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## Article

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# The effect of innovative mindset and behavior on innovation performance and competitive advantage: a case of halal SMEs owner-managers from Malaysian energy-intensive industry

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## Abstract

Malaysia was ranked 32nd on the Global Competitiveness Index in 2022, which denotes that the level of R&D and productivity in SMEs in Malaysia needs to be improved. Therefore, more research is needed to ensure it remains competitive in the global halal marketplace by using innovative concepts as a culture to promote energy-intensive halal SMEs. This study examines the sequential influence of an innovative mindset, behavior, and performance on competitive advantage among SME owner-managers embarking on halal businesses. Data were gathered from SME owner-managers from the halal energy-intensive industry by conducting a self-administered and online-based survey involving 140 respondents. Data were analyzed with the partial least squares technique (SmartPLS 3.0). The results of this study show that innovative behavior was a direct result of an innovative mindset. On the other hand, innovative behavior produced innovation performance, which in turn produced a competitive advantage. This study shows that SMEs owner-managers of halal energy-intensive industries need possess both innovative behavior and innovative attitude as valuable assets. Moreover, a key component in their ability to gain a competitive advantage is their performance in innovation.

**Keywords:** Energy-intensive halal SMEs, SMEs owner-manager, Competitive advantage

## Introduction

The global halal industry is the fastest-growing market, covering various food and non-food items like cosmetics, ingredients, and pharmaceuticals. The global market is estimated to be worth around USD 2.3 trillion annually (Azam & Abdullah, 2020). According to a report by Al-shami and Abdullah (2023), halal food has more companies than other sectors of the Islamic economy. It is expected to reach a value of 2.6 trillion

U.S. dollars in 2023. The halal market is growing significantly due to the increasing number of enterprises both small and large worldwide due to the adoption of halal standards in production and operations (Giyanti et al., 2021). The global Muslim population is around 1.8 billion and could be considered a significant consumer group of halal products and services due to increased acceptance and religious commitment. Interestingly, the increased global market demand for halal products and services is not only driven by Muslim consumers. Previous research has demonstrated that halal products are also gaining a favorable view among non-Muslims because the products meet hygienic and quality standards (Haque et al., 2015; Ismail & Nasiruddin, 2014; Wibowo & Ahmad, 2016). In that sense, the composition of various halal products has become a global commercial trend in Muslim and non-Muslim countries, and demand for halal products goes beyond religion (Choi & Jeong, 2020).

The halal industry is one of the essential contributors to national economic growth in terms of income, quality of life and employment opportunities. Malaysia is the first Muslim country in which the government progressively implemented halal businesses. Malaysia has over 1.3 million firms, of which approximately 90% are SMEs, with 200,000 engaged in halal-related activities (Yusof et al., 2019). Jabatan Kemajuan Islam Malaysia (JAKIM) is one of Malaysia's government agencies which manages and controls the halal certification process and informs Muslim consumers about halal products (Shirin Asa, 2017). In that sense, JAKIM evaluates items that strictly comply with halal criteria based on Sharia law and issues halal certificates with specific logos for distribution in local and international markets. In addition, JAKIM conducts enforcement activities by investigating and monitoring manufacturers and exporters who misuse the halal logo. Furthermore, all imported foods marketed in Malaysia must be labeled halal to guarantee they meet the requirements of a foreign halal certification authority approved by JAKIM. Those actions help Muslim consumers avoid exposure to unauthorized fraud certifications and halal labels, and help identify the local halal logo in the halal market.

Globalization has grown the halal market for businesses worldwide. With the growing interest in global halal business, the government has invested billions of dollars, establishing a halal market as an essential worldwide component. The export of the Halal industry in Malaysia reached RM30.5 billion in 2020 (Jaswir et al., 2023). However, most SME sectors need to realize that one of the most significant business opportunities and a bright future for SMEs lies with the halal market. Local energy-intensive halal SMEs are vital to Malaysia's future economy, but their products still need to be more popular than international products (Machfud et al., 2011). The SME sector also faces considerable challenges to sustain business operations and profitability in competitive foreign markets. Small and medium enterprises (SMEs) must be exposed to the demand for halal products and expand business opportunities by providing more realistic competitive advantages.

According to Dutta et al. (2020), Malaysia ranked 33 out of 131 countries in the Global Innovation Index (GII). The innovation concept is pervasive, and the Malaysian government has taken several steps to move into the innovation-led economy and become an international halal hub. There needs to be more innovative activities, but a scarcity of innovative capabilities has affected the competitive advantages due to low capabilities in accessing management and technology and a lack of skills for producing new products

(Fernando & Wah, 2017). Although Malaysia is regarded as the second most competitive country in the Global Competitive Report 2017–2018 (Nogueira & Madaleno, 2021), the level of R&D and productivity in SMEs in Malaysia is extremely low (Yuen & Ng, 2021). Therefore, more research is needed to remain competitive in the global halal marketplace; this could be achieved by using innovative concepts as a culture to promote SMEs. This study examines the sequential process of innovation ecosystem in the Halal SMEs from Malaysian energy-intensive industries by studying the influence of an innovative mindset, behavior, and performance on competitive advantage. The findings of this study provide better innovation strategies to build successful energy-intensive halal SMEs to compete in the global market.

## **Literature review**

### **The concept of halal**

"Halal" is an Arabic word that refers to "permitted or lawful" under Islamic law. In other words, halal products and services are religiously permissible for Muslim consumers and have rapidly gained worldwide recognition due to their halal standards of safety, quality assurance and hygiene. The halal concept applies to all stages of its processes, from production to customer handover. Currently, halal encompasses food, cosmetics, pharmaceuticals and even financial services. Halal is the most widely used concept among all Muslims worldwide and is an essential aspect of their daily activities, embracing services and products (Shirin Asa, 2017). According to Machfud et al. (2011), the word "halal" displayed on products or services has an appealing quality for Muslim consumers. Nowadays, the halal industry continues to expand. Multinational businesses have increased their profits by exporting products to countries with growing Muslim consumer markets. For example, halal has become widely accepted in the Western food sector, and halal companies are exporting food to the Middle East and Southeast Asia (Nurrachmi, 2016). The annual global market value for the halal food industry is US\$ 2.3 trillion (Azam & Abdullah, 2020). Halal business and trade became a new benchmark for hygiene, safety, and quality assurance. In that sense, halal-certified products and services are becoming accepted by both Muslims and non-Muslims. Halal certification has four main benefits: (1) it gives confidence to consumers consuming products and services; (2) it is used as a marketing tool and provides a competitive advantage for enterprises; (3) the product satisfies Islamic law requirements and stringent quality assurance; and (4) it establishes a framework for the auditing and monitoring by the authority.

### **Competitive advantage in the SME sector**

Competitive advantage refers to the distinct value businesses provide customers compared to other companies offering identical products or services (Kiyabo & Isaga, 2020). A firm gains a competitive advantage by implementing a value-creating strategy that competitors are not implementing at that time (Barney, 1991). Competitive advantage can be expressed in several dimensions: market sense, differentiated products, a focus on high-value customers, market responsiveness, collaboration with partners, treating customers as assets, information transparency and supply chain leadership (Kiesi, 2012). According to Alimin Ismadi et al. (2010), competitive advantage can be divided into three approaches: cost-based, product-based and service-based. In another study,

competitive advantage was measured in terms of price, consistency of delivery, product innovation, product quality and timely delivery (Wijetunge, 2016). SME owner-managers should identify their products and their products' real benefits to the potential global market. This will meet the target market's needs and ensure it offers good value compared to identical products or services already available in the global market. Even though SMEs are likely to be aware of their domestic competition, competition may differ in the global market. SMEs should look beyond their businesses and consider how impending technology might impact products or services. Usually, differentiated businesses charge the customer a higher price to achieve a greater profit margin by providing a unique product or a higher quality or delivering a service faster than others. Innovation is another approach to set a business apart from its global competitors. Besides that, a business that offers identical products or services at a lower price can also differentiate the business from the international competition. This study was conducted based on the definition of competitive advantage provided by Newbert (2008) and modified by Sigalas et al. (2013). These were chosen because this measurement scale for competitive advantage was created with accuracy and due diligence to meet all the construction process requirements for a new scale and on which most scholars agreed.

#### **Innovative mindset**

An innovative mindset plays an essential role in a successfully surviving business and becomes the key driver of competitive advantage for organizations. In other words, the creation of an innovative mindset develops and captures new value products or services, leads to the implementation of critical thinking solutions to new and old problems, and enables companies to stay ahead of their competitors (McLaughlin & McLaughlin, 2024). SMEs must constantly be able to meet the needs of their customers and survive in the global market via an innovative mindset approach. An innovative mindset should be adopted by an entire organization, from the owner to hourly workers (Kuczarski, 1996). Innovation efforts encourage firms to produce products and services through social change, a lack of environmental pressures, cost-effectiveness to remain more profitable, to commercialize and compete globally (Harsono & Fitri, 2020). This research was conducted based on six types of innovative mindset which were modified by Sidhu et al. (2016): (1) trust, (2) resilience, (3) diversity, (4) mental strength, (5) perfection and (6) collaboration. It has been discovered that, in small businesses like SMEs, owner-managers with an innovative mindset will use strategic management practices, intellectual capital management, and innovation as a tool to achieve business success more often than owner-managers without such a mindset (Volná et al., 2015). This suggests the following hypothesis:

*Hypothesis 1* The innovative mindset of owner-managers of halal SMEs in Malaysian energy-intensive industries positively influences their innovative behavior.

#### **Innovative behavior**

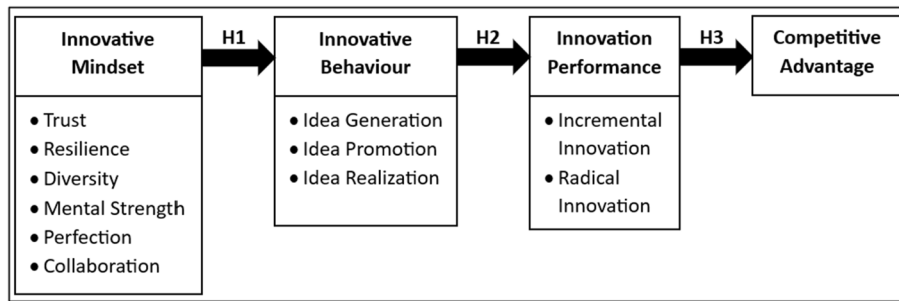
West and Wallace (1991) defined innovative behavior as the purposeful establishment or use of unique ideas and procedures. Innovative behavior was described by Yusof et al. (2019) and Omri (2015), as an individual's ability to become creative in their work.

According to Scott and Bruce (1994), innovative behavior consists of three primary stages: (1) recognition of problems, (2) seeking a solution or idea, and (3) an idea developed into a prototype or model of the innovation. Even though developing innovative behavior among employees provides a significant competitive advantage, more needs to be known about innovative behavior within SMEs. According to Carmeli et al. (2006), innovative behavior is a multi-staged process including identifying a problem, creating new ideas and solutions, and planning for idea implementation. Innovative behavior necessitates a higher level of risk during the execution of ideas and the ability to think outside the box (Carmeli et al., 2006). In another study, Xerri and Brunetto (2011) proposed that innovative employee behavior enables and encourages knowledge transfer to develop a sustainable competitive advantage; employees will only engage in innovative behavior if tempted, rewarded and supported. This research will focus on four innovative behavior processes within the context of an SME: idea generation, idea promotion and idea realization, as modified by Hakimian et al. (2016). For the owner-managers of Halal SMEs, innovative behavior can be seen as an innovation stimulus that shapes their leadership in innovation, the culture of innovation, and the management of knowledge, creativity, and technology. It has been determined that there is a considerable positive association between this innovation stimulus and innovation performance (Prajogo and Ahmed 2006). This suggests the following hypothesis:

*Hypothesis 2* Halal SMEs' owner-managers' innovative behavior has a beneficial impact on the company's innovation performance in Malaysian energy-intensive industries.

### **Innovative performance**

According to Amabile et al. (1996), innovation is "the successful adoption of novel ideas within an organization". Innovative performance helps SMEs gain and maintain a higher competitive advantage (Tojeiro-Rivero & Moreno, 2019). Yuen and Ng (2021) found that internal R&D collaboration, absorptive capacity, and knowledge-sharing practices significantly affect SMEs' innovative performance. However, achieving "innovative performance" is difficult without establishing and implementing a good road map or strategies. This study developed a construct for quantifying incremental and radical innovation performance to encompass all facets of innovation performance (Nguyen & Chau, 2017). Incremental innovation refers to minor modifications to present technologies in terms of design, function, pricing, quantity and features to meet customers' needs (Proprius, 2002). Radical innovation can be defined as adopting new technologies, however it involves more significant uncertainty and a high level of risk (Alwi et al., 2018). Technological advancements provide a competitive edge, as evidenced by the favorable relationship between tech-innovation and strategic and economic export performance (Silva et al., 2017). The results of an experimental study involving 106 Taiwanese manufacturing companies showed that innovation performance positively affects competitive advantage. Aziz and Samad's (2016) experimental study of 220 small and medium-sized food production businesses in Malaysia revealed that innovation enhances competitive advantage. This suggests the following hypothesis:



**Fig. 1** Theoretical framework and research hypotheses

*Hypothesis 3* Competitive advantage is positively impacted by the innovation performance of Malaysian energy-intensive industry’s halal SMEs.

The integrated model framework proposed in this research is shown in Fig. 1.

**Method**

**Sampling**

The data for this study were obtained by surveying halal SME owner-managers from energy-intensive industry. Energy-intensive processes like heating, cooling and refrigeration are used extensively in halal food manufacture. Food producers and processors need secure, renewable energy sources to maintain food safety and quality. According to Halal Development Corporation Berhad Malaysia, there were 7000 SMEs with halal certification in Malaysia. These SMEs offer halal products and services in various industries, such as halal food, Islamic finance, halal travel, modest fashion, halal media and recreation, and halal pharmaceuticals and cosmetics.

**Pre-test**

This study employed an online-based survey questionnaire as its instrument. The instrument was pre-tested by experts from the Halal Development Corporation Berhad Malaysia, academicians, owner-managers of SMEs, and the SME Corporation Malaysia to assess the questionnaire’s precision, organization, and applicability. Most experts provided positive feedback, and only minor adjustments needed to be made to the questionnaire based on the feedback.

**Data collection**

This study employed self-administered and online-based surveys to increase the response rate. The questionnaire booklet was distributed to SME owner-managers who participated in the Halal Development Corporation Berhad (HDC) 12th World Halal Conference. The online-based survey was distributed to the list of SMEs that the researcher identified based on the information from SME Corp Malaysia. Of the distributed 500 questionnaires (200 self-administered and 300 online-based surveys), 140 were usable. The response rate was 28%, slightly higher than those reported in SMEs-related surveys (Lee et al., 2021).

## Measures

Measurements for competitive advantage were adapted from Sigalas et al. (2013). The construct has a total of four items. The measurement was adapted from Nguyen and Chau (2017) for the innovation performance construct, including incremental and radical innovation performance. The construct has a total of sixteen items. Measurements for innovative behavior were adapted from Janssen (2000). The construct has three sub-constructs, including: generation (3 items), promotion (3 items) and realization (3 items). Measurements for “innovative mindset” were adapted from Sidhu et al. (2016). The construct has six items including the total score of trust, resilience, diversity, mental strength, perfection, and collaboration. Those abovementioned constructs were measured based on a five-point Likert scale with “1” as “Strongly disagree” and “5” as “Strongly agree”.

## Data analysis

The standard method bias was tested using Harman’s single-factor test (Malhotra et al., 2007) via SPSS. The single factor captured 26.3% of the data’s variance, suggesting that common method bias is not an issue. The descriptive statistics analysis provided the profile of the responded energy-intensive halal SMEs. The research model testing used SmartPLS 3.0. The bootstrapping method used 5,000 resamples to test the significance of the path coefficient (Hair Junior et al., 2014). This study follows the current practice of mediation testing suggested by Hair Jr et al. (2021) and Zhao et al. (2010).

## Results

### Survey sample properties

Table 1 presents the descriptive statistics of the energy-intensive halal SMEs. Regarding the halal SME certification status, 82.9% of the SMEs have halal certification status. With reference to the size of energy-intensive halal SMEs, 62.9% have 5–29 employees, 14.3% have 30–74 employees, 11.4% of SMEs with less than five employees, and 11.4% of SMEs with 75–200 employees. For the vital respondent position, 51.4% hold executive positions, 22.9% are the owners of the SMEs, 11.4% hold managerial positions, 8.6% hold CEO/COO/CFO positions, and 5.7% hold senior manager positions. Regarding the critical respondent work experience, 62.9% have 1–5 years of work experience, 17.1% have less than 1 year of experience, 11.4% have 6–10 years experience, 5.7% have 11–15 years experience, and 2.9% have more than 20 years’ work experience.

### Measurement model

Table 2 presents the measurement’s loadings, average variance extracted (AVE), and composite reliability (CR) to determine the convergent validity. All the loadings except total score collaboration, total score perfection, total score resilience, behaviour\_generation1, behaviour\_promotion2, and behaviour\_realization3 were higher than 0.7. The AVE and CR for innovative mindset, innovative behavior, competitive advantage and innovation performance were above the threshold of 0.5 and 0.7, respectively (Hair Junior et al., 2014).



**Table 1** Profiles of the respondents

|  | Frequency | Percentage |
|--|-----------|------------|
| Energy-intensive Halal SMEs certification status   |           |            |
| Yes  | 116       | 82.9       |
| No   | 24        | 17.1       |
| Energy-intensive Halal SME's size                  |           |            |
| Less than 5 employees                              | 16        | 11.4       |
| 5–29 employees                                     | 88        | 62.9       |
| 30–74 employees                                    | 20        | 14.3       |
| 75–200 employees                                   | 16        | 11.4       |
| Energy-intensive Halal SME's year of establishment |           |            |
| Less than 1 years                                  | 4         | 2.9        |
| 1–5 years  | 52        | 37.1       |
| 6–10 years   | 40        | 28.6       |
| 11–15 years  | 40        | 14.3       |
| 16–20 years  | 12        | 8.6        |
| More than 20 years                                 | 12        | 8.6        |
| Key respondent's position                          |           |            |
| Executive  | 72        | 51.4       |
| Manager  | 16        | 11.4       |
| Senior manager                                     | 8         | 5.7        |
| CEO/COO/CFO  | 12        | 8.6        |
| Owner  | 32        | 22.9       |
| Key respondent's work experience                   |           |            |
| Less than 1 years                                  | 24        | 17.1       |
| 1–5 years  | 88        | 62.9       |
| 6–10 years   | 16        | 11.4       |
| 11–15 years  | 8         | 5.7        |
| More than 20 years                                 | 4         | 2.9        |

Table 3 confirms the discriminant validity of the variable used in this study using both the Fornell–Larcker criterion and HTMT ratio (Henseler et al., 2015). The Fornell–Larcker results show that the square root of the AVE was higher than the parallel columns and rows. The HTMT results were also below the conservative threshold value of 0.85. Additionally, the bootstrapping procedure ensures that the HTMT values were significantly different from 1 (Hair Junior et al., 2014, 2021). The results confirm that none of the confidence intervals includes the value of 1, hence establishing the discriminant validity.

### Structural model evaluation

The structural model results were evaluated and confirmed the construct measures as reliable and valid. The assessment of the structural model uses the coefficient of determination ( $R^2$ ), beta ( $\beta$ ), and  $t$ -values and is obtained via the bootstrapping procedure, effect sizes ( $f^2$ ), and predictive relevance ( $Q^2$ ). Table 4 presents these results. The  $R^2$  value is above 0.35 (Cohen, 1988) for Innovative Behavior and Innovative Performance, indicating that it is a substantial model. However, it is below the threshold value for Competitive Advantage, signifying the need for caution in interpreting the model for

**Table 2** Convergent validity of the measurement model

| Construct              | Item                        | Loadings | CR    | AVE   |
|------------------------|-----------------------------|----------|-------|-------|
| Innovative mindset     | Total score collaboration   | 0.571    | 0.836 | 0.517 |
|                        | Total score diversity       | 0.891    |       |       |
|                        | Total score mental strength | 0.875    |       |       |
|                        | Total score perfection      | 0.511    |       |       |
|                        | Total score resilience      | 0.661    |       |       |
|                        | Total score trust           | Deleted  |       |       |
| Innovative behavior    | Behavior_Generation1        | 0.686    | 0.892 | 0.515 |
|                        | Behavior_Generation2        | 0.728    |       |       |
|                        | Behavior_Generation3        | 0.755    |       |       |
|                        | Behavior_Promotion1         | 0.899    |       |       |
|                        | Behavior_Promotion2         | 0.488    |       |       |
|                        | Behavior_Promotion3         | 0.700    |       |       |
|                        | Behavior_Realization1       | 0.739    |       |       |
|                        | Behavior_Realization2       | Deleted  |       |       |
|                        | Behavior_Realization3       | 0.680    |       |       |
| Competitive advantage  | Competitive_Advantage1      | 0.821    | 0.909 | 0.715 |
|                        | Competitive_Advantage2      | 0.784    |       |       |
|                        | Competitive_Advantage3      | 0.882    |       |       |
|                        | Competitive_Advantage4      | 0.892    |       |       |
| Innovation performance | Performance_Incremental1    | 0.706    | 0.956 | 0.627 |
|                        | Performance_Incremental2    | 0.827    |       |       |
|                        | Performance_Incremental3    | 0.795    |       |       |
|                        | Performance_Incremental4    | 0.710    |       |       |
|                        | Performance_Incremental5    | 0.796    |       |       |
|                        | Performance_RProcess1       | 0.706    |       |       |
|                        | Performance_RProcess2       | 0.830    |       |       |
|                        | Performance_RProcess3       | 0.804    |       |       |
|                        | Performance_RProduct1       | 0.739    |       |       |
|                        | Performance_RProduct2       | 0.869    |       |       |
|                        | Performance_RProduct3       | 0.821    |       |       |
|                        | Performance_RProduct4       | 0.831    |       |       |
|                        | Performance_RProduct5       | 0.838    |       |       |

Total score trust item and Behavior\_Realization 2 were deleted due to low loading

**Table 3** Discriminant validity of the measurement model

|    | Fornell–Larcker criterion |       |       |       |    | Heterotrait–monotrait ratio (HTMT) |       |       |    |
|----|---------------------------|-------|-------|-------|----|------------------------------------|-------|-------|----|
|    | CA                        | IP    | IB    | IM    |    | CA                                 | IP    | IB    | IM |
| CA | 0.846                     |       |       |       | CA |                                    |       |       |    |
| IP | 0.645                     | 0.792 |       |       | IP | 0.693                              |       |       |    |
| IB | 0.323                     | 0.335 | 0.773 |       | IB | 0.329                              | 0.373 |       |    |
| IM | 0.287                     | 0.322 | 0.717 | 0.719 | IM | 0.436                              | 0.427 | 0.932 |    |

CA competitive advantage, IP innovation performance, IB innovative behavior, IM innovative mindset

**Table 4** Results of the structural model analysis

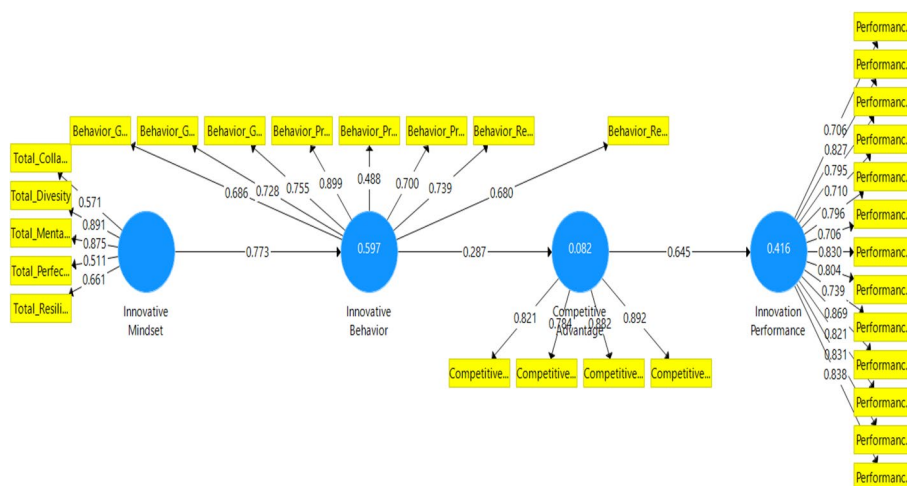
|    | Relationship                                   | Std beta | Std error | t-value  | Decision  | R2    | F2    | Q2    |
|----|--|----------|-----------|----------|-----------|-------|-------|-------|
| H1 | Innovative mindset → innovative behavior       | 0.773    | 0.055     | 11.791** | Supported | 0.597 | 1.483 | 0.296 |
| H2 | Innovative behavior → competitive advantage    | 0.287    | 0.088     | 3.247**  | Supported | 0.082 | 0.089 | 0.050 |
| H3 | Competitive advantage → innovation performance | 0.645    | 0.033     | 23.696** | Supported | 0.416 | 0.713 | 0.251 |

\*\* $p < 0.01$ , \* $p < 0.05$

Competitive Advantage. Figure 1 displays the path model with R2 value. The effect size (F2) indicates the evaluation of the change in R2 to the relevance of the independent variable in explaining the dependent variable. The effect size of Innovative Mindset on Innovative Behavior was 1.483 (large effect size), Innovative Behavior on Competitive Advantage was 0.089 (small effect size), and Competitive Advantage on Innovation Performance was 0.713 (large effect size) (Cohen, 1988; Henseler et al., 2015, 2016). The Q2 values were above zero for all the endogenous variables indicating the model’s predictive relevance. The standardized root means square residual (SRMR) was also examined to assess the model fit in PLS-SEM (Henseler et al., 2015, 2016). The SRMR value for this study is 0.05, indicating a good model fit.

**Hypotheses testing**

Figure 2 and Table 4 show the findings of the hypotheses testing. The results from the PLS-SEM show that an innovative mindset has a significant positive effect on innovative behavior ( $\beta = 0.773$ ,  $p < 0.01$ ), thereby supporting H1. Moreover, innovative behavior has a significant positive effect on competitive advantage ( $\beta = 0.287$ ,  $p < 0.01$ ), thereby supporting H2. Lastly, the relationship between competitive advantage and innovation performance is significant ( $\beta = 0.645$ ,  $p < 0.01$ ), thus supporting H3.



**Fig. 2** Path model

## Discussion and conclusion

### Theoretical implications

This study contributes to the theory in several ways. Firstly, the study has shown the relationship sequence between an innovative mindset, innovative behavior, competitive advantage, and innovative performance. Secondly, the findings show that the innovative mindset has the highest path coefficient on innovative behaviors, followed by the relationship between competitive advantage on innovative performance and innovative behavior on competitive advantage. Thirdly, the findings demonstrate that achieving a competitive advantage is necessary for energy-intensive halal SMEs to improve their innovative performance. Thus, adapting absorptive capacity as one of the innovation factors sheds light on how the company acquires or learns new knowledge, integrating old and new knowledge to support the innovation level. Technology transfer is also an element of assessing innovative performance. However, it needs to be more closely watched by most SMEs due to a lack of financial and skilled labor. Although some previous studies show that it has engaged with innovation performance, this study shows no relationship due to the company needing to understand the process and its importance fully. Besides the technology transfer contributing to this study, internal R&D collaboration significantly contributes to good innovative performance. SMEs should focus more on research and development activities to improve their innovativeness. The last variable that contributed to the research was knowledge sharing. Knowledge leads to progress, but improvement is incapable of being achieved alone. The knowledge-sharing “flow” within a firm enables the creation of more innovative ideas to achieve higher innovative performance.

### Managerial implications

The findings of this study present several implications for energy-intensive halal SMEs, particularly the managers. Firstly, the government agencies, such as the SMEs’ coordinating agency, SME Corp. Malaysia, and the coordinating agency related to halal innovation such as the Halal Development Corporation Berhad (HDC) need to provide training and consultation for energy-intensive halal SMEs to boost their innovative mindset and innovative behavior to gain competitive advantage and increase their innovation performance in the local and global Halal market. Secondly, higher education institutions need to provide a course syllabus that can increase the innovative mindset and behavior of the current undergraduates to ensure that they are equipped with a substantial innovative mindset and innovative behavior to increase the quality of the future workforce in the halal industry, and other industries generally.

On the practical side, this research provides several contributions. First, it was found that most of the SMEs in Malaysia focus less on innovation. Thus, this research may provide a path for them to follow. The first assistance that can be provided is managerial support. Top management is reluctant to change and tends to “wait and see” (Pattinson & Chen, 2020) before implementing new practices or changes in their organizations, therefore, the findings of this study are helpful for these traditional SMEs. Since the findings imply that innovation factors will enhance innovation performance, top management can use it as a reference to re-organize or focus more on innovative activities. Some management policies or regulations should support innovation activities. For

instance, those policies that oppose or make it challenging to create innovation activities need to be restructured or considered so that SMEs have more significant opportunities to contribute to innovative capacity and performance. Understanding the issue of SMEs being low in innovation is essential in anchoring future directions for firm innovation. The findings show that the company's absorptive capacity requires more new knowledge rather than just focusing on existing knowledge. Considering this, the study gives management insight into improving its employees' abilities by providing training, improving knowledge, integrating new and old knowledge, and collaborating.

The findings also allow stakeholders to understand the importance of developing or upgrading lines and what factors cause their businesses to have low innovation performance. To upgrade development, stakeholders and management should continuously have innovative strategic planning. SMEs in Malaysia need to keep increasing human capital and able to ensure that they have adequate resources to overcome and manage innovation activities. The findings of this study provide SMEs in Malaysia with the opportunity to be more innovative than larger enterprises because SMEs' innovation performances are yet to reach their full potential. In addition, top management should be more innovative and support R&D collaboration in innovation. For example, when embarking upon development, being involved in a consultancy or partnership with an R&D agency can achieve higher innovation performance. Top management knows what elements and requirements are needed to develop a product. This study provides a blueprint for top management making knowledge-sharing initiatives essential to effect innovation.

This study also contributes to manufacturing SMEs in terms of what factors make the industry step back from innovation and what is necessary to be proactive to make innovation happen. Since the Malaysian government is moving into a K-based economy, this research provides guidelines to understand the factors that result in SMEs' low innovation performance. The GDP of SMEs in Malaysia remains relatively small compared to their counterparts in advanced countries (47.2%) and other high-middle-income countries (Yuen & Ng, 2021); thus, this also provides policymakers with appropriate approaches in public agencies and governmental departments. This data led the government to adopt measures to improve SMEs' innovativeness level. In line with the Malaysia SMEs master plan (2012–2020) (Yuen & Ng, 2021), within six of the high impact programs (HIP) of the SME master plan, this study would contribute to two of the HIP. The first is the technology platform to promote an innovative idea, put simply, to promote innovation activities at a commercialization stage. It can stimulate SMEs to develop more and more innovative ideas and upgrade from a traditional business concept. Secondly, inclusive innovation empowers the bottom 40% of the income group to leverage innovation by transforming the rural community through a hand-holding approach (Yuen & Ng, 2021). Hence, this research helps government to have a better approach to transforming the rural community. This could be done by providing more training and development to improve innovative capability, R&D collaboration with SMEs, and technology support since SMEs in the manufacturing sector have grown more slowly since 2016.

## Conclusion

In conclusion, Malaysia's energy-intensive halal industry still needs more awareness on the part of society. The industry needs to incorporate advanced business processes and practices designed to serve better the rising expectations of customers, suppliers and other stakeholders to enhance its competitiveness further. Concerted efforts and strategies are critical to testify to the positive prospects of enhancing awareness in this industry. After considering the results, the study has several elements and limits. Almost all the local halal food firms need to follow market labeling requirements. Furthermore, there needs to be more knowledge of the external environment, thus minimizing the possibility of limiting the growth of halal product awareness.

## Recommendations

There are some recommendations for managers and the government. First, top management should determine the main root cause of low innovation performance in the company before implementing new planning. Despite government support, innovation in SMEs still needs to be at a higher level. From this point of view, the firms' top management executives are advised to focus on innovation activities to ensure effective implementation. However, top management must support the manager to make the activities happen. Innovation initiatives would be more aggressive if top management were involved directly. The current study suggests that top management should upgrade employee knowledge and skills by providing training consistently, and integrating it with existing knowledge. As such, management is recommended to employ better strategic planning to support innovation activities. In addition, the government should provide more support to local SMEs since the challenges faced by SMEs are the low-level technology transfer, lack of skilled human capital, poorly developed industry, and lack of R&D, as well as operating in isolation from the world centers of innovation.

The government should provide tax exemption for crucial R&D initiatives of SMEs to reduce the financial burden and improve the level of innovation. The government should also educate SMEs on using more technology to keep pace with the times and introduce a new and timely sought after product to meet a market need. Although the government has supported SMEs, it shows that the government still needs to bring more education and subsidies to local businesses so that SMEs can improve their innovation levels because SMEs are the economy backbone of Malaysia. Moreover, most Malaysian SMEs are local or family businesses practicing traditional business concepts. It also appears that upgrading their poorly developed industrial and technological infrastructure is essential. The government needs to promote the importance of innovation which will affect the businesses. SMEs can be more innovative through learning, knowledge sharing and upgrading skills. Improving innovation performance is a stage-by-stage approach, institutionalized across a whole firm. The government or community needs to understand the different perspectives of rural and urban SMEs before implementing new policies or education such as capability and innovativeness. In a nutshell, future research could center on how the innovative behaviors of owner-managers affect their propensity to conserve energy or adopt energy-saving protocols.

## Appendix A

| Coding                  | Items   | Scale  | Source of measurement |
|-------------------------|---|--|-----------------------|
| Mindset_Trust 1         | Most people can be trusted  | 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree. Mark 3 for "Don't know" | Sidhu et al. (2016)   |
| Mindset_Trust 2         | Most people tell a lie when they can benefit by doing so  |  |                       |
| Mindset_Trust 3         | I trust other people  |  |                       |
| Mindset_Trust 4         | Those devoted to unselfish causes are often exploited by others   |  |                       |
| Mindset_Trust 5         | How long does it typically take you to generate a basic level of trust from a person you just met:  |  |                       |
| Mindset_Resilience1     | I can accept failures as part of a learning process   | 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree. Mark 3 for "Don't know" |                       |
| Mindset_Resilience2     | Failures often lead to positive outcomes in the long run  |  |                       |
| Mindset_Resilience3     | I quickly overcome setbacks   |  |                       |
| Mindset_Resilience4     | Failures allow opportunities for reflection and consideration   |  |                       |
| Mindset_Diversity1      | It is important to me to interact with people who are different from me   | 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree. Mark 3 for "Don't know" |                       |
| Mindset_Diversity2      | I frequently come in contact with people who are different from me  |  |                       |
| Mindset_Diversity3      | I feel comfortable to talk to people who are different from me  |  |                       |
| Mindset_Diversity4      | Interacting with other persons makes me interested in things that happen outside of my field  |  |                       |
| Mindset_MentalStrength1 | I can succeed at any endeavor to which I set myself   | 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree. Mark 3 for "Don't know" |                       |
| Mindset_MentalStrength2 | I have been able to successfully overcome many challenges   |  |                       |
| Mindset_MentalStrength3 | When facing difficult tasks, I am certain I will accomplish them  |  |                       |
| Mindset_MentalStrength4 | I have been able to achieve most of the goals I set for myself  |  |                       |
| Mindset_MentalStrength5 | When I see a better way to do something, I can influence the "organization where I work" or the "people around me" to adopt that new approach |  |                       |

| Coding                 | Items  | Scale  | Source of measurement |
|------------------------|--|--|-----------------------|
| Mindset_Perfection1    | I consider myself a perfectionist  | 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree. Mark 3 for "Don't know" |                       |
| Mindset_Perfection2    | I would prefer to hand in a product on time rather than making it perfect                    |  |                       |
| Mindset_Perfection3    | In general, quality and perfection are more important than effectiveness                     |  |                       |
| Mindset_Perfection4    | I would rather create something that is cost effective than the highest possible quality     |  |                       |
| Mindset_Collaboration1 | There are times when it makes sense to collaborate with my competitors                       | 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree. Mark 3 for "Don't know" |                       |
| Mindset_Collaboration2 | An active cooperation with my collaborators is important to me                               |  |                       |
| Mindset_Collaboration3 | A cooperation with one of my enemies could be very important to my firm                      |  |                       |
| Mindset_Collaboration4 | There are times when I would be open to share resources and information with my competitor   |  |                       |
| Behavior_Generation1   | Creating new ideas for difficult issues  | 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree                          | Janssen (2000)        |
| Behavior_Generation2   | Searching out new working methods, techniques, or instruments                                |  |                       |
| Behavior_Generation3   | Generating original solutions for problems   |  |                       |
| Behavior_Promotion1    | Mobilizing support for innovative ideas  |  |                       |
| Behavior_Promotion2    | Acquiring approval for innovative ideas  |  |                       |
| Behavior_Promotion3    | Making important organizational members enthusiastic for innovative ideas                    |  |                       |
| Behavior_Realization1  | Transforming innovative ideas into useful applications                                       |  |                       |
| Behavior_Realization2  | Introducing innovative ideas into the work environment in a systematic way                   |  |                       |
| Behavior_Realization3  | Evaluating the utility of innovative ideas   |  |                       |
| Competitive_Advantage1 | Your firm exploited all market opportunities that have been presented to your industry       | 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree                          | Sigalas et al. (2013) |
| Competitive_Advantage2 | Your firm fully exploited the market opportunities that have been presented to your industry |  |                       |
| Competitive_Advantage3 | Your firm neutralized all competitive threats from rival firms in your industry              |  |                       |
| Competitive_Advantage4 | Your firm fully neutralized the competitive threats from rival firms in your industry        |  |                       |



| Coding                | Items  | Scale   | Source of measurement  |
|-----------------------|--|---|------------------------|
| Performance_IProcess1 | Our organization introduced minor or incrementally improved machinery and equipment for producing products or services     | 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree | Nguyen and Chau (2017) |
| Performance_IProcess2 | Our organization introduced minor or incrementally modified productive processes for producing products or services        |   |                        |
| Performance_IProcess3 | Our organization introduced minor or incrementally improved information technologies for producing products or services    |   |                        |
| Performance_IProduct1 | Our new products differ slightly from our existing products  |   |                        |
| Performance_IProduct2 | We introduce incremental product innovations into the market more frequently than our competitors                          |   |                        |
| Performance_IProduct3 | Our percentage of incremental product innovations in the product range is significantly higher compared to the competition |   |                        |
| Performance_IProduct4 | The percentage of total sales from incremental product innovations is up substantially                                     |   |                        |
| Performance_IProduct5 | We are well known by our customers for incremental product innovations   |   |                        |
| Performance_RProcess1 | Our organization has introduced new or significantly improved machinery and equipment for producing products or services   |   |                        |
| Performance_RProcess2 | Our organization has introduced new or significantly modified productive processes for producing products or services      |   |                        |
| Performance_RProcess3 | Our organization has introduced new or significantly improved information technologies for producing products or services  |   |                        |
| Performance_RProduct1 | Our new products differ substantially from our existing products   |   |                        |
| Performance_RProduct2 | We introduce radical product innovations into the market more frequently than our competitors                              |   |                        |
| Performance_RProduct3 | Our percentage of radical product innovations in the product range is significantly higher compared to the competition     |   |                        |
| Performance_RProduct4 | The percentage of total sales from radical product innovations is up substantially   |   |                        |
| Performance_RProduct5 | We are well known by our customers for radical product innovations   |   |                        |

### Abbreviations

|      |                            |
|------|----------------------------|
| AVE  | Average variance extracted |
| HTMT | Heterotrait–monotrait      |
| PLS  | Partial least square       |
| R&D  | Research and development   |
| SEM  | Structural equation model  |
| SME  | Small-to-medium enterprise |

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### Author contributions

Conceptualization, formal analysis, supervision, AHJ; writing—review and editing, data curation, NAM; writing—original draft preparation, resources, SK; investigation, visualization, AI; validation, project administration, funding acquisition, MNRA; methodology, software, ARZ. All authors read and approved the final manuscript.

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