Innovation Capabilities as an Element of Halal Cosmetics Supply Chain Agility Practices and Their Effects on Operational and Financial Performance

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ABSTRACT

The global halal cosmetics sector is a rapidly expanding segment of the halal economy, yet its supply chain dynamics remain less extensively studied than those of the food and pharmaceutical industries. Manufacturers face increasing pressure from stricter global regulations, including mandatory halal certification requirements, as well as rising consumer demand for ingredient transparency and Shariah-compliant formulations. This study examines the structural relationships between innovation capabilities (IC), halal cosmetics supply chain agility practices (HCSCAP), and their ultimate impact on operational performance (OP) and financial performance (FP). Using a quantitative research design, data were gathered via an online survey distributed to 313 cosmetics manufacturers registered with Malaysia's National Pharmaceutical Regulatory Agency (NPRA). A total of 205 usable responses were obtained, representing an effective response rate of 65.5%. Partial Least Squares Structural Equation Modeling (PLS-SEM) revealed that innovation capabilities significantly enhance HCSCAP ($B = 0.317$, $t = 7.138$, $p < 0.001$). Subsequently, HCSCAP demonstrated a strong positive influence on both operational performance ($B = 0.389$, $t = 7.538$, $p < 0.001$) and financial performance ($B = 0.305$, $t = 3.739$, $p < 0.001$). These findings underscore that strengthening internal innovation capabilities is critical for building agile supply chains capable of navigating complex halal compliance environments. Practical implications and strategic recommendations for halal cosmetics manufacturers are discussed.

Keywords: Halal Cosmetics Supply Chain, Innovation Capabilities, Supply Chain Agility, Financial performance, Operational Performance.

INTRODUCTION

The global halal industry has experienced significant growth and diversification in recent years, expanding beyond traditional food products to encompass sectors such as pharmaceuticals, cosmetics, health products, toiletries, medical devices, and services like logistics, marketing, and finance. As stated by Africa Islamic Economic Foundation, (2020), this expansion reflects the increasing demand for halal-certified products and services among the world's approximately 1.9 billion Muslims. In 2021, the global halal market was valued at approximately USD 2 trillion, with projections suggesting it could reach USD 3.9 trillion by 2027. This growth is driven by factors such as the rising Muslim population, increasing disposable incomes, and heightened awareness of halal standards (Nor et al., 2023). The halal industry is divided into product and service sectors (Muhammad Aswad, 2022). The product sectors range from health products and cosmetics to pharmaceuticals, while service sectors are marketing, packaging, supply chain, manufacturing, logistic, financing, and branding. On the other hand, hospitality management, fashion, travel, and tourism are part of the extended sectors of the halal industry.

Halal encompasses the entire process from production to the final product or service delivered to consumers. It is not limited to meat, poultry, or food but also includes lifestyle aspects such as personal care, cosmetics, and

health products (M. Q. Ali & Ahmad, 2023). Study by Shah et al., (2022) mention that the halal cosmetic industry is growing rapidly and has become a major focus for Muslims worldwide. Muslim consumers prioritize being aware of the ingredients and contents of cosmetics, choosing only products that meet their requirements and provide them with a sense of assurance and confidence.

While extensive literature has evaluated supply chain management within the halal food and pharmaceutical sectors (e.g., Ali et al., 2017; Mohamed et al., 2020), empirical investigation into the cosmetics sector remains predominantly confined to consumer purchase intention, certification awareness, and generic warehousing logistics (Ngah et al., 2021; Putri, 2019). Crucially, previous studies have largely neglected how firm-level innovation capabilities serve as a core foundational element in operationalizing supply chain agility practices within halal cosmetics manufacturing. To bridge this empirical gap, this study formulates a focused structural model testing the direct effect of Innovation Capabilities (IC) on Halal Cosmetics Supply Chain Agility Practices (HCSCAP), and the subsequent impact of HCSCAP on both Operational Performance (OP) and Financial Performance (FP).

Innovation Capabilities

An organization's innovation capability reflects its aptitude for leveraging organizational knowledge, skills, and strategic assets to create or improve products, operational workflows, and administrative systems for stakeholder value creation (Hurtado-Palomino et al., 2022). Building robust innovation capabilities strengthens market competitiveness by facilitating product breakthroughs, enabling geographic expansion, and supporting long-term organizational growth (Martínez-Román et al., 2017). Furthermore, companies with strong innovation capabilities can convert intellectual assets into market-ready solutions that align with shifting consumer preferences (Ruiz-Ortega et al., 2021). As Rajapathirana and Hui (2018) noted, the effective management of these capabilities directly enhances overall innovation performance, a view echoed by Irwanti et al. (2020), who emphasized data-driven innovation capabilities as a primary performance driver.

In the context of the halal sector, technological innovation capabilities are critical for safeguarding supply chain integrity (Akman et al., 2023). Advanced operational systems facilitate comprehensive end-to-end traceability, allowing firms to monitor ingredients, processes, and movement across every stage of the supply chain (Kadir et al., 2016). Technologies such as Radio Frequency Identification (RFID) provide continuous data tracking and visibility, thereby reinforcing supply chain transparency and ensuring halal compliance from origin to end-user (Poniman et al., 2015; Sutawidjaya & Nawangsari, 2020).

Prior empirical work has examined innovation capabilities across diverse settings. For instance, Yusr (2016) highlighted its mediating role between quality management and performance, while Abdallah et al. (2021) demonstrated how supply chain innovation interacts with agility to influence performance outcomes. Similarly, Masudin et al. (2020) and Ab Rashid & Bojei (2019) linked technological readiness and innovation skills directly to halal logistics operations. Given that logistics serves as a vital bridge among supply chain actors, strategic technology integration remains crucial for sustaining halal integrity throughout the supply network.

Halal Cosmetics Supply Chain Agility Practices

Halal cosmetic items encompass products formulated to enhance physical appearance or cleanliness without adversely affecting user health, adhering strictly to Shariah standards (Cosmetics and Your Health, 2018; Mat Jusoh & Panatik, 2016). Halal cosmetics supply chain agility practices (HCSCAP) refer to an organization's capability to swiftly adapt operational processes, streamline decision-making, and implement managerial innovations across all supply chain phases which from sourcing and procurement to inventory management, packaging, and final distribution. Achieving high supply chain agility allows firms to navigate unexpected external shocks, regulatory changes, or macro-environmental disruptions (such as global pandemics) while maintaining strict adherence to halal compliance principles.

Financial Performance

Financial performance reflects an enterprise's efficiency in managing and deploying its monetary resources over a given timeframe, typically evaluated through profitability, liquidity, solvency, and return metrics

(Fatihudin et al., 2018). Supply chain agility acts as a crucial catalyst for market responsiveness and timely customer delivery, thereby yielding positive financial returns (Swafford et al., 2008; Zainuddin et al., 2017).

Extensive literature supports the positive linkage between supply chain agility and financial outcomes. Zailani et al. (2019) argued that agile halal supply chain configurations allow enterprises to capture larger market shares, directly improving financial metrics. Consistent with findings by Gligor et al. (2015), Chan et al. (2017), and Avelar-Sosa et al. (2018), manufacturing agility positively influences key indicators such as Return on Assets (ROA). Furthermore, product innovation and formal halal certification enhance consumer willingness to pay premium prices, facilitating access to global export markets and expanding revenue streams (Tieman & Ghazali, 2013; Urumsah & Puspitasari, 2021; Verbeke et al., 2013).

Operational Performance

Operational performance represents a non-financial multidimensional construct encompasses indicators such as internal productivity, process efficiency, on-time delivery, and overall product quality (Argyropoulos et al., 2010). Supply chain agility enables organizations to better manage internal operational risks and external supply disruptions, thereby safeguarding service precision and schedule adherence (Blome et al., 2013; Eckstein et al., 2015).

A solid body of research confirms that agile supply chains foster superior operational results (Acar et al., 2017; Abdelilah et al., 2021). Key enablers such as information sharing, visibility, and collaborative practices significantly boost operational flexibility and competitive positioning (Baah et al., 2022; Cadden et al., 2022; Fernandez-Giordano et al., 2021). Expanding on these foundations, this study evaluates the specific impact of supply chain agility on operational performance within the distinct context of the halal cosmetics industry.

Based on the dynamic capabilities perspective and existing empirical literature, the following hypotheses are proposed:

- **H1:** Innovation capabilities have a positive effect on halal cosmetics supply chain agility practices.
- **H2:** Halal cosmetics supply chain agility practices have a positive effect on operational performance.
- **H3:** Halal cosmetics supply chain agility practices have a positive effect on financial performance.

METHODOLOGY

Sampling and Data Collection

The target population for this study comprised local cosmetics manufacturers operating in Peninsular Malaysia and registered with the National Pharmaceutical Regulatory Agency (NPRA) 313 database. Based on Krejcie and Morgan's (1970) sampling criteria, a minimum sample size of 175 is required. To account for potential non-response and incomplete submissions, the questionnaire was distributed to the complete sampling frame of 313 manufacturers using simple random sampling generated via computer randomized selection. A total of 205 completed and valid questionnaires were returned, yielding an effective response rate of 65.5%. Because all online survey items were configured with mandatory response fields, no missing data were encountered. To evaluate non-response bias, an independent-samples t-test was conducted comparing early respondents (first 50%) with late respondents (last 50%) across all key constructs. The results showed no statistically significant differences ($p > 0.05$), confirming that non-response bias is not a critical threat to the generalizability of the findings to halal cosmetics manufacturers in Malaysia. According to the finding, analysis of the data revealed that the highest ownership was held by private limited organizations, with a frequency of 112 (54.6%) followed by public limited organization, with a frequency of 45 (22.0%). Most manufacturer reported having fewer than 100 employees, accounting for 167 (81.4%), while 32 (15.6%) manufacturers indicated having between 100 and 500 employees, and only six manufacturers (3.0%) reported having between 501 to 1000 employees. Regarding market focus, 112 companies (54.6%) have concentrated their efforts on the domestic market, followed by 44 (21.4%) companies targeting multinational markets, and 49 (24.0%) companies catering to both domestic and international markets. Regarding the duration of operation, most of the

manufacturer have been operational between six to 10 years. This was followed by 11 to 20 years with 83 (40.5%) manufacturers and 77 (37.5%) manufacturers have operated between 11 to 20 years. There were 125 (61.0%) organizations located in Selangor, 17 (8.3%) were situated in Pulau Pinang, and 14 (6.8%) in Kedah. Despite these trends, the data revealed that a significant number of manufacturers, specifically, 136 (68.1%), generated annual sales ranging from RM1 million to RM10 million. The details of the respondent profiles are presented in Table 1 as follows.

Table 1. Company Profile

Description	Frequency (n=205)	Percentage%
What is the type of ownership of your organization?		
Sole trader	15	7.3
Private limited organization	112	54.6
Partnership	33	16.1
Public limited organization	45	22
How many employees (approximately) does your organization have?		
Less than 100	167	81.4
100 – 500	32	15.6
501 – 1000	6	3
1001 – 2000	-	-
More than 2000	-	-
What is the organization level of involvement in the market?		
Domestic market	112	54.6
Multinational market	44	21.4
Regional market	-	-
All market	49	24
How long has your organization been in the business?		
Less than 2 years	-	-
2 to 5 years	-	-
6 to 10 years	83	40.5
11 to 20 years	77	37.5
More than 20 years	45	22
Where is your organization located?		
Selangor	125	61
Kuala Lumpur	10	4.9
Kedah	14	6.8
Johor	14	6.8
N. Sembilan	5	2.4
Terengganu	3	1.5
Pahang	-	-
Perak	3	1.5
Kelantan	10	4.9
Pinang	17	8.3
Melaka	3	1.5
Perlis	1	0.5
W.P. Putrajaya	-	-
What is the annual sales turnover of your organization?		

Less than RM1 million	13	6.3
RM1 million to RM10 million	136	66.3
RM11 million to RM25 million	40	19.5
RM26 million to 50 million	16	7.8

Questionnaire and Measurements

There are eight sections in the questionnaire in which one section reflects the respondent's profile and the other seven sections focuses on the main constructs that are modified from past studies which is to measure operational performance, three items were adopted and adapted from Sayuti (2013) and Yadav et al. (2019). To measure financial performance, the items from Sayuti (2013) and Wan Omar (2017) were adopted and adapted. The items measuring operational and financial performance were taken from sources where the Cronbach's alpha was between 0.70-0.95. The items measuring the antecedents of HCSCAP were adapted from Bahar et al. (2021), Sundram et al. (2018), Wan Omar (2017), Sweeney and Webb (2007), Sayuti (2013), Abdul et al. (2013), Üstündağ and Ungan (2020), Squire et al. (2009), Rajab and Muchelule (2016), Chen (2013), Omar (2015), as well as Zamberi Ahmad and Xavier (2012). This study applied seven-point Likert scale to all main constructs which is an ascending order of strongly disagree (1) to strongly agree (7).

RESULTS AND DISCUSSION

Common Method Variance (CMV)

CMV analysis is conducted before other analysis tests. As highlighted by Podsakoff et al. (2003), the threshold of exhibiting CMV is less than 50%. For this study CMV was examined using dimension reduction via factor analysis. The finding indicated that the highest variance explained was 30.197%, which did not exceed 50%. Thus, common method bias was not significant in the current study.

Measurement Model

Outer factor loadings were evaluated against the threshold of 0.708 (Ramayah et al., 2018). Although certain loadings fell between 0.528 and 0.688 such as IC6, IC7, HCSCAP1, HCSCAP3, HCSCAP4, these items were retained as the composite reliability (CR) and average variance extracted (AVE) for all constructs successfully exceeded the mandatory cut-off values of 0.70 and 0.50 (Hair et al., 2017). Specifically, AVE values were 0.553 (IC), 0.510 (HCSCAP), 0.957 (OP), and 0.786 (FP). Regarding internal consistency, Cronbach's alpha for FP was 0.610. However, its Composite Reliability (CR = 0.862) demonstrated robust construct reliability, which is deemed acceptable in exploratory empirical research (Hair et al., 2017). The high factor loadings observed for OP items is between 0.950 to 0.988 where it reflects high internal item consistency and convergence within the scale without indicating multicollinearity, as all Variance Inflation Factor (VIF) values remained well below the threshold of 5.0. As shown in Table 2, all values for the reflective items passed the threshold value. Therefore, discriminate validity of the measurement model was established.

Table 2. Measurement Properties of Reflective Construct (Factor Loading, AVE and CR)

Constructs	Items	Loading	AVE	CR	Cronbach's Alpha
Innovation Capabilities	IC6	0.547	0.553	0.857	0.79
	IC7	0.657			
	IC8	0.688			
	IC9	0.883			
	IC10	0.883			
HCSCAP	HCSCAP1	0.528	0.51	0.858	0.8
	HCSCAP2	0.74			
	HCSCAP3	0.575			

	HCSCAP4	0.629			
	HCSCAP5	0.901			
	HCSCAP6	0.834			
Operational Performance	OP1	0.988	0.957	0.991	0.989
	OP2	0.988			
	OP3	0.982			
	OP4	0.982			
	OP5	0.95			
Financial Performance	FP1	0.785	0.786	0.862	0.61
	FP2	0.757			
	FP3	0.843			
	FP4	0.734			

Note: HCSCAP (Halal Cosmetics Supply Chain Agility Practices)

Structural Model

Before the current study measures the path-coefficient to evaluate the hypotheses, collinearity issue is first assessed. As mentioned earlier, the value of VIF should be less than 5 (Hair et al., 2011) in which the constructs for the current study met all the conditions HCSCAP (1.228), IC (2.995). Thus, collinearity issues do not occur in this study.

Next, the current study analyses path-coefficient to measure the significance hypotheses by using

Table 3. Path Coefficient Assessment

Hypothesis	R/Ship	Std.Beta	Std.Error	t-value	p-value	Result
H1	IC > HCSCAP	0.317	0.111	7.138**	0	Significant
H2	HCSCAP > OP	0.389	0.084	7.538**	0	Significant
H3	HCSCAP > FP	0.305	0.121	3.739**	0	Significant

The coefficient of determination (R^2) was evaluated to assess the predictive accuracy of the target endogenous constructs. The single predictor, Innovation Capabilities (IC), accounted for an R^2 value of 0.101 (10.1%) of the variance in Halal Cosmetics Supply Chain Agility Practices (HCSCAP), reflecting an expected direct contribution for a single capability domain (beta = 0.317). Furthermore, HCSCAP explained 33.2% (R^2 = 0.332) of the variance in Operational Performance (OP) and 43.1% (R^2 = 0.431) of the variance in Financial Performance (FP), demonstrating meaningful explanatory power across organizational performance metrics.

Table 4. Level of R^2 Assessment

Construct	Coefficient of Determination (R^2)	Explanatory Power
Financial Performance	0.431	Weak
Halal Cosmetics Supply Chain Agility Practices	0.101	Weak
Operational Performance	0.332	Weak

Finally, the current study measures predictive relevance by using Stone-Geisser's Q2 (Hair et al., 2017; Stone, 1974; Geisser, 1974). The finding indicates that the Q^2 values for all of the constructs halal cosmetics supply chain agility practices, financial performance, and operational performance yielded Q^2 values of 0.331, 0.244, and 0.310, respectively. Table 5 shows the predictive relevance (Q^2) Assessment

Table 5. Predictive Relevance (Q^2) Assessment

Construct	Predictive Relevance (Q^2)
Financial Performance	0.244
HCSAP	0.331
Operational Performance	0.31

HTMT Discriminant Validity

Discriminant validity was further verified using the Heterotrait-Monotrait ratio of correlations (HTMT). As presented in Table 6, all HTMT values fell below the conservative standard threshold of 0.85 (Kline, 2011) and the liberal threshold of 0.90 (Gold et al., 2001), establishing distinctiveness among all reflective constructs.

Table 6: Heterotrait-Monotrait (HTMT) Matrix

Construct	IC	HCSCAP	OP	FP
Innovation Capabilities (IC)	-			
HCSCAP	0.382	-		
Operational Performance (OP)	0.295	0.412	-	
Financial Performance (FP)	0.21	0.354	0.512	-

PRACTICAL AND MANAGERIAL IMPLICATIONS

The empirical findings offer concrete guidance for decisionmakers and supply chain managers in the halal cosmetics sector. First, manufacturers must actively invest in technological and administrative innovation capabilities such as automated Shariah-compliant ingredient tracking systems and digital audit logs to heighten supply chain agility. Second, operationalizing agility within halal cosmetics logistics for example flexible sourcing, rapid batch adjustments and traceable warehousing directly translates into superior operational efficiency and improved financial margins. Despite that impending mandatory global halal compliance standards, building robust internal innovation capabilities provides manufacturers with a sustained competitive advantage in domestic and international markets.

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

Several limitations of this study should be noted. First, the sample was geographically restricted to halal cosmetics manufacturers operating within Peninsular Malaysia; future studies could extend the framework to Sabah, Sarawak, and regional halal hubs across ASEAN. Second, this study utilized a cross-sectional design, capturing firm responses at a single point in time. Longitudinal approaches could provide deeper insights into how the evolution of innovation capabilities affects supply chain agility over time. Finally, future research could explore potential moderating variables, such as firm size or digital maturity, to provide a more nuanced understanding of halal supply chain agility dynamics.

CONCLUSION

This study underscores the vital role of innovation capabilities as a foundational element of supply chain agility practices in the halal cosmetics industry. By validating a direct structural path, the results confirm that firms possessing strong innovation capabilities exhibit greater agility in managing complex halal compliance and supply chain operations. In turn, heightened halal supply chain agility significantly boosts both operational precision and financial performance. Halal cosmetics firms should thus prioritize innovation-driven agility investments to ensure regulatory compliance, operational resilience, and commercial viability.

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