FACTORS INFLUENCING BRAND IDENTITY OF SMALL AND MEDIUM-SIZED ELECTRICAL EQUIPMENT MANUFACTURING ENTERPRISES IN VIETNAM: EMPIRICAL EVIDENCE FROM A CLUSTERED SEM MODEL

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Abstract: ***This study aims to identify factors affecting the Brand Identity Strength (BIS) of small and medium-sized electrical equipment manufacturing enterprises (SMEs) in Vietnam. The research model consists of four factors: quality & compliance (QC), brand orientation (BO), innovation & new product (IN), and visual & communication (VC). The primary data was collected from 200 respondents from 40 enterprises and analyzed using SEM model combined with cluster SEM technique to control intra-group error. The results show that all factors have a positive and statistically significant impact on BIS, in which BO (β = 0.338) and VC (β = 0.300) show a stronger impact than QC (β = 0.266) and IN (β = 0.219). The model explains 53.5% of the variation in BIS (R^2 = 0.535), confirming its appropriate explanatory value. The research results emphasize the role of brand orientation, identity communication, quality assurance and innovation in strengthening the brand identity of manufacturing SMEs in emerging markets.***

• Keywords: *brand identity; cluster SEM; brand orientation; innovation; quality.*

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1. Introduction

In the current context of globalization and fierce competition, brand identity plays a central role in helping businesses improve their competitiveness, create customer loyalty and recall. For small and medium-sized electrical equipment manufacturing enterprises (SMEs), building brand identity strength (BIS) becomes even more urgent when the market has the strong participation of large corporations and imported goods, requiring SMEs to affirm their own value and sustainable competitiveness (Acar et al., 2024).

In Vietnam, many electrical equipment manufacturing enterprises are still limited in financial resources, brand management skills and access to modern communication technology. Despite many efforts to innovate, many businesses still face difficulties in forming a clear, consistent brand strategy and creating a brand impression in the market (Thi, 2022). This raises an urgent need for research on core factors affecting BIS in the context of Vietnamese SMEs.

Recent studies have shown that brand orientation plays a particularly important role for SMEs in exploiting brand assets, promoting innovation, and creating competitive advantages through consistent brand positioning and management (Mijan, 2020). In parallel, innovation and new product development are considered strategic drivers to help small businesses adapt quickly to the market and strengthen brand image (Tran & Vu, 2024). In addition to these two factors, aspects of quality and compliance, as well as visual and brand communication play a key role in increasing customer recognition and trust in electrical equipment manufacturing enterprises.

However, studies applying advanced quantitative models such as Structural Equation Modeling (SEM), especially in clustered SEM design, for SMEs in the electrical equipment manufacturing sector in Vietnam are still limited. The research gap is reflected in the lack of studies integrating the factors of quality & compliance, brand orientation, innovation & new product, and visual & communication in explaining the strength of brand identity in this sector.

Therefore, this study was conducted with the goal of testing the cluster SEM model on a sample of 200 respondents from 40 SME enterprises in the electrical equipment industry in Vietnam (5 respondents per enterprise). The research results are expected to contribute to filling the existing academic gap and provide some practical management

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recommendations to support Vietnamese small and medium-sized electrical equipment manufacturing enterprises in strengthening their brand identity, gradually improving their competitiveness in the domestic and international markets.

2. Literature Review

2.1. Brand Identity Strength (BIS)

Brand identity strength (BIS) refers to the degree of clarity, distinctiveness, and consistency in how a business expresses its values, philosophy, and brand image. BIS directly affects customer trust, market recognition, and loyalty (Mahdiraji et al., 2024). In the context of fierce competition and globalization of electrical equipment manufacturing, BIS plays a particularly important role in building sustainable competitive advantage.

Recent studies show that BIS is reinforced by consistency in brand communication, strategic positioning, and overall customer experience (Juntunen, 2025). For manufacturing SMEs, clarity and consistency in brand messaging helps businesses increase credibility, attract partners, and reduce the risk of competition from cheap goods.

2.2. Quality & Compliance (QC)

QC represents the ability of a business to maintain production standards, ensure technical reliability and comply with safety regulations. In the electrical equipment industry - where technical requirements are strict - QC is considered the foundation for building brand trust (Li & Ye, 2023).

According to Fu et al. (2021), stable product quality and standard compliance help SMEs enhance their reputation and increase brand strength by reinforcing trust and positive expectations from customers. Thus, QC plays an important role in developing BIS of manufacturing SMEs in emerging economies.

2.3. Brand Orientation (BO)

Brand orientation (BO) reflects the extent to which a business orients all activities according to its brand strategy. BO helps businesses focus on long-term brand value, instead of competing purely on price or production capacity (Li et al., 2023).

Flührer (2025) argues that SMEs with high BO tend to invest in brand identity, brand culture and communication management, thereby creating a solid foundation for BIS. BO is especially necessary in the context of Vietnamese SMEs transforming their model from "processing production" to "brand building".

2.4. Innovation & New Product (IN)

Innovation and new product development (IN) are the driving force for differentiation, value enhancement and brand competitive advantage. Fu et al. (2021) point out that innovation capabilities play a central role in promoting SME performance and image.

In the electrical equipment industry, product innovation, technology optimization and feature improvement help businesses improve quality, meet market demand and increase brand trust. This contributes to strengthening the BIS through adaptability and creating new value for customers.

2.5. Visual & Communication (VC)

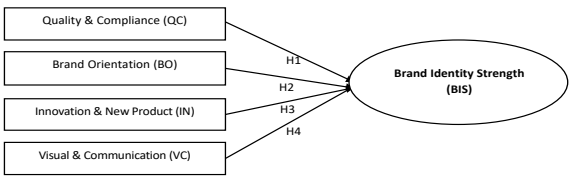
Visual & Communication (VC) includes brand identity, product design, logo, messaging and integrated communication strategy. VC plays a role in creating emotional connections and identification with customers, especially in the less emotional technical market (Flührer, 2025).

Recent research shows that a strong, consistent identity system and effective communication help SMEs increase brand recall, increase awareness and strengthen the BIS (Juntunen, 2025).

2.6. Proposed Model and Hypotheses Development

Based on the theoretical foundation and empirical evidence, the study proposes a model linking the four main components of brand capabilities (QC, BO, IN and VC) with brand identity strength (BIS). The model reflects the assumption that product quality, brand orientation, innovation and visual communication play a core role in strengthening BIS in the context of electrical equipment manufacturing SMEs. Figure 1 illustrates the proposed research model.

Figure 1. Proposed Research Model



Based on the proposed research model, the research hypotheses are stated as follows:

H1: QC positively influences BIS.

H2: BO positively influences BIS.

H3: IN positively influences BIS.

H4: VC positively influences BIS.

These hypotheses will be empirically tested using clustered SEM based on data collected from 200 respondents across 40 electrical equipment manufacturing SMEs in Vietnam.

3. Research Methodology

The study employed a quantitative research design to examine the relationship between four brand competence factors and brand identity strength (BIS) among small and medium-sized electrical equipment manufacturing enterprises in Vietnam. Data were collected through a structured questionnaire adapted from previous studies, using a 5-point Likert scale (1 = completely disagree, 5 = completely agree).

A total of 200 respondents from 40 enterprises (five per enterprise) participated, including managers and staff knowledgeable about branding, marketing, and production. Data were gathered via direct and online surveys using convenience sampling while ensuring anonymity and voluntariness.

The constructs included Quality & Compliance, Brand Orientation, Innovation & New Product, Visual & Communication, and Brand Identity Strength, with measurement items adapted from Li & Ye (2023), Fu et al. (2021), Flührer (2025), Mahdiraji et al. (2024), and Juntunen (2025).

Data analysis was conducted using SPSS 24 for descriptive statistics and reliability testing (Cronbach's Alpha), and AMOS 24 for Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM). To account for clustered data (five respondents per enterprise), the study applied a clustered SEM model, which adjusts for intra-group correlations and enhances the accuracy and reliability of statistical inferences.

4. Results

4.1. Descriptive statistics of enterprises

Table 1: Enterprises' Profile (n = 40)

Variable	Frequency	Percent (%)
Type of firm		
Sole proprietorship	5	12.5
Limited liability company	16	40.0
Joint stock company	19	47.5
Length of operation		
Less than 5 years	6	15.0
From 5 years to 10 years	12	30.0
More than 10 years	22	55.0
Number of employees		
Fewer than 50 people	9	22.5
From 50 to 200 people	23	57.5
More than 200 people	8	20.0
Main product		
Household electrical equipment	21	52.5
Industrial electrical equipment	12	30.0
Basic household appliances	7	17.5
Major distribution channel		
Traditional trade	13	32.5
E-commerce	16	40.0
Direct-to-Consumer	8	20.0
Export	3	7.5

Source: Compiled by the author

Table 1 presents the characteristics of 40 electrical equipment manufacturing enterprises participating in the survey. The results show that the joint stock company and limited liability company models account for the largest proportion in the sample, 47.5% and 40.0% respectively, reflecting the development trend towards a modern legal model and a relatively systematic management scale of enterprises in the industry. Private enterprises account for the lowest proportion (12.5%), consistent with the reality that the electrical equipment manufacturing sector requires relatively high investment capital and technology.

In terms of operating time, more than half of the enterprises (55.0%) have been operating for over 10 years, showing stability and long-term experience in the industry. The group of new enterprises operating for less than 5 years accounts for only 15.0%, showing relatively high barriers to entry in the industry. In terms of labor scale, enterprises with 50 to 200 employees account for the majority (57.5%), reflecting the medium-sized characteristics of the industry. Micro-enterprises (under 50 employees) account for 22.5%, while large-scale enterprises (over 200 employees) account for 20.0%.

In terms of main product lines, 52.5% of enterprises focus on household electrical appliances, 30.0% on industrial electrical equipment production and 17.5% on basic household appliances production. This shows that the output market orientation is mainly towards end consumers, in addition to the presence of a group of enterprises serving industrial production.

Finally, the distribution channel is mainly e-commerce (40.0%) and traditional channels (32.5%), reflecting the trend of shifting to digital platforms in electrical equipment business activities. Direct sales channels to consumers account for 20.0%, while exports account for the lowest proportion (7.5%), showing that the potential for international market development of businesses in the industry still has a lot of room.

4.2. Descriptive Analysis of Factors

Table 2: Descriptive Statistics and Correlation Matrix

Construct	Mean	SD	IN	VC	BO	QC	BIS
IN	3.475	0.641	1.000				
VC	3.517	0.762	0.230**	1.000			
BO	3.361	0.757	0.084	0.440**	1.000		

Construct	Mean	SD	IN	VC	BO	QC	BIS
QC	3.515	0.770	0.027	0.170*	0.180*	1.000	
BIS	3.525	0.574	0.294**	0.536**	0.529**	0.390**	1.000

** p < 0.05; ** p < 0.01*

Source: Compiled by the author

The results show that the research variables have an average value ranging from 3.36 to 3.53, reflecting a fairly positive assessment of the respondents. The standard deviation is at an average level, indicating relative consistency in responses. The correlation matrix shows that BIS is positively and significantly correlated with VC, BO, QC and IN, in which VC and BO have a stronger correlation. The correlation coefficients are all below 0.8, indicating that there is no significant multicollinearity problem in the model.

4.3. Reliability and Convergent Validity of Constructs

Table 3: Reliability and Convergent Validity

Construct	No of Items	Cronbach's α	CR	AVE
QC	4	0.870	0.874	0.638
BO	4	0.879	0.881	0.650
IN	4	0.814	0.815	0.525
VC	4	0.849	0.851	0.590
BIS	3	0.973	0.974	0.926

Note: α ≥ 0.70 indicates acceptable internal consistency; CR ≥ 0.70 and AVE ≥ 0.50 indicate convergent validity

Source: Compiled by the author

The results of reliability and convergent validity tests showed that all scales met the standards. Specifically, Cronbach's Alpha ranged from 0.814 to 0.973, exceeding the threshold of 0.70, demonstrating good internal consistency. At the same time, the CR coefficients (0.815-0.974) were all greater than 0.70 and the AVE values (0.525-0.926) exceeded the threshold of 0.50, confirming the convergent validity of the measurement constructs. Thus, the scales used in the study ensured the reliability and validity necessary to conduct subsequent SEM analyses.

4.4. Discriminant Validity (Fornell-Larcker Criterion)

To assess the discriminant validity between the concepts in the model, the study applied the Fornell-Larcker criterion, according to which the square root of the AVE of each variable must be greater than the correlation coefficient between that variable and the remaining variables. This helps to ensure that each measurement construct is clearly differentiated from other constructs in the research model.

Table 4: Discriminant Validity

	BIS	BO	IN	QC	VC
BIS	0.962	0.560	0.309	0.400	0.577
BO	0.560	0.806	0.082	0.203	0.502
IN	0.309	0.082	0.725	0.012	0.220
QC	0.400	0.203	0.012	0.799	0.225
VC	0.577	0.502	0.220	0.225	0.768

Note: Diagonal values represent the square roots of AVE, all of which are greater than the corresponding inter-construct correlations, satisfying the Fornell-Larcker criterion.

Source: Compiled by the author

The results in Table 4 show that the square root of AVE (diagonal value) of all variables is larger than the correlation coefficient between that variable and other variables in the matrix. Specifically, BIS reached 0.962, higher than the remaining correlation values (maximum 0.577), while BO, IN, QC and VC also showed a clear level of discrimination compared to other variables. This confirms that the scales in the study achieved discriminant validity according to the Fornell-Larcker criterion. Thus, the research variables represent separate concepts and can be used to test the SEM structural model in the next step.

4.5. Goodness-of-Fit Indices for Confirmatory Factor Analysis

To assess the adequacy of the measurement model, the study used common indices in CFA analysis, including χ^2/df, CFI, TLI, RMSEA, and SRMR. The assessment thresholds were referenced according to the recommendations of Byrne (2016) and Hair et al. (2019), to ensure the reliability and scientific value of the model.

Table 5: Model Fit Indices for Confirmatory Factor Analysis

Fit Index	Value	Threshold	Assessment
χ^2(df)	147.704 (142)	p > 0.05	Good Fit
p-value	0.354	≥ 0.05	Good
CFI	0.998	≥ 0.90	Excellent
TLI	0.997	≥ 0.90	Excellent
RMSEA	0.014	≤ 0.08	Excellent
SRMR	0.038	≤ 0.08	Excellent

Note: CFA model meets all recommended thresholds, indicating excellent model fit.

Source: Compiled by the author

The results in Table 5 show that all indices meet or exceed the recommended level, confirming that the measurement model has a very high level of fit. Specifically, p-value = 0.354 (> 0.05) and χ^2/df = 1.04 both reflect that the model fits the data well. At the same time, CFI = 0.998 and TLI = 0.997 far exceed the threshold of 0.90, indicating an excellent level of fit. The RMSEA = 0.014 and SRMR = 0.038 values are lower than 0.08, further strengthening the model's suitability. Thus, the measurement model has the reliability and appropriate value to conduct SEM structural model testing.

4.6. Structural Model and Hypotheses Testing

To test the research hypotheses, the SEM linear structural model was estimated with both the

traditional planar model and the cluster SEM model to control for intragroup bias. Table 6 presents the standardized path coefficients, standard errors, and corresponding p-values. The analysis results show that there is no significant difference between the two estimation methods, confirming the stability and reliability of the research model.

Table 6: Structural Model Results (Flat vs. Clustered SEM)

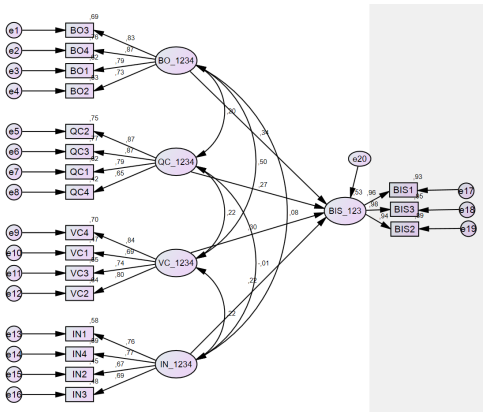
Hypothesis	Path	β (Flat)	β (Clustered)	S.E.	p-value	Supported
H1	QC → BIS	0.266	0.266	0.038	0.000	Yes
H2	BO → BIS	0.330	0.338	0.042	0.000	Yes
H3	IN → BIS	0.219	0.219	0.051	0.000	Yes
H4	VC → BIS	0.300	0.300	0.061	0.000	Yes
	R^2 (BIS) = 0.535					

Note: Note: All paths are significant at $p < 0.05$. $R^2 = 0.535$ indicates that 53.5% of the variance in BIS is explained by QC, BO, IN, and VC.

Source: Compiled by the authors

The results show that all four independent variables have a positive and statistically significant impact on brand identity strength (BIS). Specifically, brand orientation ($\beta = 0.338$, $p < 0.001$) and visual & communication ($\beta = 0.300$, $p < 0.001$) have the strongest impact, emphasizing the important role of brand orientation and visual communication in strengthening the brand identity of the enterprise. Quality & compliance ($\beta = 0.266$, $p < 0.001$) and innovation & new product ($\beta = 0.219$, $p < 0.001$) also have a significant impact, indicating the necessity of product quality and innovation in brand development. The R^2 value = 0.535 shows that the model explains 53.5% of the variation in BIS, reflecting the good explanatory power and suitability of the model.

Figure 2. Structural Equation Model with Standardized Path Coefficients



The SEM model results illustrated in Figure 2 show that the standardized path coefficients from the four brand competence components to brand identity strength (BIS) are all positive and statistically significant. Specifically, brand orientation (BO) and visual & communication (VC) show a stronger impact than quality & compliance (QC) and innovation & new product (IN), emphasizing the key role of brand strategic orientation and identity communication in strengthening the brand identity of electrical equipment manufacturing enterprises. In addition, the loading factors of the observed variables are all high (> 0.65), confirming the good representation of the scales for each theoretical concept. Thus, the research model is proven to be practical, stable and has high explanatory value in the context of SMEs in Vietnam.

5. Discussion

The study results confirm that all four brand capability components - quality & compliance, brand orientation, innovation & new product, and visual & communication - positively impact the brand identity strength (BIS) of small and medium-sized electrical equipment manufacturers (SMEs) in Vietnam. This is consistent with the view that strong brand identity requires a combination of core values, consistent positioning, and clear brand experience (Urde & Greyser, 2021). In this study, brand orientation and visual & communication showed the strongest impact, emphasizing the role of strategic brand orientation and identity communication in creating a clear, trustworthy, and distinctive brand image. This finding is consistent with Juntunen's (2025) study that brand orientation provides a strategic foundation for building a sustainable brand identity.

At the same time, the results also show that quality & compliance is significant, reflecting the fact that in the field of electrical equipment manufacturing, product quality, safety and compliance with technical standards are important factors in creating customer trust (De Giovanni, 2023). This shows that businesses need to not only invest in branding activities, but also ensure product quality as a prerequisite for brand identity.

Innovation & new product also has a positive influence, although at the lowest level of the four factors. This is consistent with the argument that innovation plays a supporting role in creating differentiated value, especially in manufacturing industries (Fu et al., 2021), but innovation performance may take time to translate into clearly recognized value in the market. This finding suggests that electrical equipment manufacturing SMEs need to combine innovation and quality consistency, while prioritizing effective brand-oriented and communication strategies to optimize brand identity strength.

In addition, the use of cluster SEM models shows stable and reliable results, reinforcing the evidence that the theoretical model is consistent and consistent with empirical data in the context of Vietnamese SMEs. This result is consistent with recent research trends that emphasize the role of hierarchical models and cluster data in assessing brand performance at the organizational level (Mahdiraji et al., 2024).

Overall, the study contributes to the field of SME brand management in emerging markets by confirming the importance of brand orientation, image communication, quality and innovation for brand identity strength, while providing empirical evidence from the electrical equipment industry - a sector that is under-examined in the context of developing economies.

6. Conclusion and Implications

6.1. Conclusion

This study examines the factors affecting the brand identity strength (BIS) of small and medium-sized electrical equipment manufacturing enterprises in Vietnam. The results from the cluster SEM model show that four factors including quality & compliance (QC), brand orientation (BO), innovation & new product (IN) and visual & communication (VC) all have a positive impact on BIS. Of which, BO and VC show a stronger influence than the other two factors, emphasizing the role of strategic brand orientation and consistent identity communication in building a sustainable brand identity. This result affirms the importance of brand management for manufacturing SMEs - a group of enterprises that focus heavily on technical and product capabilities. At the same time, the use of the cluster SEM model demonstrates the reliability and stability of the research model in the context of data grouped by enterprise.

6.2. Policy Implications

Academic Implications

The study contributes to the literature in three main ways.

First, the results reinforce and extend theoretical models of brand identity in emerging market SMEs, adding evidence that BIS is a multidimensional construct influenced simultaneously by brand strategy, product quality, innovation, and brand communication.

Second, the study highlights the importance of brand orientation and visual & communication - two factors that have not been frequently emphasized in the context of manufacturing SMEs in Vietnam. This finding is consistent with the view of Urde & Greyser (2021) and Mahdiraji et al. (2024) that strategic brand thinking and identity systems play a core role in sustaining long-term brand equity.

Third, the application of cluster SEM is an important methodological contribution, affirming the appropriateness of this method when data has multiple respondents in the same enterprise. This opens a reliable approach for other studies in the field of organizational branding and internal governance.

Managerial Implications

In terms of management practice, the research results suggest some important directions for SMEs in the electrical equipment industry:

- Build and maintain a clear brand orientation: Enterprises need to form a long-term brand vision, promote internal core values and ensure consistency in all marketing activities - from strategy to operation.

- Improve the effectiveness of identity communication: Focus on developing a visual identity, enhancing a professional image, clear messages and using digital platforms to strengthen brand presence.

- Ensure quality and compliance with standards: Apply a quality management system, technical certification and strict production processes to build trust and reputation in the market.

- Encourage innovation and product development: Innovation in design, technology, user experience and investment in R&D helps businesses maintain competitive advantage and adaptability.

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