATQ), Sihha (SIH), Nafath (NAF), Ilzham (ILZ) and Delivery (DEL).

Construct reliability and validity assessments provided by the measurement model analysis in PLS-SEM include:

1. internal consistency reliability,
2. convergent validity, and
3. discriminant validity (Hair et al., 2019).

Hence, the results of the measurement model analysis are presented in this report in this order.

Internal Consistency Reliability and Convergent Validity

Internal consistency reliability is represented by composite reliability (ρ_c) coefficients. Meanwhile, convergent validity is determined through Average Variance Extracted (AVE) values. Notably, the satisfactory level for the ρ_c coefficient is 0.70 and above (Gefen et al., 2000; Hair et al., 2017), whereas the minimum requirement of convergent validity for a construct is to obtain at least AVE of 0.50 (Fornell & Larcker, 1981; Hair et al., 2017). The results of internal consistency reliability and convergent validity are summarised in Table 1.

Table 1. Internal consistency reliability and convergent validity results

Constructs	Items	Loadings	ρ_c	AVE
Shariah-Compliant Knowledge (SCK)	SCK01	0.817	0.957	0.761
	SCK02	0.853		
	SCK03	0.881		
	SCK04	0.897		
	SCK05	0.89		
	SCK06	0.869		
	SCK07	0.897		
Al-Ta'aqud (ATQ)	ATQ01	0.616	0.846	0.53
	ATQ02	0.789		
	ATQ03	0.541		
	ATQ04	0.845		
	ATQ05	0.801		
Sihha (SIH)	SIH01	0.577	0.943	0.65
	SIH02	0.829		
	SIH03	0.764		
	SIH04	0.758		
	SIH05	0.882		
	SIH06	0.847		
	SIH07	0.863		

	SIH08	0.863		
	SIH09	0.828		
	NAF01	0.875		
Nafath (NAF)	NAF02	0.89	0.917	0.787
	NAF03	0.896		
	ILZ01	0.887		
Ilzham (ILZ)	ILZ02	0.882	0.911	0.773
	ILZ03	0.869		
	DEL01	0.858		
	DEL02	0.912		
Delivery (DEL)	DEL03	0.896	0.951	0.795
	DEL04	0.881		
	DEL05	0.909		

As a result, all constructs fulfilled the composite reliability benchmark with ρ_C coefficients ranging from 0.846 to 0.957. Similarly, all constructs passed the convergent validity threshold with AVE values as low as 0.530 and as high as 0.795. Although a few items, such as ATQ01, ATQ03 and SIH01, demonstrated factor had loadings less than the standard threshold at $r < 0.708$ (Hair et al., 2017), these items were retained. Researchers are allowed to retain items with a factor loading as low as 0.50 (Byrne, 2016) as long as that particular construct has achieved its convergent validity requirement (AVE $\geq$ 0.50). Overall, the results in Table 1 indicated that all constructs passed the internal consistency and convergent validity test without needing to exclude any measurement item from the model.

Discriminant Validity

Next, the Hetereotrait-Monotrait (HTMT) ratio result was presented to assess discriminant validity (see Table 2). HTMT is the ratio between the mean of all items' correlations across constructs measuring different constructs and the mean of the average items' correlations measuring the same construct (Henseler et al., 2015). Note that an HTMT ratio greater than 0.90 indicates a problem of discriminant validity (Franke & Sarstedt, 2019).

Table 2. Results of HTMT Ratio

Constructs	SCK	ATQ	SIH	NAF	ILZ	DEL
SCK						
ATQ	0.627					
SIH	0.696	0.79				
NAF	0.752	0.758	0.804			
ILZ	0.791	0.806	0.831	0.891		
DEL	0.728	0.716	0.717	0.776	0.82	

Table 2 indicates that all ratios were below 0.90. Hence, it was confirmed that there was no discriminant validity problem between all constructs in the measurement model. Overall, no item was removed to pass all measurement model assessments.

Structural Model Analysis

Structural model analysis assesses whether a certain relationship between two or more constructs likely occurred by chance (Hair et al., 2017; Saunders et al., 2016). In the present study, this analysis was employed to evaluate the relationships between fundamental components of the Shariah contract and knowledge of SC online business. Following the recent guidelines advocated by Hair et al. (2022), a structural model assessment involves four reporting sequences, which include the results of:

1. collinearity tests;
2. significance testing;
3. explanatory power (R^2) with effect sizes (f^2).

Thus, this study reports the result of the structural model analysis following these sequences.

Collinearity Test

Collinearity issues (Hair et al., 2014), also known as multi-collinearity (Pallant, 2016), occur when two or more predictors are highly correlated. It causes estimated path coefficients to fluctuate widely (Cooper & Schindler, 2014) and bias the structural model (Bowerman & O'Connell, 1990). Hair et al. (2017) suggested the evaluation of Variance Inflation Factor (VIF) values to assess the severity of collinearity issues in a PLS-SEM path model. Note that VIF statistics of 5 or greater suggest that a collinearity issue may mislead the structural model findings (Hair et al., 2019).

Table 3. Results of the Collinearity Test

Predictors	Variance Inflation Factor (VIF)
ATQ	2.17
SIH	2.86
NAF	3.015
ILZ	3.445
DEL	2.564

As a result, all predictors produced VIF values that were less than 5 as presented in Table 3. Hence, collinearity was not a severe problem in this structural model, and the statistical results would not be misleading.

Significance Testing

Typically, the significance of hypothesised relationships is decided based on probability estimates (*p*-value). The *p*-value represents the probability of error for assuming that a path coefficient is

significantly different from zero (Hair et al., 2017). In particular, a *p*-value of 0.01, 0.05, and 0.10 represent 1%, 5% and 10% of error probability. It also suggests that only 1%, 5% or 10% of the hypothesised relationships occur by chance. However, the American Statistical Association (ASA) highlights that reporting *p*-values alone does not provide a sound measure of evidence regarding a model or hypothesis (Ramayah et al., 2018). Therefore, this study also reports other measures, including a *t*-value and confidence interval, as additional evidence to accept or reject the hypothesised relationships (Aguinis et al., 2010; Hair et al., 2014; Lin et al., 2013).

A commonly used benchmark of *t*-values in one-tailed tests is 2.33, 1.65, and 1.28, for $p < 0.10$, $p < 0.05$, and $p < 0.01$, consecutively (Hair et al., 2014). On a similar note, for confidence interval values, the Upper Limit (UL) and Lower Limit (LL) values must be either both positive or both negative, which indicates zero does not fall into the range of upper and lower bound values (Hair et al., 2017). In this study, significance testing was performed using bootstrapping procedures with 5,000 resamples (Hair et al., 2014) to assess hypothesised relationships (see Figure 3).

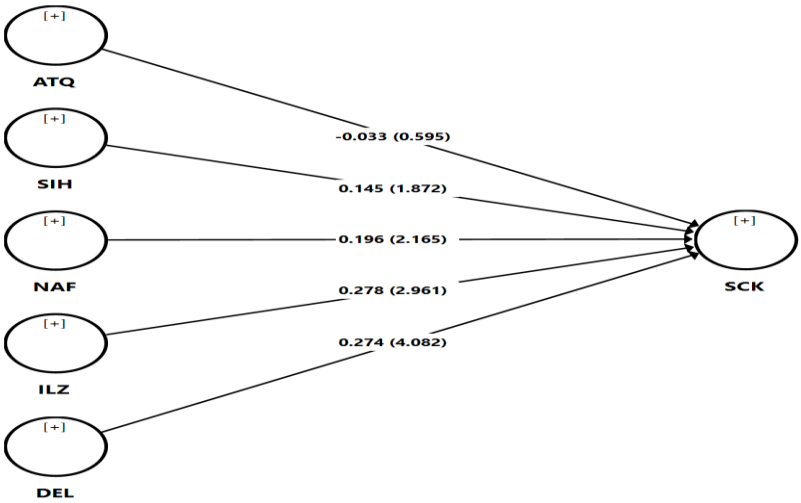

Figure 3. Structural Model (Significance Testing)

Figure 3 illustrates the structural model of the present study, which demonstrated direct relationships between exogenous and endogenous constructs. Meanwhile, the arrows represent relationships between constructs with the values of path coefficient, *β* (outside brackets) and the *t*-values (inside brackets). Overall, relationships with a *t*-value of more than 1.65 ($t > 1.65$) were significant at $p < 0.05$. The full results of significance testing are summarised in Table 4.

Table 4. Results of Significance Testing

Relationships	*β*	SD	*t* -value	*p*-value	CI (BC)		Decision
					LL	UL	
H1: ATQ → SCK	-0.033	0.056	0.595	0.276	-0.125	0.06	Not supported
H2: SIH → SCK	0.145	0.078	1.872	0.031	0.018	0.271	Supported
H3: NAF → SCK	0.196	0.091	2.165	0.002	0.043	0.341	Supported

H4: ILZ → SCK	0.278	0.094	2.961	<.001	0.123	0.436	Supported
H5: DEL → SCK	0.274	0.067	4.082	0.027	0.172	0.395	Supported

Note. SD = standard deviation, CI (BC) = confidence interval (bias-corrected), LL = lower limit, UL = upper limit

From the results presented in Table 4, there were significant and positive direct relationships between all fundamental components of Shariah contracts except Al-Ta'aqud. These findings interpreted that as the level of student entrepreneurs' knowledge of fundamental components of the Shariah contract increased, the level of their knowledge of SC online business also increased. Despite this, only the level of student entrepreneurs' knowledge of Al-Ta'aqud (i.e., contract initiation) did not influence their knowledge of SC online business.

Explanatory Power and Effect Sizes

A model's explanatory power is measured by the R^2 value (Hair et al., 2019; Shmueli & Koppius, 2011), also known as a coefficient of determination (Hair et al., 2017; Ramayah et al., 2018). R^2 interprets the model's in-sample predictive power (Rigdon, 2012). Generally, an R^2 value equal to or larger than 0.10 is acceptable (Falk & Miller, 1992; Raithel et al., 2012). However, Chin (1998) suggested a more specific cut-off for R^2 values as the following: 0.67 (substantial), 0.33 (moderate), and 0.19 (weak). As a result, SCK demonstrated a moderate explanatory power at R^2 = 0.591 (see Figure 3), implying that all predictors (i.e., Al-Ta'aqud, Sihha, Nafath, Ilzham and Delivery) had explained 59.1% of the variance in SCK for online business.

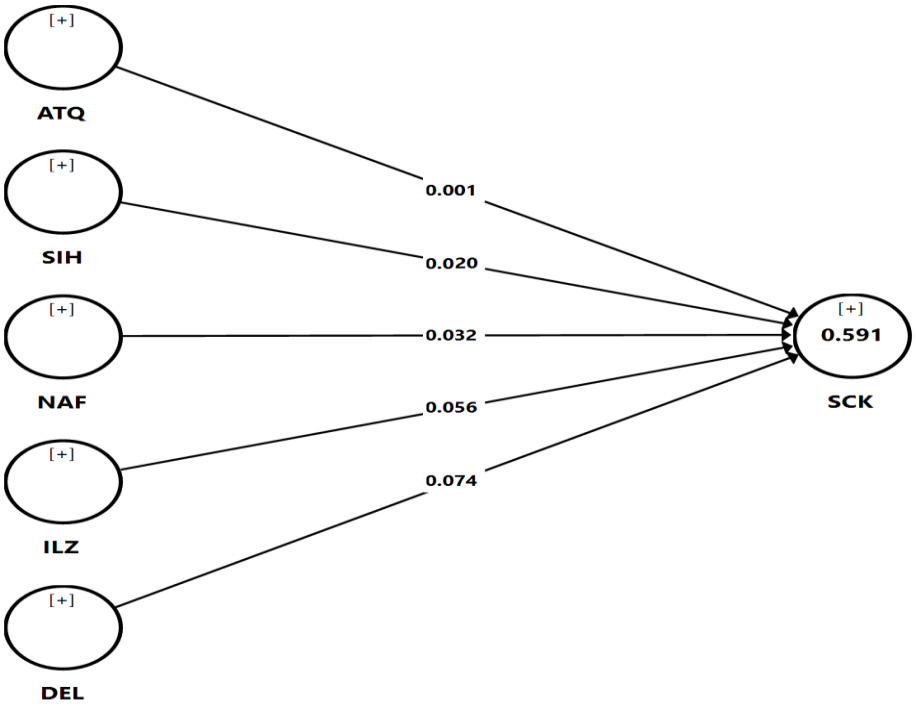

Figure 3. Main effect model
*Note. Values on arrows indicate f^2. Values within endogenous construct represents R^2.

R^2 interprets the combined effect of predictor variables on a dependent variable. Meanwhile, recent PLS-SEM applications literature (Manley et al., 2020; Ringle et al., 2020; Xu et al., 2019)

suggested that substantive effects of a predictor variable on each dependent variable should be reported. This substantive effect is known as f^2. As recommended in recent PLS-SEM reporting guidelines (Hair et al., 2019; Sarstedt et al., 2019), benchmark thresholds introduced by Cohen (1988) were employed to determine the magnitudes of f^2. Hence, the magnitudes are 0.02, 0.15, and 0.35, representing small, medium, and large effects, respectively. All results of R^2 and f^2 from the structural model analysis are summarised in Table 5.

Table 5. Results of Model's Explanatory Power (R^2) and Predictors' Effect Sizes (f^2)

Relationships	Effect Size		Explanatory Power (R^2)
	f^2	Magnitude	
H1: ATQ → SCK	0.001	None	.591 (moderate)
H2: SIH → SCK	0.018	Small	
H3: NAF → SCK	0.032	Small	
H4: ILZ → SCK	0.056	Small	
H5: DEL → SCK	0.074	Small	

Table 5 indicates that all significant components of the Shariah contract had small effects (f^2 between 0.02 and 0.149) on online business's SCK. On the other hand, Al-Ta'aqud, which noted a non-significant relationship with SCK, presented no effect at all ($f^2 < 0.02$).

DISCUSSION AND CONCLUSION

Regarding the first research question, the relationship of four components of SC online business, namely Sihha, Nafath, Ilzham and Delivery, was positively and significantly correlated with knowledge of Shariah compliance. However, an exception was noted with respect to Al-Ta'aqud, the component responsible for initiating contracts. This factor had no impact on knowledge of Shariah compliance. It was observed that most components of Shariah compliance are positively correlated with knowledge of Shariah compliance, suggesting that a thorough understanding of the Shariah legal framework substantially enhances one's comprehension of SC business practices. This correlation asserts that as student entrepreneurs acquire further insights into the constituents of Shariah contracts, their comprehension and competence in managing online businesses in accordance with Shariah principles are generally enhanced.

It is intriguing that there is no correlation between knowledge of SC online enterprises and Al-Ta'aqud (contract initiation). This implies that while contract initiation is a critical element of Shariah contracts, its specific impact on sole proprietors' understanding of SC online enterprises may not be as significant as that of other elements. Therefore, additional examination could explore the potential reasons why Al-Ta'aqud's direct influence may be comparatively limited. Accordingly, potential factors that could account for this relationship include the intricacy of the topic, the manner in which it is applied to online business environments or particular attributes of the surveyed SMEs. Notably, examining these factors may yield significant knowledge regarding

enhancing educational curricula or support structures for aspiring business owners interested in operating SC online enterprises.

For the second research objective, to measure the level of knowledge/understanding of SC online business among student entrepreneurs, it was revealed that SCK demonstrated a moderate explanatory power at $R^2 = 0.591$. This highlighted that all predictors (Al-Ta'aqud, Sihha, Nafath, Ilzham and Delivery) had explained 59.1% of the variance in SCK for online business. In other words, these predictors (Al-Ta'aqud, Sihha, Nafath, Ilzham and Delivery) influence SCK for online business. It underscores that these five stages are essential for ensuring Shariah compliance in online business transactions. Considering this, further discussion of the influence of the stages of SCK for online business would be best to explore how each stage contributes to the overall understanding and implementation of Shariah compliance, for example:

1. Al-Ta'aqud: This stage is critical for ensuring the contract is valid and SC from the outset. By initiating a contract through offering and acceptance, both parties can ensure that they enter into a transaction that aligns with Shariah law and business ethics. This stage also requires both parties to be well-informed and adhere to the pillars of a Shariah contract, which helps to prevent misunderstandings and disputes later on.

2. Sihha: This stage is also critical for ensuring the contract is valid and SC. Sihha refers to the validity of the contract, which requires adherence to the pillars of a Shariah contract, such as the offer and acceptance, the contracting parties, and the subject matter. Thus, by ensuring that the contract is free of *riba*, *gharar*, and *maysir*, both parties can be confident that they are entering into a transaction that aligns with Shariah law and business ethics.

3. Nafath: This stage is essential for ensuring that the contract is fulfilled in a SC manner. Nafath refers to the implementation of the contract, which involves ensuring that the party offering a product is the true owner and possesses authority over the product. Additionally, the product must be free of all liability. By fulfilling the contract in a SC manner, both parties can ensure that they are upholding their obligations and responsibilities under Shariah law and business ethics.

4. Ilzham: This stage is crucial for ensuring that all parties have access to accurate and transparent information about the transaction. Ilzham refers to the disclosure of information, which requires transparency and honesty in business dealings. Notably, by disclosing all relevant information about the transaction, both parties can make informed decisions and ensure that the transaction aligns with Shariah law and business ethics.

5. Delivery: This stage is essential for ensuring the contract is completed in a SC manner. Delivery refers to the transfer of ownership and payment, which must be done in accordance with Shariah law and business ethics. Hence, by completing the contract in an SC manner, both parties can ensure that they are upholding their obligations and responsibilities under Shariah law and business ethics.

These stages can help online businesses overcome some of the challenges associated with Shariah compliance as follows:

1. Fraud: One of the biggest challenges associated with Shariah compliance in online business is fraud. By following the Al-Ta'aqud and Sihha stages, businesses can ensure that the contract is valid and SC from the outset, which can help prevent fraudulent transactions. Additionally, by following the Ilzham stage, businesses can ensure that all relevant information with regard to the transaction is disclosed, which can help prevent misunderstandings and disputes.

2. Misunderstanding: Another challenge associated with Shariah compliance in online business is misunderstanding. By following the Al-Ta'aqud and Sihha stages, businesses can ensure that both parties are well-informed and adhere to the pillars of a Shariah contract, which can help prevent misunderstandings. Furthermore, by following the Ilzham stage, businesses can ensure that all relevant information about the transaction is disclosed, which can help prevent misunderstandings and disputes.

3. Sales issues: Another challenge associated with Shariah compliance in online business is sales issues. By following the Nafath and Delivery stages, businesses can ensure that the contract is fulfilled and completed in an SC manner, which can help prevent sales issues. In addition, by following the Ilzham stage, businesses can ensure that all relevant information about the product or service is disclosed, which can help prevent sales issues.

Therefore, by following these stages, online businesses can ensure that they operate according to Shariah law and business ethics, which helps build trust and credibility with customers. Moreover, by building trust and credibility, businesses can overcome some of the challenges associated with Shariah compliance in online business, such as fraud, misunderstandings, and sales issues.

Furthermore, the third objective of this study is to explore the integration of AI technologies into teaching and learning processes to enhance students' comprehension of Shariah compliance in online business. This includes investigating how AI can support personalised and adaptive learning experiences that foster a deeper and more practical understanding of SC business operations in the digital economy. Specifically, AI has demonstrated great promise in improving students' grasp and application of complex concepts, particularly the principles underlying SC online business. In addition, AI technologies, such as machine learning, Natural Language Processing (NLP), and data analytics, offer innovative, interactive, and dynamic ways to present Shariah principles. This, in turn, makes learning more engaging, relevant, and personalised.

AI-powered educational tools can deliver personalised learning paths tailored to students' diverse needs, particularly in areas like Islamic contract law and ethical business practices. Thus, by leveraging AI's capacity to analyse large datasets and respond in real-time, students can explore foundational Shariah concepts such as Al-Ta'aqud (contract initiation), Sihha (validity), Nafath (revocation), Ilzham (obligation), and delivery. For instance, AI-driven platforms can simulate practical, real-world scenarios, allowing students to engage with SC business models and apply theoretical knowledge in a hands-on, experiential learning environment. Furthermore, these systems provide immediate feedback and assessment, enhancing comprehension and reinforcing key principles.

Additionally, AI supports continuous assessment and adaptive learning. As students progress, AI can monitor learning behaviours, identify gaps in understanding, and adjust the learning content

accordingly. This adaptive approach ensures that students, regardless of their starting knowledge, achieve a thorough and nuanced understanding of ethical and SC business practices. Similarly, collaborative features, such as AI-enabled discussion forums, chatbots, and virtual tutors, further enrich the learning experience by promoting peer engagement, critical thinking, and deeper reflection on the application of Shariah in digital business contexts. However, the successful integration of AI in teaching SC business requires thoughtful implementation. On that note, content delivered via AI must be accurate, contextually appropriate, and aligned with the principles of Shariah. Educators must also be equipped with the skills and ethical awareness to use AI tools effectively, ensuring technology complements, rather than replaces, traditional instruction.

This research makes notable theoretical and practical contributions to understanding SC online businesses among student entrepreneurs. Remarkably, theoretical advancements include illuminating the connection between fundamental Shariah contract elements and modern business practices, thereby enriching Islamic business studies. Additionally, the study highlights positive correlations between knowledge of SC online businesses and Shariah contract components, contributing to the theoretical underpinnings of Islamic finance and entrepreneurship. It also identifies a knowledge deficit regarding Al-Ta'aqud, suggesting further exploration. On the practical side, the study informs the development of educational programmes tailored for student entrepreneurs and offers policy insights for policymakers to enhance regulatory frameworks supporting SC enterprises. Furthermore, it suggests potential impacts on industry and business development, emphasising the need for improved decision-making in online business strategies within SC companies. Overall, the research underscores the significance of considering Shariah contract components and suggests addressing knowledge gaps to promote a comprehensive understanding among aspiring entrepreneurs in SC ventures.

The research's primary limitation lies in its focus solely on student entrepreneurs at UiTM Kedah, suggesting avenues for future research expansion. Meanwhile, recommendations for broadening the scope include increasing participant diversity to encompass entrepreneurs from various regions, universities, and business sectors. This allows for a comparative analysis of their comprehension of SC online businesses. In line with this, cross-comparative studies with different institutions or regions could provide a more comprehensive outlook on implementing Shariah principles in online commerce. Moreover, longitudinal studies spanning extended periods could track shifts in knowledge among entrepreneurs. At the same time, methodological enhancements such as incorporating qualitative data alongside quantitative data and engaging industry professionals and stakeholders could offer deeper insights into SC business practices. Hence, by incorporating these suggestions, future research could provide a more holistic understanding of the relationship between Shariah contract elements and online businesses adhering to Shariah principles.

Nevertheless, the implications of this study are multifaceted. For educators, the findings underscore the significance of integrating SC business modules into entrepreneurship curricula to foster ethically sound online businesses among students. For policymakers, the study provides evidence to support the formulation of targeted strategies and policies that promote SC entrepreneurship within Malaysia's higher education ecosystem. Industry players may also benefit by aligning their digital business strategies with Islamic principles, enhancing consumer trust and market competitiveness. In addition, future efforts should explore how emerging technologies,

such as AI-driven educational tools, can be systematically implemented to personalise learning and reinforce understanding of Shariah principles in online entrepreneurship. Nonetheless, these efforts will be crucial in equipping the next generation of entrepreneurs with the ethical grounding and technological agility needed in the digital economy.

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Conflict of Interest

The authors declare there is no conflict of interest.

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Authors' Contributions

The authors confirm their contribution to the paper as follows: study conception and design were carried out by Norhidayah Ali and Zuraidah Mohamed Isa; data collection was conducted by Suhaida Abu Bakar; analysis and interpretation of results were performed by Norhidayah Ali, Zuraidah Mohamed Isa, and Fathiyah Ahmad @ Ahmad Jali; draft manuscript preparation was completed by Fathiyah Ahmad @ Ahmad Jali and Sarah Shaharruddin. All authors reviewed the results and approved the final version of the manuscript.