Business Sustainability through Halal Supply Chain, Green Finance, and Digital Literacy: Second-Order SEM Approach

Nurul Aidha[a], Ria Nelly Sari[b*], and Yesi Mutia Basri[c]

[a]*Accounting Department, Universitas Riau, Indonesia, nurul.aidha8088@grad.unri.ac.id*
[b]*Accounting Department Universitas Riau, Indonesia, ria.nellysari@lecturer.unri.ac.id*
[c]*Accounting Department Universitas Riau, Indonesia, yesimutiabasri@lecturer.unri.ac.id*

Abstract. Business sustainability is crucial for every business. Understanding the factors that drive and sustain sustainability helps business actors develop effective strategies. This study examines the effects of Halal Supply Chain, Green Finance, and Digital Literacy on Business Sustainability. The population was culinary sector SMEs in Pekanbaru City that had halal certification and at least 2 years of operation. Slovin's formula determined the sample size. Data were collected via questionnaires, yielding 170 valid responses. The analysis used the Second-Order SEM approach. Results show that Halal Supply Chain and Digital Literacy positively affect sustainability in culinary SMEs, while Green Finance does not. Integrating Halal Supply Chain and Digital Literacy practices helps culinary SMEs sustain their business.

Keywords: Halal supply chain, Green finance, Digital literacy, Business sustainability

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[*]Corresponding author. E-mail: ria.nellysari@lecturer.unri.ac.id

Introduction

Business sustainability is a significant challenge faced by Small and Medium Enterprises (SMEs) in the digital economy era, as well as intense global competition. Data from the Ministry of Cooperatives and MSMEs indicate that the number of MSMEs in Indonesia is estimated to exceed 65 million by 2024 (Indonesia.go.id, 2024), with the culinary sector being a significant contributor to the national economy. However, data from the Central Statistics Agency (BPS) indicates that 9 out of 10 culinary businesses go bankrupt or are unable to continue operating within their first three years of operation (Sandiaga Uno, 2024).

Business sustainability is an organization's ability to simultaneously create economic, social, and environmental value (the Triple Bottom Line) through integrated business practices (Schaltegger et al., 2012). Business sustainability has a significant effect on a company's or organization's performance across various aspects. Business sustainability encompasses not only positive financial performance but also environmental, social, and governance aspects.

A business will experience stagnation or even lack a clear direction if it lacks a sustainable concept. Therefore, various strategic efforts are essential for business owners to maintain their business continuity. Implementing a halal supply chain, green financing, and digital literacy are crucial factors that can support the sustainability of culinary MSMEs. These three factors are relevant to current conditions in Indonesia.

Based on data from GoodStats in 2024 Indonesia has the largest Muslim population in the world (84.35%) (Yashilva, 2024). This presents a significant opportunity for halal food products. Furthermore, since 2024, the Indonesian Government has had a vision to become a Global Halal Hub. (Coordinating Ministry for Economic Affairs, 2024). This government's aim is to increase the role of MSMEs in creating halal products and markets, as well as raise awareness of the importance of sustainable business practices. To date, not all MSMEs in Indonesia have halal certification, although the government has provided facilities through the Sehati Program (Free Halal Certificate). The Coordinating Ministry for Economic Affairs (2024) noted that out of 65,200,000 MSMEs, only 25,509 have halal certification.

MSMEs are not only required to have halal certification, but also to ensure that every stage, from raw material selection and storage to production, transportation, and product distribution, meets halal criteria. This process is known as the halal supply chain. The consistent implementation of a halal supply chain not only fulfills religious compliance but also supports business sustainability by increasing consumer trust, enhancing operational efficiency, and mitigating the risk of contamination that can cause reputational damage (Tieman, 2011). As stated by Anwar et al. (2024), integrating halal principles throughout the logistics process will create a more transparent, secure, and sustainable system. Therefore, comprehensive implementation of a halal supply chain is a crucial element not only for meeting halal standards but also as a long-term sustainability strategy for MSMEs in an era of global competition.

Furthermore, to support business sustainability, green financing presents an innovative solution by integrating environmental aspects into financial decisions. This concept offers a financing scheme that focuses not only on profitability but also considers the environmental and social impacts of business activities. The World Bank defines green financing as financing that supports economic development by simultaneously reducing pollution, greenhouse gas emissions, and increasing the efficiency of natural resource use (World Bank, 2023). Green financing is a financial service that supports projects with a positive environmental impact through various instruments, including green credit, green bonds, and sustainability-based investments (Direktorat Jenderal Perbendaharaan, 2024). Bank Rakyat Indonesia (BRI) has distributed sustainable financing to MSMEs and the green sector, reaching IDR 83.1 trillion (Khaerunnisa, 2024). However, access to green financing has not been optimally utilized by MSMEs, despite its enormous development potential (Saragih & Lubis, 2023).

To address the sustainability challenges faced by culinary MSMEs in the digital era, digital literacy can be a viable solution. Digital literacy refers to the ability of business actors to access, understand, and effectively utilize technology to manage their business operations. By digitizing, MSMEs can reach a wider market, improve the customer experience through digital interactions, and manage finances and inventory with digital systems (Hafeez et al., 2025).

This study aims to answer three questions related to the explanation above. First, does the halal supply chain have a positive effect on business sustainability? Second, does green financing have a positive effect on business sustainability? And third, does digital literacy have a positive effect on business sustainability?

This research is grounded in the Resource-Based View (RBV) theory (Barney, 1991) and the Triple Bottom Line (TBL) framework. These two theories are applied simultaneously to explain how halal supply chain, green finance, and digital literacy enhance business sustainability.

This research presents an innovative approach by integrating three strategic constructs —halal supply chain, green financing, and digital literacy — into a single model framework aimed at explaining business sustainability. Furthermore, the research's novelty lies in its methodological approach, which utilizes second-order SEM for each construct, presented as a multidimensional construct.

Literature Review

Resource-Based View Theory

The Resource-Based View (RBV), rooted in Penrose's (1959) work and refined by Wernerfelt (1984) and Barney (1991), explains that a company's sustainable competitive advantage stems from its unique internal resources.

The RBV theory explains that business sustainability can only be achieved if business actors have access to valuable, rare, difficult to imitate, and irreplaceable (VRIN) resources (Barney, 1991).

In the context of this research, halal supply chains, green financing, and digital literacy are viewed as valuable internal resources (VRIN) for MSMEs. Effective management of these resources can mediate business sustainability and ultimately improve MSME performance.

Triple Bottom Line Theory

The Triple Bottom Line (TBL) concept was first introduced by John Elkington in 1994 and further developed in his book, "Cannibals with Forks: The Triple Bottom Line of 21st Century Business" (Elkington, 1997). This concept emphasizes that business success is no longer measured solely by financial aspects, but also by contributions to the environment and society. Elkington explains that business sustainability must consider three main dimensions: profit as economic sustainability, people as social sustainability, and the planet as environmental sustainability (Elkington, 1997). Through this approach, TBL challenges business leaders to reevaluate the traditional capitalist mindset that is solely oriented towards profit, encouraging

companies to pay more holistic attention to their social and environmental responsibilities. These three elements are interconnected and need to be managed simultaneously to achieve long-term sustainability in 21st-century business practices (Elkington, 1997).

Business Sustainability

The sustainability of MSMEs is the result of adaptive business efforts to ensure long-term viability, which is now evaluated multidimensionally, not just from a financial perspective. In general, the sustainability framework for MSMEs is often viewed as the ability to continue operating and competing, especially in the face of market and technological disruption (Alshebami, 2025).

Business sustainability aims to ensure that business activities can continue in the long term while still providing economic, social, and environmental benefits. The concept of business sustainability is built on three main interrelated components: economic, social, and environmental. From an economic perspective, businesses must generate stable profits, manage resources efficiently, and continuously innovate to maintain market relevance (Elkington, 1997). From a social perspective, sustainability is viewed through concerns for employee welfare, customer satisfaction, community relationships, and the implementation of business ethics (Azapagic, 2003). Meanwhile, from an environmental perspective, business sustainability is achieved through environmentally friendly operational practices, the efficient use of energy and raw materials, and efforts to mitigate negative impacts on the ecosystem (Bansal & DesJardine, 2014). These three components are known as the triple bottom line principle (profit, people, planet), which is the basis for creating a business that survives and grows responsibly (Elkington, 1997).

Halal Supply Chain

The Halal Supply Chain (HSC) is defined as the management of logistics and product processes that ensure the halal nature of products, from raw materials to the end consumer, in accordance with Sharia principles. In the context of MSMEs in Muslim-majority countries, the HSC is a critical factor that influences not only religious compliance but also sustainability aspects.

The supply chain encompasses all integrated activities involving the flow of materials, information,

and product distribution from suppliers to end consumers. To systematically understand the supply chain structure, Almelhem, Buics, dan Süle (2025) divides it into three main components: the upstream supply chain, the internal supply chain, and the downstream supply chain.

The goal of the supply chain is to maximize the overall value generated to meet consumer needs and demands. Another goal is to minimize overall costs (ordering costs, storage costs, raw material costs, transportation costs, etc. The concept of the halal supply chain was adopted from Azmi et al. (2018). Based on Azmi et al. (2018) halal supply chain has 3 dimensions, namely: 1) technological factors, 2) environmental factors, and 3) organizational factors.

Green Finance

Green finance refers to financing or investment that supports economic activities focused on environmental conservation, carbon emission reduction, and ecological sustainability (Ningsih & et al., 2025). The products of green finance include credits, bonds, investments, and incentives aimed at environmentally friendly projects, such as renewable energy, energy efficiency, waste management, green transportation, and natural resource conservation. (UNEP, 2016). More broadly, green finance is also understood as the integration of environmental factors into financial decisions, encouraging the transition to a sustainable economy (Zhang et al., 2019).

Green finance aims to provide financial support for environmentally friendly economic activities, particularly to reduce emissions, increase energy efficiency, and encourage sustainable resource use (UNEP, 2016). This instrument also aims to accelerate the transition to a green economy that is not only financially profitable but also supports social and environmental responsibility (OECD, 2020), while strengthening economic resilience to the risks of climate change (World Bank, 2017).

The dimensions of green finance encompass three main aspects. First, the environmental dimension focuses on funding projects that reduce pollution, promote conservation, and support the development of renewable energy (Bai et al., 2020). Second, the economic and investment dimension involves financing schemes and instruments such as green bonds to direct capital to sustainable sectors (OECD, 2020). Third, the policy and regulatory dimension emphasizes the role of governments and financial institutions in establishing standards, guidelines, and transparent governance (World Bank, 2017).

Digital Literacy

Digital Literacy refers to an individual's ability to understand, apply, and utilize digital technology for operational, marketing, and strategic decision-making purposes.

Digital literacy aims to enhance individuals' ability to utilize technology effectively, ethically, and productively, thereby supporting economic, social, and educational activities (Van Laar et al., 2020). In the context of MSMEs, digital literacy enhances competitiveness and operational efficiency by fostering mastery of technology-based skills. The dimensions of digital literacy include: (a) Digital Platform Utilization, namely the ability to use digital media and applications for communication, marketing, and transactions; (b) Problem Solving Through Digital Tools, namely the skill of using technology to overcome operational or technical obstacles; and (c) Digital Awareness, namely an understanding of ethics, data security, and responsibility in the use of technology.

Hypotheses Development

Halal Supply Chain and Business Sustainability

As explained above, the halal supply chain encompasses a series of activities or processes, from the procurement of raw materials to the production of finished goods, that are compliant with Sharia law.

From the perspective of the Resource-Based View (RBV) theory, the optimal halal supply chain management can enhance operational efficiency, enabling SMEs to meet consumer preferences in an ethical and sustainable manner. Halal certification and effective HSC implementation are expected to enhance SMEs' profits by increasing consumer trust and product differentiation (Putra & Rahayu, 2021). This demonstrates a strong link between ethical (halal) supply chain management and achieving social and economic sustainability goals for SMEs.

Furthermore, the consistent application of a halal supply chain not only fulfills religious compliance aspects but also supports business sustainability through increased consumer trust, operational efficiency, and mitigation of contamination risks that can cause reputational damage (Tieman, 2011). The integration of halal principles throughout the logistics

process will create a more transparent, safe, and sustainable system (Anwar et al, 2024),

Based on the theoretical and empirical explanations above, the first hypothesis is proposed: H₁: Halal Supply Chain has a positive effect on Business Sustainability

Green Finance and Business Sustainability

Green Finance refers to financing mechanisms allocated for projects and business activities that support environmental sustainability, such as investments in energy efficiency, renewable energy, and sustainable resource management (Feng et al., 2022). This concept offers a financing scheme that not only focuses on profitability but also considers the environmental and social impacts of business activities.

For SMEs, green finance plays a crucial role as a sustainability support tool, particularly in the context of Islamic banking in Indonesia. This financing scheme offers incentives for SMEs to adopt environmentally friendly practices, aligning with the 3R criteria (reduce, reuse, recycle), thereby supporting environmental protection efforts. The availability of green finance can increase SME access to capital for sustainable projects, ultimately improving corporate environmental performance and supporting green economic development (C. Li et al., 2022).

From the Triple Bottom Line (TBL) perspective, green finance represents the Planet dimension that must be balanced with Profit and People dimensions to achieve true business sustainability. Green finance is an innovative solution that integrates environmental aspects into financial decisions. Green finance will cause business units to choose environmentally friendly projects that will not only have an economic impact, but also an environmental and, ultimately, a social impact.

Based on these arguments, the second hypothesis is proposed: H₂: Green Finance has a positive effect on Business Sustainability

Digital Literacy and Business Sustainability

Digital Literacy refers to the ability of SMEs to understand, apply, and utilize digital technology for operational, marketing, and strategic decision-making purposes. Through digitalization, SMEs can reach wider markets, enhance customer experiences through digital interactions, and manage finances and inventory using digital systems (Hafeez et al., 2025).

Digital literacy is a key element in the digital transformation of SMEs, which is crucial for improving their productivity, competitiveness, and sustainability. SMEs with high digital literacy are able to utilize technology (such as e-commerce, cloud computing, or Big Data) for business process automation, improving operational efficiency, and expanding market reach, which is essential for business continuity (Salwa, 2024).

From the RBV perspective, digital literacy can be considered a dynamic capability that enables businesses to adapt to rapid environmental changes and create sustainable competitive advantages.

Based on the theoretical foundation and empirical support above, the third hypothesis is proposed: H₃: Digital Literacy has a positive effect on Business Sustainability

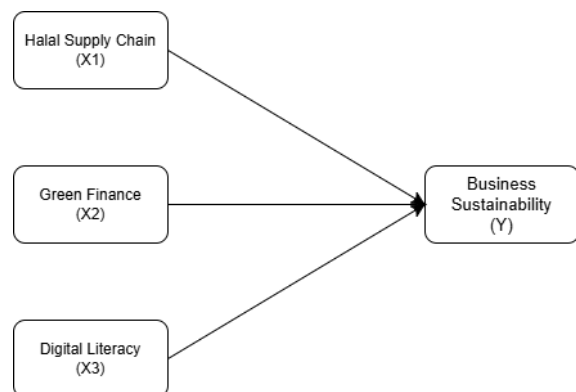Based on the above hypothesis, the research model is as follows:

Fig. 1. Research Model

Research Method

This quantitative study employs a survey method to investigate the impact of halal supply chains, green financing, and digital literacy on business sustainability. The subjects of this study were Small and Medium Enterprises (SMEs) operating in Pekanbaru City, Riau Province. The population used in this study consisted of SMEs in the culinary sector that already had halal certification and had been operating for at least 2 years (6,837 business units). The sample size consisted of 378 business units, determined using the Slovin formula (sample error:

5%). Data were obtained by distributing questionnaires to Culinary SME owners. A total of 176 questionnaires were returned (response rate 46.6%). Due to incomplete responses from respondents, the final dataset that could be analyzed consisted of 170 sets of data.

The questionnaire (research instrument) was developed by referring to research instruments from several previous studies (Tieman, 2011; Zulfakar et al., 2014; Wang & Zhi, 2016; Khan et al., 2021; Rahayu & Day, 2017; Baumgartner & Ebner, 2010; Golicic & Smith, 2013; Parker et al., 2022; Gorzin & Smith, 2023). The instrument (questionnaire) was developed using four research constructs: Halal Supply Chain (HSC), Green Financing (GF), Digital Literacy (DL), and Business Sustainability (BS). Based on a review of previous research, the following indicators were obtained to measure each research construct:

1. HSC has three dimensions and is measured by nine indicators (four items for the Halal Commitment and Compliance dimension, three items for the Halal Operations Process dimension, and two items for the Risk Management dimension).
2. GF has three dimensions and is measured by seven indicators (three items for the Financial Efficiency dimension, two items for the Utilization of Green Finance dimension, and two items for the Environmental and Social Performance in Business dimension).
3. DL has three dimensions and is measured by nine indicators (three items for the Utilization of Digital Platforms dimension, three items for the Problem-Solving Through Digital Tools dimension, and three items for the Digital Awareness dimension).
4. BS has three dimensions and is measured by 13 items (four items for the Economic Sustainability dimension, four items for the Social Sustainability dimension, and five items for the Environmental Sustainability dimension).

Respondents were asked to indicate their level of agreement with the statement provided using a 7-point Likert scale. The level of agreement was expressed on a scale of 1 (strongly disagree with the statement) to 7 (strongly agree with the statement).

The research hypotheses were tested using second-order SEM analysis with the help of WrapPLS 8.0. A second-order SEM approach was employed because the constructs in this study are multidimensional and best represented as higher-order factors comprising several interrelated dimensions. This approach increases parsimony, reduces multicollinearity among first-order variables, and ensures closer alignment between theoretical conceptualization and measurement. Furthermore, hierarchical modelling enhances construct validity and enables more robust testing of complex relationships (Hair et al., 2022).

Results and Discussion

Descriptive Statistics of Respondents

The descriptive statistics of the respondents provide an overview of the characteristics of those who participated in this study. The respondents in this study consisted of 117 females (68.82%) and 53 males (31.18%). The educational background of the respondents was quite good, with 156 (91.76%) having completed their Bachelor's degree (S1). The rest, comprising seven people, had a high school or vocational education background. Four people held a Diploma 3 (D3), two people had a Master's degree (S2), and one person had a Master's degree (S3). In general, all respondents had adequate education. 71.18% of the respondents were of productive age, specifically between 31 and 40 years old (121 people), while the rest fell into the following age groups: between 20 and 30 years old (12 people), between 41 and 50 years old (33 people), and over 50 years old (4 people).

Furthermore, the SMEs that participated in this study consisted of entrepreneurs who provided meals, 53 SME's (31.18%), snacks, 52 SME's (30.59%), and beverages, 33 SME's (9.41%), cake and bread 25 SME's (14.71%), and Fast Food as many as 7 SME units (4.12%).

Descriptive Statistics of Research Constructs

As explained in the previous section, this study examines four constructs: Halal Supply Chain (HSP), Green Financing (GF), Literacy Digital (LD), and Business Sustainability (BS). The following table presents descriptive statistics for the research variables and constructs.

Table 1
Descriptive Statistics of Research Constructs

	N	Min	Max	Mean	Std. Dev
HSC	170	9	63	45.15	12.60

GF	170	8	40	26.72	6.88
DL	170	9	63	44.67	12.80
BU	170	12	77	48.26	15.94
Valid N (listwise)	170				

Based on the table above, the data are suitable for further analysis. The minimum and maximum values for all constructs/variables are within a reasonable range, while the mean score is within that range, indicating a balanced response. The standard deviation, ranging from 6.88 to 15.94, is not too large relative to the mean, indicating normal variability. With an adequate sample size of 170, this dataset is reliable and suitable for further statistical testing.

Outer Loading and Validity Reliability Test

The analysis conducted using PLS involves several stages; first, indicator reliability testing and convergent validity testing are performed. Based on the outer loading values in Table 3, all indicators in each construct have loading values above 0.70, indicating that each indicator significantly represents the construct being measured. The AVE values for all constructs also exceed the minimum limit of 0.50, thus concluding that the measurement model meets the requirements for convergent validity. This indicates that the indicators in each construct have good internal consistency in explaining the latent variables. These results align with those of Hair et al. (2022), who stated that outer loading values ≥ 0.70 and AVE ≥ 0.50 are criteria for meeting convergent validity in the PLS-SEM model.

Tables 2 and 3 below describe the validity and reliability tests of the constructs. In general, the constructs in this study meet the criteria for excellent validity and reliability, both at the first- and second-order levels. All constructs meet the requirements recommended by Hair et al. (2022): outer loading value >0.7, composite reliability >0.7, Cronbach's alpha >0.5, and AVE 0.7.

AUGF	0.749	0.871	0.703	0.771
ESPB	0.836	0.880	0.728	0.786
UDP	0.928	0.959	0.936	0.886
PS	0.927	0.945	0.913	0.852
DA	0.902	0.949	0.919	0.861
ES	0.919	0.966	0.952	0.875
SS	0.940	0.964	0.950	0.871
EnS	0.920	0.951	0.923	0.866

Table 3
Second Order Validity and Reliability Tests

Contructs	CR	CA	AVE
HSC	0.94	0.91	0.84
GF	0.84	0.71	0.63
DL	0.94	0.91	0.85
BS	0.95	0.92	0.86

Structural Model Testing

The information presented in Table 4 below concludes that all model fit and quality indices (APC, ARS, AARS, AVIF, AFVIF, GoF, SPR, RSCR, and SSR) meet the required criteria. This indicates that the structural model used in this study is suitable and reliable for further analysis, both in terms of general model fit, collinearity, and the stability of the relationships between variables.

Table 2
Results of First Order Validity and Reliability Tests

Dimension	Outer Loading	CR	CA	AVE
HCC	0.927	0.958	0.941	0.850
HPO	0.921	0.963	0.942	0.897
RM	0.904	0.956	0.908	0.916
GFE	0.798	0.898	0.829	0.745

Tabel 4
Model Fit and Quality Indices

Indicators	p	Rule of thumb	Information
APC (Average Path Coefficient)	0.130 (p = 0.021)	p < 0.05	Fit
ARS (Average R-squared)	0.096 (p = 0.051)	p <0.10	Fit
AARS (Adjusted R-squared)	0.080 (p = 0.073)	p < 0.05	Fit
AVIF (Average VIF)	1.300	≤ 3.3	Fit
AFVIF (Full Collinearity VIF)	1.269	≤ 3.3	Fit
GoF (Tenenhaus Goodness of Fit)	0.276	≥ 0.25	Fit
SPR (Simpson's Paradox Ratio)	1.000	≥ 0.7	Fit
RSCR (R-squared Contribution Ratio)	1.000	≥ 0.9	Fit

Indicators	p	Rule of thumb	Information
SSR (Statistical Suppression Ratio)	1.000	≥0.7	Fit

Discriminant Validity Testing

Based on Table 5 below, the AVE root value and the latent construct correlation of each variable are declared valid, because the AVE root value of each variable is greater than the latent variable correlation. Thus, it can be concluded that the construct indicators better represent their own constructs than other constructs.

Table 5
Discriminant Validity Testing

Contructs	HSC	GF	DL	BS
HSC	**0.917**	0.012	0.556	0.284
GF	0.012	**0.794**	-0.025	0.042
DL	0.556	-0.025	**0.919**	0.255
BS	0.284	0.042	0.255	**0.926**

Results of Hypotheses Testing

The decision to accept the proposed hypothesis is determined based on the path coefficient and p-value. The hypothesis is accepted if the p-value is less than 0.05. The results of the hypothesis testing are presented in Table 6 below.

Table 6
Results of Hypotheses Testing

	β	p-value	Decision
HSC → BS	0.205	0.003	Sig
GF → BS	0.043	0.286	No Sig
DL → BU	0.142	0.029	Sig

From the table above, it can be concluded that:
1. Hypothesis 1 (H1) is accepted, with a path coefficient (β) of 0.524 and significant at a p-value of 0.003 (<0.05).
2. Hypothesis 2 (H2) is rejected, with a path coefficient (β) of 0.043 and a p-value of 0.286 (>0.05).
3. Hypothesis 3 (H3) is accepted, with a path coefficient (β) of 0.428 and a p-value of 0.029 (<0.05).

The complete relationship between the constructs and their influence on endogenous constructs is illustrated in Figure 2 below.
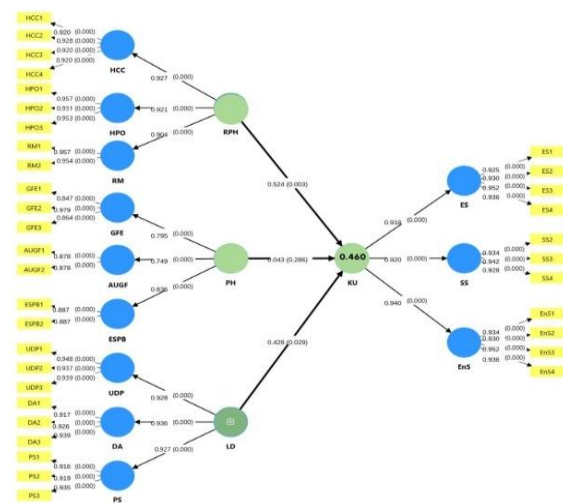

Fig. 2. Variable Relationship

These findings support the Resource-Based View (RBV) theory, which positions the halal supply chain as a strategic resource with VRIN (Valuable, Rare, Inimitable, Non-substitutable) characteristics. This finding is consistent with research by Muhammad et al. (2021), which demonstrates that halal supply chain integration enhances the quality and trust in halal products. By rejecting H2, these findings indicate that green financing is not yet considered a strategic resource within the RBV context. This is likely due to limited infrastructure, low awareness, and long-term benefits that have not yet been directly experienced by business actors in Indonesia (Volz, 2018; Flammer, 2021).

Meanwhile, the third hypothesis (H3) was accepted, where digital literacy has a positive and significant effect on business sustainability (p-value = 0.029 < 0.05). Digital literacy is considered a dynamic capability in the RBV that enables businesses to adapt and create a competitive advantage (Teece, 2007). These results are also supported by a study by Porter & Heppelmann (2014), which found that digitalization expands market access and improves operational efficiency.

Theoretically, the results of this study reinforce the RBV concept by demonstrating that not all resources have a strategic contribution to business sustainability. Halal supply chains and digital literacy meet VRIN criteria, while green financing has not demonstrated these characteristics in the Indonesian context. This study also strengthens the Triple Bottom Line (TBL) framework, which views sustainability from not only a financial perspective (profit) but also from a social perspective (people) and an environmental perspective

(planet). Digital literacy and halal supply chains have been shown to simultaneously promote all three, while green financing requires a stronger supporting ecosystem to generate a significant impact.

Conclusion

This study aimed to examine the effect of halal supply chains, green finance, and digital literacy on business sustainability. The study successfully supported two of the three hypotheses proposed. Unfortunately, the data failed to demonstrate the effect of green finance on increasing business sustainability.

The synthesis of this study highlights both theoretical and practical implications, underscoring the importance of a comprehensive understanding of the Resource-Based View (RBV) and its application in the context of sustainability (TBL). Halal supply chains and digital literacy were shown to be not only theoretically relevant but also applicable in business practice. These results underscore the importance of integrating theory and practice in developing sustainable business strategies.

From a practical perspective, these findings suggest that SMEs should focus on developing integrated halal supply chains and improving the digital literacy of employees and management. SMEs need to invest in training, certification, and protection of their digital ecosystem. This will impact long-term business sustainability. Furthermore, the government and relevant parties need to create policies related to green finance supported by regulations to encourage business participation, such as fiscal incentives, administrative simplification, and education on the long-term benefits of green finance.

Contextually, green finance should improve business if business actors understand and utilize it. Therefore, outreach to business actors is needed to increase their understanding of green finance, as well as to strengthen regulations and infrastructure for optimal green finance operations.

Although this study has successfully achieved most of its objectives, further research on business sustainability is needed to increase its generalizability. This study only examined three variables (halal supply chain, green finance, and digital literacy) related to business sustainability. Future research should consider other variables, such as technology, entrepreneurial spirit, business innovation, and business planning, as these factors can also influence business sustainability (Fitriani, R., & Utami, H. N.,

2022; Nazaruddin, Utami, & Rahmawati, 2024; Zhang, Jano, & Kudus, 2024).

Future studies are also encouraged to examine the impact of business sustainability on enhancing business performance (Indriastuti & Riansyah, 2024; Min et al., 2023; Schaltegger & Wagner, 2017). Expanding this study is also recommended to examine SMEs in other sectors, such as pharmaceuticals and cosmetics. Research conducted in these two sectors is important because halal issues are also found in these sectors. Studies in different SME sectors will enhance our understanding to empower SMEs.

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