Innovation Through the Elements and Principles of Design

Mohamad Hazmi Mohamad Shoroin, Norarifah Ali*

Faculty of Art & Design, Universiti Teknologi MARA Kedah, Kampus Sungai Petani, 08400 Merbok, Kedah, Malaysia

***Corresponding Author**

DOI: https://dx.doi.org/10.47772/IJRISS.2025.909000231

Received: 30 August 2025; Accepted: 05 September 2025; Published: 07 October 2025

ABSTRACT

Product innovation often emphasizes market strategies and process management while overlooking the foundational role of design elements and principles. This study aims to examine how these fundamentals influence product innovation through mediating constructs such as aesthetic value, functional performance, and user experience. A quantitative, cross-sectional design was employed, using a structured questionnaire distributed to 150 Malaysian product designers, educators, and practitioners. Data were analyzed using Structural Equation Modeling (SEM) to test direct and indirect relationships among the constructs. Findings reveal that design elements and principles significantly contribute to innovation outcomes, particularly when mediated by aesthetic and experiential factors. The study underscores the importance of integrating theoretical perspectives such as Emotional Design and cultural dimensions into design practice. These insights provide both theoretical contributions to design research and practical guidance for fostering culturally resonant, user-centered product development.

Keywords: Design Elements, Design Principles, Product Innovation, User Experience, Aesthetic Value

INTRODUCTION

In an era marked by rapid technological advancement and pressing global challenges, the role of design in fostering innovation has become increasingly significant. Design elements such as line, shape, color, texture, and space, along with design principles including balance, contrast, emphasis, movement, proportion, and unity, serve as the foundation for creating meaningful and functional products. These components are not merely aesthetic tools. They shape how products are perceived, used, and valued across cultural and industrial contexts.

The integration of design elements and principles within product development has enabled transformative innovations that address both user needs and market demands. Global companies show that the strategic use of visual and structural components can produce designs that redefine user experience and establish new industry standards. For example, Apple's commitment to simplicity and human-centered design has resulted in products that are intuitive and elegant. Similarly, Dyson's inventive approach has reshaped household technologies through form-function integration and engineering precision.

Beyond functionality and form, design elements and principles are increasingly viewed through the lens of sustainability and emotional value. Emotionally durable design highlights the creation of long-term bonds between users and products, reducing waste by extending product lifespans. Cradle-to-cradle approaches advocate for closed-loop systems where materials are continuously repurposed or safely reintegrated into the environment. These philosophies illustrate how foundational design decisions contribute not only to innovation but also to responsible and forward-thinking production systems.

Although the importance of design elements and principles is widely acknowledged, there remains a gap in understanding how these fundamentals can systematically act as drivers of innovation. This paper aims to

explore how the deliberate use of these core components supports the creation of products that are not only novel but also meaningful and sustainable. By examining both theoretical insights and practical applications, the discussion will highlight the value of returning to design basics as a powerful approach to innovation in product design.

In Malaysia, the integration of design elements and principles into product innovation is gaining momentum, yet several challenges persist. According to the Global Innovation Index 2024, Malaysia ranks 33rd among 133 economies, placing 28th in innovation inputs but 41st in innovation outputs. This disparity indicates a gap between investment in innovation and the tangible outcomes produced, suggesting a need for more effective application of design fundamentals in product development processes. The local design industry largely adopts a market-need-driven model, with marketing-oriented managers directing designers to respond to projected demand. However, difficulties remain in grasping the problem-solving approaches of designers, due to implicit practices. Weak communication and collaboration among managers, designers, and researchers continue to hinder a full understanding of innovation processes in manufacturing.

The educational landscape presents further obstacles. A study of diploma-level industrial design students in Malaysia found that while 40 percent of their curriculum covers art and design fundamentals, there is still a gap in applying design thinking principles throughout the design process. This underlines the need for curricula that balance technical skills with critical thinking and problem-solving abilities inherent in design. Cultural expectations add another dimension. Research shows that Malaysian designs often adhere strictly to authority requirements and Islamic values, aiming to reflect racial harmony and national ideology. Yet the unique traits of each ethnic group are not always preserved, causing cultural identities in design to fade or merge. These issues stress the need for a deeper application of design elements and principles in the Malaysian context. By addressing these gaps, Malaysia can harness design as a driver of innovation, ensuring that products are not only functional and market-ready but also culturally resonant and globally competitive.

Past research has reinforced the challenges Malaysia faces in effectively applying design elements and principles to drive innovation. Ali et al. (2024) highlighted that the Malaysian design industry often struggles with managing the integration of design processes due to communication gaps between designers, managers, and researchers. This weak collaboration limits the strategic application of core design principles, leading to products that may meet functional demands but fall short in delivering innovative breakthroughs. In addition, Ali et al. (2024) emphasized that while project-based learning environments encourage creativity among Malaysian product design students, there remains a lack of deep understanding in applying design principles systematically throughout the development process. Without a strong conceptual grasp of elements such as balance, proportion, and unity, students often produce work that is visually expressive but lacks coherent structure and innovation potential. Furthermore,

Abidin (2016) noted that issues surrounding the preservation of Malaysian product design identity are compounded by a limited translation of cultural elements into modern product designs, which affects the uniqueness and competitiveness of locally developed products. Collectively, these findings underscore the urgent need to strengthen the application of design elements and principles within educational, industrial, and cultural frameworks to enhance Malaysia's standing in the global innovation landscape.

Despite greater recognition of the role of design elements and principles in product development, a clear research gap remains in linking these fundamentals to innovation outcomes, especially in the Malaysian setting. Past studies have focused on the creative process or cultural aspects but rarely examined how deliberate application of specific design elements and principles can act as structured drivers of innovation. In addition, although product design’s role in enhancing user experience and marketability has been widely discussed, there is limited study of how foundational visual strategies contribute to sustainable, culturally relevant, and commercially viable innovations. Addressing this gap, this paper aims to show how careful integration of design elements and principles can support innovation in product design. The study provides a theoretical perspective that connects design fundamentals with innovation outcomes, offering insights valuable to both academic and industry contexts.

This article is structured into several sections to provide a coherent exploration of the topic. Following this introduction, the next section presents a comprehensive review of the literature related to design elements, design principles, and their connections to innovation in product development. The subsequent section discusses the conceptual framework proposed in this study, highlighting how design fundamentals can be systematically linked to innovative practices. The discussion section then critically interprets the findings within a broader theoretical and practical context. Finally, the conclusion summarizes the key insights, outlines the contributions to the field, and proposes directions for future research.

LITERATURE REVIEW

Understanding Design Elements, Design Principles, and Product Design

Design elements and design principles serve as the fundamental building blocks of visual communication and product development. Design elements include line, shape, color, texture, space, and form. These basic visual components are manipulated by designers to create composition and meaning (Lidwell et al., 2003). Each element holds the potential to evoke emotional responses, guide attention, and convey functional information within a product's interface or physical form. For instance, dynamic lines can suggest motion, while variations in texture enhance tactile engagement with a product.

Design principles complement these elements by guiding their organization and arrangement. Principles such as balance, contrast, emphasis, movement, rhythm, proportion, and unity provide structure for achieving harmony and coherence in design (Ambrose & Harris, 2010). When applied effectively, these principles ensure that products are not only visually appealing but also functionally clear and contextually suitable.

Product design is broadly defined as the process of imagining, creating, and developing tangible solutions that address user needs and market demands (Ulrich et al., 2020). It involves both functional problem-solving and aesthetic consideration, linking technology, materials, and user experience. Modern product design goes beyond physical form to encompass emotional value, sustainability, and cultural relevance. Understanding the interplay between elements and principles is therefore critical in shaping innovative and meaningful products that can succeed in global markets.

Theoretical Frameworks Supporting Design and Innovation

Several theoretical models provide valuable perspectives on how design elements and principles contribute to product innovation. One influential framework is the Design Thinking Model, popularized by Stanford, which emphasizes empathy, ideation, prototyping, and testing (Brown, 2020). Design Thinking promotes iterative exploration where elements and principles guide the creation of solutions that are user-centered and innovation-driven.

Another significant model is the Product Experience Framework proposed by Desmet and Hekkert (2007). This framework conceptualizes user experience in three layers: aesthetic, meaning, and emotional. Design elements such as color, form, and material are closely tied to these layers, showing how visual strategies trigger cognitive and emotional responses that influence product preference and loyalty.

Norman's Emotional Design Theory (Norman, 2004) also explains the importance of visual and interactive design in creating pleasurable and satisfying experiences. Norman argues that design should engage three levels of human processing: visceral appearance, behavioral functionality, and reflective meaning. The careful use of design principles supports positive outcomes at each level, reinforcing the designer's role in creating innovation that resonates widely.

In the Malaysian context, Cultural Dimensions Theory by Hofstede (2011) provides further insight. Cultural values shape user expectations of aesthetics, functionality, and symbolic meaning. By recognizing this backdrop, designers can apply elements and principles more sensitively, ensuring that innovation is culturally aligned rather than disruptive.

Synthesizing these theories shows that design elements and principles are not isolated artistic choices. They are embedded within cognitive, emotional, and sociocultural systems that collectively shape innovation.

Research Gaps and Emerging Insights

While there is agreement on the importance of design fundamentals in shaping innovative products, several gaps remain. First, although frameworks such as Design Thinking and Product Experience address creativity and user experience, there is little systematic study of how specific design elements and principles contribute at different stages of product development, particularly in non-Western contexts like Malaysia. Most studies focus on process management or market strategies, while the foundational role of visual and structural components is often overlooked (Ali et al., 2024).

Second, Malaysian studies reveal a continued gap between design education and industry practice. Students may be introduced to design fundamentals, yet their application in innovative work is inconsistent (Ali, Nawi, & Latiff, 2024). Cultural integration into product design is also often shallow, producing outcomes that meet functional needs but lack genuine cultural expression (Zainal Abidin, Othman, & Shamsuddin, 2015).

Third, much of the literature emphasizes outcomes rather than processes. Few studies examine how design elements and principles shape user perception, emotional response, and market acceptance. This gap limits understanding of how early design decisions influence long-term innovation.

Addressing these issues, this paper builds a conceptual link between foundational design knowledge and innovation outcomes. It proposes that a systematic use of design elements and principles, guided by cognitive, emotional, and cultural theories, can produce products that are both innovative and culturally significant. Anchoring innovation within design fundamentals offers product development greater relevance and impact at local and global levels.

Table 1

Author(s)	Year	Title	Methodology	Key Findings
Ali, A., Liem, A., Isa, S. S., & Jamaludin, N. L.	2024	Challenges in Malaysian Design Industry: Managing Design and Decision-Making Processes	Qualitative case study	Identified communication gaps between designers and managers, hindering the effective application of design principles in product development.
Ali, N., Nawi, A. M., & Latiff, N. A.	2024	Enhancing Creativity and Problem-Solving: Design Principles for Project-Based Learning in Product Design	Mixed-methods study	Found that integrating design principles into project-based learning enhances students' creativity and problem-solving skills in product design.
Zainal Abidin, S., Othman, A., & Shamsuddin, Z.	2016	Malaysian Product Design Identity: Issues, Transformation, and Challenges	Literature review	Highlighted the need for incorporating cultural elements into product design to preserve Malaysian design identity amidst globalization.
Kasap, H. Ö., Altın, E., & Ergene, A. İ.	2022	Design Principles and Concept Research in Interior Architecture Design Studio I During the Pandemic Period	Qualitative study	Explored how design principles were adapted in interior architecture education during the pandemic, emphasizing flexibility and innovation.
Desmet and Hekkert	2007	Framework of Product Experience	Theoretical framework	Proposed a model linking design elements to user experience, emphasizing the role of aesthetics and meaning in product design.

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue IX September 2025

Table 1 summarizes studies that underscore the critical role of design elements and principles in shaping innovative and culturally resonant products. Ali et al. 2024) emphasize the importance of effective communication between designers and managers to ensure the successful application of design principles in the Malaysian context. Similarly, Ali, Nawi, and Latiff (2024) highlight the benefits of integrating design principles into education to enhance creativity and problem-solving skills among students.

Zainal Abidin, Othman, and Shamsuddin (2015) stress the need to embed cultural elements into product design to preserve national identity in an increasingly global market. This perspective aligns with the theoretical frameworks of Desmet and Hekkert (2007) and Norman (2004), who link design elements to user experience and emotional engagement.

Furthermore, Kasap et al. (2022) add insights into the adaptability of design principles in education during the COVID-19 pandemic. Their findings show that flexibility and innovation in applying design principles are essential for effective learning. Collectively, these studies point to a gap in systematically connecting design elements and principles with innovation outcomes, especially in cultural contexts such as Malaysia. Future research could focus on building frameworks that integrate cultural considerations with design knowledge to foster innovation that is both globally competitive and culturally authentic.

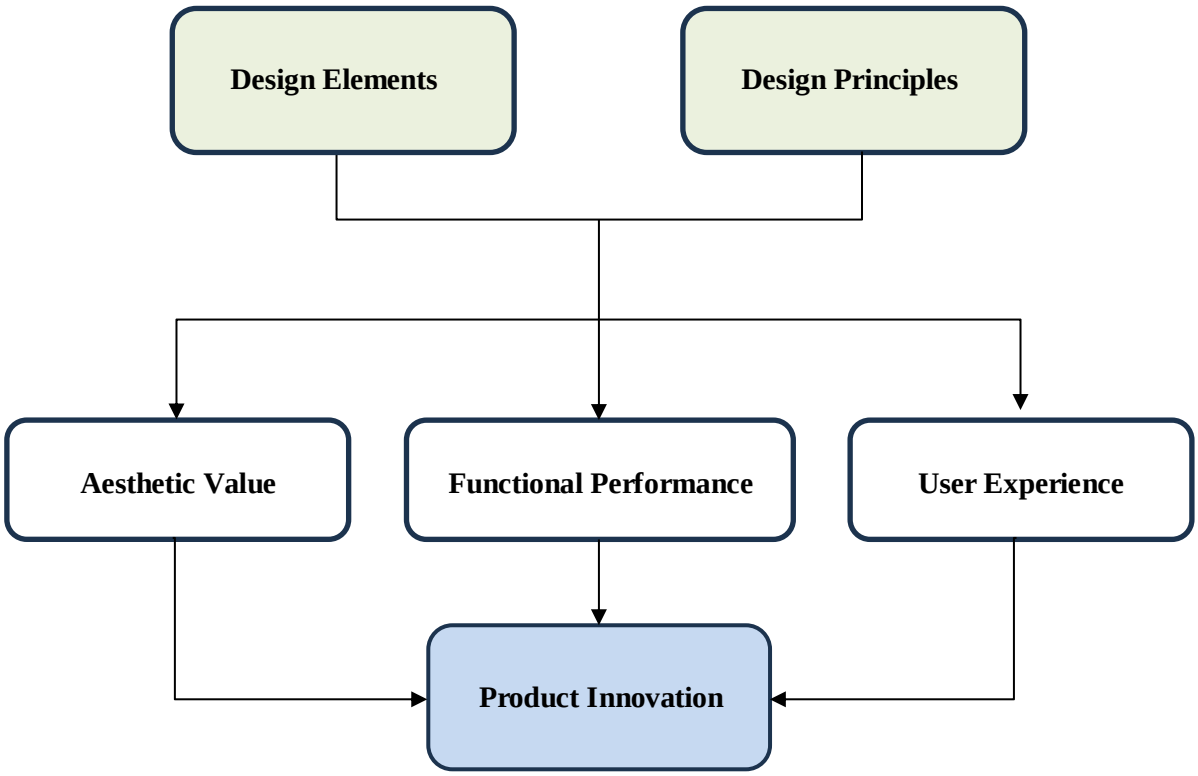

Fig. 1 Conceptual Framework Diagram

Figure 1 presents the conceptual framework, which illustrates the foundational role of design elements and design principles in shaping product innovation. Design elements such as line, shape, color, texture, space, and form provide the visual and structural foundation that shapes how a product is conceived and perceived. In parallel, design principles including balance, contrast, emphasis, unity, proportion, and rhythm guide the arrangement and organization of these elements to ensure coherence, harmony, and clarity.

These two dimensions work together to influence three mediating constructs: aesthetic value, functional performance, and user experience. Aesthetic value refers to the visual appeal and emotional impact of a product, which strongly shapes user impressions and preferences. This aligns with the visceral level of Norman's Emotional Design Theory, where appearance triggers emotional responses. Functional performance reflects how well a product fulfils its intended function, ensuring reliability, usability, and satisfaction. This corresponds with the behavioural level of user interaction, where performance and usability dominate product

evaluation. User experience, as defined by Desmet and Hekkert, covers emotional, cognitive, and symbolic interactions that users develop with products, blending practical use with personal meaning.

Together, these mediating constructs create a pathway toward product innovation. In this framework, innovation is not restricted to technological novelty but is seen as a meaningful transformation that arises from deliberate application of design fundamentals. The integration of design elements and principles strengthens a product's capacity to deliver aesthetic richness, functional quality, and compelling user experiences. This is reinforced by the Design Thinking model, which emphasizes empathy, creativity, and iteration in innovative problem-solving.

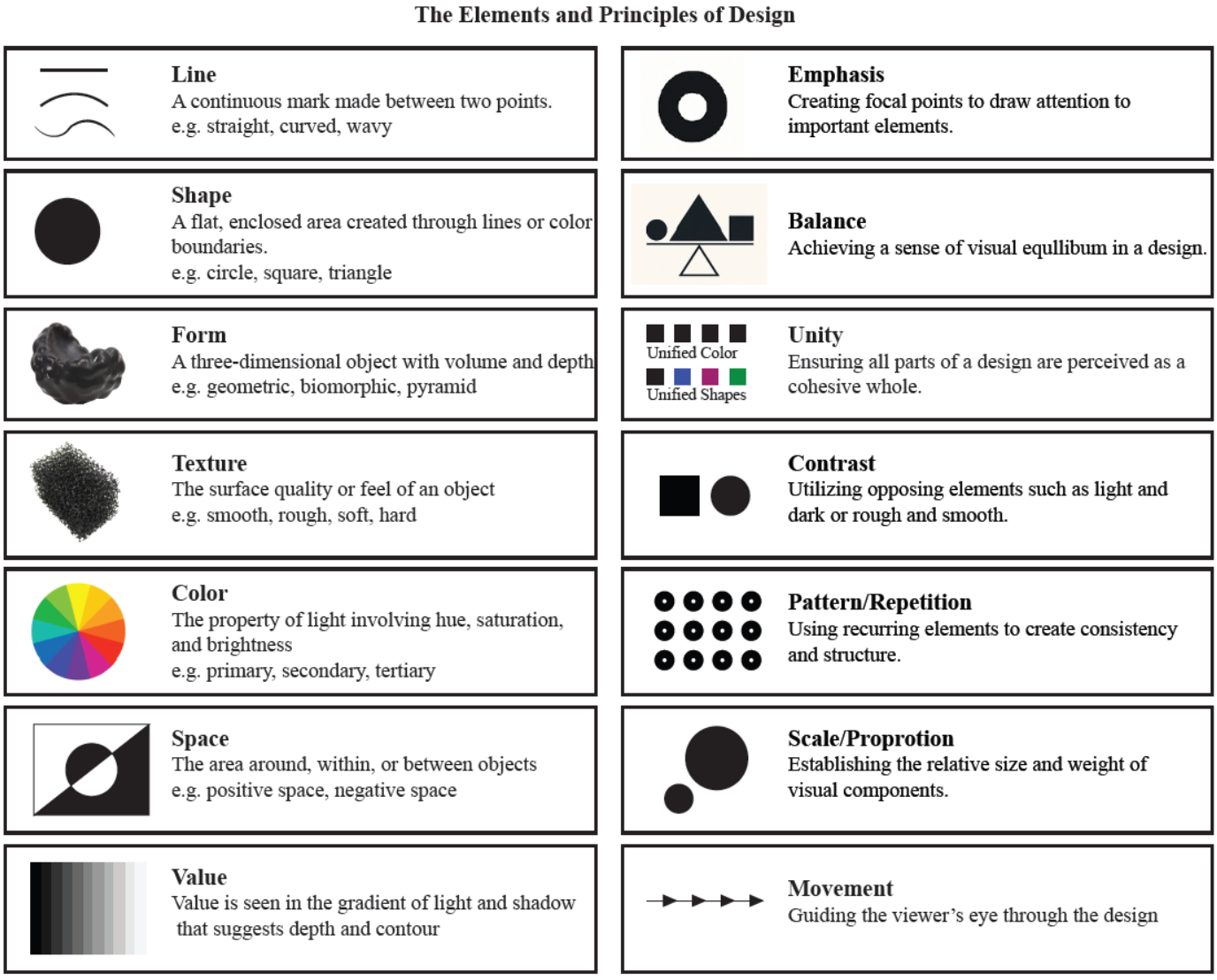

Fig. 2 Design Elements and Principles

Figure 2 shows the fundamental design elements and principles that form the basis of this study. The elements include line, shape, form, color, texture, space, and value, which represent the core components of design. The principles of balance, contrast, emphasis, rhythm, proportion, and unity guide how these elements are arranged to create coherence and meaning. In this study, these fundamentals provide the foundation for exploring their influence on innovation outcomes.

In culturally diverse contexts such as Malaysia, the framework also supports design practices that are sensitive to local identity while maintaining global relevance. This connection positions the conceptual framework as a bridge linking design fundamentals with innovation outcomes through a structured, user-centered, and culturally informed process.

METHODOLOGY

Research Design, Population, Sample Size, and Sampling Technique

This study uses a quantitative cross-sectional design to examine how design elements and design principles influence product innovation through aesthetic value, functional performance, and user experience. A conceptual model is tested with a structured questionnaire administered to experienced respondents in product design. The target population includes professional product designers, design educators, and industrial practitioners with at least three years of experience in product development and design decision making. This criterion ensures respondents hold a grounded grasp of design fundamentals and innovation practice.

Using purposive sampling, a total of 150 respondents were targeted across institutions, design firms, and creative industries in Malaysia. Purposive sampling is appropriate when the study seeks insights from individuals with specific expertise that align with the research objectives (Creswell & Creswell, 2018). The sample size follows guidance for multivariate analysis, with 150 judged adequate for structural equation modeling in studies of similar complexity (Hair et al., 2022).

Data Collection

Data were collected through a self-administered online questionnaire developed using Google Forms and distributed via professional design networks, academic institutions, and social media platforms. Before full distribution, a pilot test was conducted with ten expert participants to refine structure, clarity, and consistency. These pilot responses were excluded from the main dataset. Feedback from the pilot phase led to adjustments in terminology and scale wording to ensure clear understanding across diverse respondent backgrounds.

The final questionnaire was divided into five sections: demographic information, design elements, design principles, mediating constructs (aesthetic value, functional performance, user experience), and product innovation outcomes. Respondents were informed of the study's purpose, and consent was obtained in line with ethical guidelines ensuring voluntary participation, anonymity, and confidentiality.

Data Analysis

The collected data were analyzed using SPSS Version 28 for descriptive statistics and SmartPLS 4 for Partial Least Squares Structural Equation Modeling (PLS-SEM). PLS-SEM was chosen to examine both direct and indirect relationships between latent variables as specified in the conceptual framework.

The analysis proceeded in two stages. First, the measurement model was assessed through reliability and validity checks, including outer loadings, Cronbach's alpha, Composite Reliability (CR), Average Variance Extracted (AVE), and discriminant validity using Fornell–Larcker and HTMT criteria. Second, the structural model was tested through path coefficients, coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2), and bootstrapping with 5,000 resamples to determine significance levels at $p < .05$.

Variables and Measurement

All variables in this study were measured using a structured questionnaire with five-point Likert scale items that were adapted from previous research and refined through a pilot test. The constructs include Design Elements, Design Principles, Aesthetic Value, Functional Performance, User Experience, and Product Innovation. Each construct was represented by three or more items to provide sufficient indicators for assessing reliability and validity in structural equation modeling.

Reliability and Validity of Questionnaire Constructs

The reliability and validity of the constructs were examined to ensure the soundness of the measurement model. Internal consistency was assessed through Cronbach's alpha and Composite Reliability (CR), with all

values exceeding the recommended threshold of 0.70, confirming that the items demonstrated strong reliability. Convergent validity was evaluated using the Average Variance Extracted (AVE), and all constructs recorded AVE values above 0.50, indicating that each construct explained more than half of the variance in its indicators.

Discriminant validity was then established using the Fornell–Larcker criterion and the Heterotrait–Monotrait ratio of correlations (HTMT). The Fornell–Larcker test confirmed that the square root of AVE for each construct was greater than its correlation with other constructs, while HTMT values remained below the threshold of 0.90. These results demonstrate that the constructs were both reliable and distinct, providing a strong foundation for the subsequent structural model analysis.

DISCUSSION

The findings of this study highlight that design elements and principles are not merely decorative but form a central pathway to product innovation. A consistent observation across the literature is the aesthetic–usability effect, which shows that visually attractive products are often judged to be easier and more pleasant to use. Sauer and Sonderegger (2022) demonstrated that when aesthetics is carefully integrated into design, users perform tasks more effectively and report higher satisfaction with the interaction. This reveals that aesthetic qualities have a direct influence on perceived usability and early user acceptance.

Desmet and Hekkert (2007) provide a theoretical explanation for this relationship by positioning product experience as a combination of aesthetic, emotional, and symbolic dimensions. Their framework emphasizes that design elements such as line, shape, and color work in tandem with principles like balance, contrast, and unity to evoke meaningful experiences that go beyond appearance. A product that achieves coherence between its elements and principles therefore supports not only visual appeal but also emotional engagement and symbolic value, both of which are critical for innovation.

More recent studies support this layered perspective. Sauer and Sonderegger (2022) showed that while aesthetics strongly influences first impressions, their impact can evolve with repeated use. In longer-term interactions, functional performance and usability become increasingly important to sustaining user satisfaction. This indicates that while design aesthetics can draw users in, principles that guide usability and performance must reinforce the interaction to ensure lasting acceptance.

In the Malaysian context, these insights carry particular importance. Research has shown that design education often emphasizes fundamentals but does not consistently translate them into innovative practice in industry settings (Ali, Nawi, & Latiff, 2024). Cultural elements are sometimes applied superficially, limiting their potential to contribute to authentic and meaningful product design (Zainal Abidin, Othman, & Shamsuddin, 2015). Anchoring innovation in strong visual and structural design, while ensuring cultural cues are embedded meaningfully, offers a pathway for producing products that are both aesthetically resonant and functionally sustainable.

FUTURE WORK

Future research should extend this study by examining longitudinal effects of design aesthetics and principles on innovation outcomes. Comparative studies across cultural contexts would deepen understanding, while mixed-method approaches could reveal nuanced insights into how users experience and interpret design decisions throughout product development.

THEORETICAL AND PRACTICAL IMPLICATIONS

Theoretical Implications

This study extends design theory by demonstrating how design elements and principles influence innovation through mediating factors such as aesthetics, functionality, and user experience. It strengthens existing

frameworks like Product Experience and Emotional Design by showing their relevance in linking cognitive, emotional, and cultural aspects of product development, especially within the Malaysian context.

Practical Implications

For practice, the findings guide designers, educators, and industry players to integrate design fundamentals more systematically in product development. Designers can apply aesthetics and functionality in balanced ways, educators can embed these insights into teaching, and industry practitioners can adopt them to produce products that are culturally meaningful, user-friendly, and competitive in both local and global markets.

Limitations and Delimitations

This study is limited by its reliance on self-reported data, which may be influenced by respondent bias. The use of purposive sampling also restricts the generalizability of findings beyond the targeted population of Malaysian designers, educators, and practitioners. Delimitations include the focus on design elements, principles, and innovation outcomes, excluding other external factors such as market conditions or organizational strategies.

CONCLUSION

This study highlights the significant role of design elements and principles in driving product innovation through aesthetic value, functional performance, and user experience. By integrating theoretical perspectives such as Design Thinking, Emotional Design, and cultural frameworks, the findings emphasize that innovation must be rooted in strong design fundamentals. The results provide evidence that thoughtful application of design principles contributes not only to user satisfaction but also to sustainable and culturally meaningful innovation in the Malaysian context. Although the study is limited by its reliance on self-reported data and purposive sampling, it offers a valuable foundation for future research. Ultimately, it reinforces the need to bridge design education, practice, and cultural identity in advancing product development.

REFERENCES

1. Abidin, S. Z. (2016). Malaysian Product Design Identity: Issues , Transformation , and Challenges. Proceedings of the 2nd International Colloquium of Art and Design Education Research (i-Cader 2015), October 2018. https://doi.org/10.1007/978-981-10-0237-3
2. Ali, A., Liem, A., Isa, S. S., & Jamaludin, N. L. (2024). Challenges in Malaysian Design Industry Managing Design and Decision-making Processes. Form Akademisk, 17(1), 1–32.
3. Ali, N., Nawi, A. M., & Latiff, N. A. (2024). Enhancing Creativity and Problem-Solving : Design Principles for Project-Based Learning in Product Design. International Journal of Research and Innovation in Social Science, VIII(IX), 3733–3742. https://doi.org/10.47772/IJRISS
4. Ambrose, G., & Harris, P. (2010). Design Thinking. AVA Publishing.
5. Brown, T. (2020). Design Thinking. IEEE Software, 37(2), 21–24.
6. Creswell, J. W., & Creswell, J. D. (2018). Research design: qualitative, quantitative, and mixed methods approach. Fifth edition. Los Angeles : SAGE (5th ed.). SAGE Publications.
7. Desmet, P., & Hekkert, P. (2007). Framework of product experience. International Journal of Design, 1(1), 57–66.
8. Hair, J. F., Ringle, C. M., Hult, G. T. M., & Sarstedt, M. (2022). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM) (Issue January). SAGE Publications.
9. Hofstede, G. (2011). Dimensionalizing Cultures : The Hofstede Model in Context Dimensionalizing Cultures : The Hofstede Model in Context Abstract. Online Readings in Psychology and Culture, 2(1), 1–26.
10. Kasap, H. Ö., Altın, E., & Ergene, A. İ. (2022). Design Principles and Concept Research in " Interior Architecture Design Studio I " during the Pandemic Period. International Design and Art Journal, 4(2).

11. Lidwell, W., Holden, K., & Butler, J. (2003). Universal Principles of Design (2nd ed.). Rockport Publishers.
12. Norman, D. A. (2004). Emotional Design: Why we love (or hate) everyday things. Basic Books.
13. Sauer, J., & Sonderegger, A. (2022). Visual aesthetics and user experience: A multiple-session experiment. International Journal of Human - Computer Studies, 165(April). https://doi.org/10.1016/j.ijhcs.2022.102837
14. Ulrich, K. T., Eppinger, S. D., & Yang, M. C. (2020). Product Design and Development (7th ed.). McGraw-Hill Education.