Journal of Informatics Education and Research
ISSN: 1526-4726
Vol 4 Issue 3 (2024)

Design Thinking in Automotive and Consumer Packaging: A Review

Madhav[1], Dr.D.N.Murthy[2]

1- Research scholar, ISBR Research Centre, University of Mysore
2- Professor, ISBR Research Centre, University of Mysore

Abstract

This literature review explores the application of design thinking in the automotive and consumer packaging industries, highlighting its role in fostering innovation, enhancing user experience, and promoting sustainability. By examining case studies from companies like Ford, BMW, Unilever, and Coca-Cola, the review underscores the effectiveness of design thinking methodologies in addressing evolving consumer demands and market complexities. The analysis includes a discussion of the design thinking framework's stages, critiques of its common interpretations, and insights into team dynamics and organizational factors that influence innovation. Ultimately, the review emphasizes the transformative potential of design thinking in driving strategic advancement across industries.

keywords: consumer packaging, automotive, problem solving, challenges, opportunities

1.0 Introduction

Design thinking has emerged as a critical framework for innovation across various industries, including automotive and consumer packaging. The approach prioritizes understanding the end-user's needs and experiences, which is essential in creating products that resonate with consumers (Brown, 2008). In the automotive industry, design thinking facilitates the development of vehicles that meet evolving consumer expectations, while in consumer packaging, it aids in creating sustainable and appealing solutions (Kelley & Kelley, 2013).

Design thinking plays a pivotal role in the automotive industry by fostering innovation and enhancing user experience through a human-centered approach. This methodology emphasizes understanding the needs and behaviours of users, which allows automotive companies to develop products that resonate with consumer expectations. For instance, Ford Motor Company has successfully implemented design thinking in the development of its Ford Sync system, integrating user feedback directly into the design process. This approach not only improved the functionality of the product but also cultivated a culture of continuous innovation within the organization (Michels, 2016). Furthermore, companies like BMW have utilized design thinking to prioritize sustainability and user engagement in their product lines, such as the i series, demonstrating how iterative prototyping and consumer insights can lead to vehicles that align with modern values and preferences (Fischer et al., 2019).

By employing design thinking, automotive manufacturers can navigate the complexities of an evolving market, addressing challenges such as technological advancements and changing consumer preferences. The iterative nature of design thinking allows for rapid prototyping and testing, enabling companies to refine their offerings based on real user feedback. This not only enhances product development efficiency but also fosters a deeper connection between brands and their customers, ultimately driving loyalty and satisfaction in a competitive landscape (Kelley & Kelley, 2013).

Design thinking plays a pivotal role in the automotive industry by fostering innovation and enhancing user experience through a human-centered approach. This methodology emphasizes understanding the needs and behaviours of users, which allows automotive companies to develop products that resonate with consumer expectations. For instance, Ford Motor Company has successfully implemented design thinking in the development of its Ford Sync system, integrating user feedback directly into the design process. This approach not only improved the functionality of the product but also cultivated a culture of continuous innovation within the organization (Michels, 2016). Furthermore, companies like BMW have utilized design thinking to prioritize sustainability and user engagement in their product lines, such as the I series, demonstrating how iterative prototyping and consumer insights can lead to vehicles that align with modern values and preferences (Fischer et al., 2019).

By employing design thinking, automotive manufacturers can navigate the complexities of an evolving market, addressing challenges such as technological advancements and changing consumer preferences. The iterative nature of design thinking allows for rapid prototyping and testing, enabling companies to refine their offerings based on real user feedback. This not only enhances product development efficiency but also fosters a deeper connection between brands and their customers, ultimately driving loyalty and satisfaction in a competitive landscape (Kelley & Kelley, 2013).

This review aims to explore the intersection of design thinking with automotive and consumer packaging, examining its impact on product development, user engagement, and sustainability initiatives.

2.0 Methodology

This literature review involved a systematic search of academic and industry sources related to design thinking in automotive and consumer packaging. Key databases such as Google Scholar, JSTOR, and ScienceDirect were utilized, focusing on peer-reviewed articles, case studies, and industry reports published from 2000 to 2023. The analysis included identifying recurring themes, methodologies, and outcomes associated with design thinking applications.

3.0 Review of literature

3.1 Design Thinking Framework

The design thinking framework typically consists of five stages: Empathize, Define, Ideate, Prototype, and Test (Liedtka, 2011). Each stage plays a crucial role in guiding teams through a structured process that encourages creativity and innovation.

1. **Empathize**: Understanding user needs through observation and engagement.
2. **Define**: Framing the problem based on insights gathered from users.
3. **Ideate**: Generating a wide range of ideas and solutions.
4. **Prototype**: Creating tangible representations of ideas to explore their feasibility.
5. **Test**: Evaluating prototypes with users to gather feedback and refine solutions.

Kimbell(2009) critiques the common understanding of design thinking - that it is a prescriptive method for problem-solving. The writer argues that design thinking is often oversimplified and disconnected from the nuanced and complex realities of design work. He introduces the notions of 'design-as-practice' and 'designs-in-practice' to point out the real-world and iterative nature of design processes. Through attending to the process of design in practice within organizations, she points out to the value of context, collaboration and socio-materiality that often determines the outcome beyond the usual limits implied in the design thinking approach. Kimbell suggests a wider-angle lens through which to view design activities, arguing that a practice perspective of design is more likely to provide richer insight into the role of design in driving both innovation and organizational performance. She encourages both scholars and practitioners to engage more deeply with the specifics of design practices, from the tangled relation between designers, clients, and users to the shaping of such practices through tools and materials. This article, therefore, calls for a shift from seeing design as a set of methodologies to an appreciation of design as a complex and evolving practice deeply embedded in the organizational fabric, thereby enriching the discourse surrounding design in management and innovation contexts.

In "Design Thinking for Strategic Innovation," Mootee (2013) presents a comprehensive exploration of how design thinking can serve as a catalyst for strategic innovation in organizations. The book argues that traditional approaches to strategy often fall short in addressing the complexities and rapid changes faced by modern businesses. By integrating design thinking principles, which emphasize empathy, experimentation, and iterative problem-solving, organizations can foster a culture of innovation that aligns closely with customer needs and market dynamics. Mootee outlines a framework that combines design thinking methodologies with strategic management, enabling organizations to identify opportunities for innovation that are both viable and sustainable.

Mootee also emphasizes the importance of cross-disciplinary collaboration and diverse team dynamics in the design thinking process. He discusses how involving various stakeholders—such as customers, employees, and partners—in the innovation process can lead to more holistic solutions that resonate with end-users. By creating an environment where experimentation is encouraged and failure is viewed as a learning opportunity, organizations can enhance their agility and responsiveness to market changes. Ultimately, Mootee advocates for design thinking as an essential approach for leaders seeking to drive strategic innovation, emphasizing that it not only improves product development but also transforms organizational culture and enhances competitive advantage in an increasingly complex business landscape.

3.2 Application in Automotive Industry

In the automotive sector, design thinking has been employed to enhance user experience and streamline design processes. For instance, Ford Motor Company's use of design thinking led to the development of the Ford Sync system, which integrates user feedback directly into the design process (Michels, 2016). This approach not only improved the product but also fostered a culture of innovation within the organization.

Another notable example is BMW's I series, which was developed using design thinking methodologies to prioritize sustainability and user experience. The iterative prototyping phases allowed BMW to incorporate consumer feedback effectively, resulting in a product that aligns with modern environmental values (Fischer et al., 2019).

Perry Simpson (2024) from Star global outlines the crucial role of Design Thinking in automotive retail, emphasizing its potential to navigate industry challenges and seize opportunities in a rapidly changing market. Design Thinking is described as a human-centered approach that enables organizations to anticipate consumer needs and industry shifts, particularly in the context of digital disruption and direct-to-consumer trends. Star, the organization discussed, applies Design Thinking by focusing on three core questions: desirability (does it resonate with consumers?), feasibility (can we implement it?), and viability (does it make commercial sense?). This framework helps ensure that new initiatives align with business goals while remaining user-centric.

Star global identifies five fundamental principles of Design Thinking essential for success in the automotive sector:

1. **Identify Your Endgame**: Companies must define a clear vision of their goal, grounded in a deep understanding of customer needs.
2. **Form a Team of Experts**: Integrating diverse perspectives from various stakeholders ensures a comprehensive approach to addressing challenges.
3. **Think Experiences, Not Things**: Emphasizing the importance of creating seamless and engaging customer experiences across both digital and physical touchpoints.
4. **Use All Three of Your Brains**: Acknowledging the rational, emotional, and intuitive aspects of customer decision-making is key to developing effective solutions.
5. **Prototype and Validate**: An iterative approach to testing ideas allows businesses to learn and adapt quickly, fostering innovation and responsiveness to market demands.

Ellen Simon (2015) in their study explore the application of Design Thinking in the automotive industry to understand the factors influencing the innovativeness of Design Thinking teams. The research is based on a grounded theory and template analysis approach, with 15 semi-structured interviews with employees of a car manufacturer providing practical insights into which factors and in which direction they influence the link. In total, 14 Design Thinking projects were examined, with findings showing that organizational environment is a relevant factor for the relationship between the application of Design Thinking and team's innovativeness.

The purpose of this study is to explain the factors influencing the innovativeness of Design Thinking teams in the automotive industry. The research question is answered through a full conceptual model explaining influencing factors on a macro, meso, and micro level. On a macro level, the organizational environment is a relevant factor for the relationship between the application of Design Thinking and team's innovativeness.

The study explores the application of Design Thinking in the automotive industry, revealing that it leads to creative team outcomes and innovation. The elements of Design Thinking, such as mindset, team diversity, process, tools, environment, and newness of the method, are similar across projects regardless of the department. An automotive Design Thinking project team focuses on the customer, is diverse in backgrounds, follows processes, applies diverse tools, and works in inspiring environments. This research contributes to the "management discourse" of Design Thinking by providing characteristics of Design Thinking teams as differentiation aspects to other innovation teams such as R&D and NPD teams.

The study used a qualitative methodology to analyse 14 Design Thinking projects, analysing factors on a macro, meso, and micro level. The results showed that organizational environment, team climate, team collaboration, and leadership were significant factors for team innovativeness. Team climate was found to be the most important factor, incorporating vision, participative safety, task orientation, and support for innovation. Team collaboration included positive factors interaction and intra-organizational networks, as well as negative factors discrepancy. Three leadership styles were supported by the data: transformational leadership, transactional and laissez-faire, and intrinsic motivation. Transformational leadership enhanced the innovativeness of Design Thinking teams, while transactional and laissez-faire were detrimental. Intrinsic motivation supported employees' capabilities, while extrinsic motivation negatively affected the team's innovativeness.

The study also analysed the difference between highly and less innovative project teams, finding that supervisory encouragement and freedom were only applicable to highly innovative projects. Supervisory encouragement, as incorporated by an organizational committee, is especially important for Design Thinking projects due to the lack of standardized gateway decision points. Freedom developed as an important factor in Design Thinking projects.

3.3 Application in Consumer Packaging

In consumer packaging, design thinking has revolutionized how brands approach product presentation and sustainability. Companies like Unilever have leveraged design thinking to create packaging that is not only visually appealing but also environmentally friendly. Their Sustainable Living Plan emphasizes reducing plastic waste through innovative packaging design (Unilever, 2020).

With the rapid advancement of China’s economy, society has transitioned into the era of big data intelligence, resulting in significant changes to shopping behaviours. The traditional methods of shopping, which relied on street vendors and farmer’s markets, have evolved into a reliance on digital e-commerce platforms such as WeChat, Douyin, Taobao, and Pinduoduo. In the post-pandemic era, online shopping has become the standard and an essential aspect of daily life. This shift from conventional offline shopping to online purchasing necessitates a transformation in design thinking, particularly in food packaging design. It calls for a focus on consumer needs and brand narratives, while also reflecting individual identities and regional cultures, and incorporating elements of traditional Chinese aesthetics and cultural heritage.

Additionally, Coca-Cola has utilized design thinking to enhance user engagement with their products. The "Share a Coke" campaign is an example where consumer insights were used to personalize packaging, resulting in increased brand loyalty and sales (Smith, 2014).

Design thinking is a human-centered creative approach that seeks innovative solutions for various life and social challenges. As per Chao-Ming yang (2018), it empowers individuals to generate ideas that effectively meet consumer needs. A packaging design course is a professional program that integrates material use, design aesthetics, and branding. It serves as a multidisciplinary course focused on nurturing students' creative thinking and their ability to apply practical technologies.

In this study, experimental teaching method was implemented to incorporate design thinking into the packaging design curriculum. The goal was to help students identify issues related to product packaging, brand identity, spatial layout, and marketing strategies. By encouraging students to reevaluate the significance and role of packaging design, we aimed to enhance their structural creativity, visual appeal, and design thinking skills, while also fostering their analytical abilities and problem-solving skills in design contexts.

Design thinking is a user-centered approach that emphasizes empathy, ideation, and experimentation, making it highly applicable to consumer packaging. This methodology allows companies to innovate and create packaging solutions that

resonate with consumers' needs and preferences. Design thinking begins with deep empathy for the end user. In the context of consumer packaging, this means understanding how packaging affects the consumer experience. Research by Kuo and Chiu (2019) highlights that involving consumers in the design process can lead to more effective packaging solutions that enhance usability and satisfaction. By employing techniques such as interviews, surveys, and observation, designers can gather insights that inform packaging design, ensuring it meets users' functional and emotional needs.

In the ideation phase, design thinking encourages brainstorming and generating a wide range of ideas for packaging. This can include exploring new materials, shapes, and forms that not only attract attention but also improve functionality. A study by Koller et al. (2020) discusses how prototyping different packaging concepts allows designers to test hypotheses about consumer reactions and usability. Rapid prototyping can lead to innovative solutions that stand out in a crowded marketplace.

Design thinking also plays a crucial role in addressing sustainability in packaging. As consumers become more environmentally conscious, packaging designers must consider the ecological impact of their materials and processes. Research by Bocken et al. (2016) emphasizes the importance of incorporating sustainable practices into the design thinking process. This includes selecting renewable materials and designing for recyclability, which not only meets consumer demand but also aligns with broader corporate social responsibility goals. The iterative nature of design thinking allows for continuous refinement of packaging designs based on consumer feedback. Research by McMahon et al. (2021) indicates that iterative testing can lead to significant improvements in packaging effectiveness, as it provides opportunities to address issues identified by consumers in real-time. This process fosters innovation and adaptability, ensuring that packaging evolves to meet changing consumer preferences.

3.4 Challenges and Limitations

While design thinking has shown significant benefits, there are challenges and limitations to its implementation. One challenge is the resistance to change within organizations, particularly in traditional sectors like automotive (Luchs et al., 2016). Moreover, the iterative nature of design thinking can be time-consuming and may not align with the fast-paced demands of the market.

Another limitation is the potential for bias in the empathize stage. If the target audience is not adequately represented, the solutions generated may not effectively address the needs of all users (Kelley, 2016). Thus, it is crucial for organizations to ensure diverse stakeholder involvement throughout the design thinking process. Design thinking also faces specific challenges and limitations when applied to the consumer packaging industry.

1. **Sustainability Pressures**: The consumer packaging industry is under increasing pressure to adopt sustainable practices. Design thinking must balance the need for innovative, user-friendly packaging with environmental considerations. This dual focus can complicate the design process and require additional resources for sustainability assessments and material sourcing.
2. **Rapid Market Changes**: Consumer preferences and market trends in the packaging industry can change rapidly. Design thinking requires continuous iteration and adaptation to stay relevant. However, the fast-paced nature of consumer markets can make it challenging to keep up with evolving demands and preferences
3. **Cost Constraints**: Cost is a significant factor in consumer packaging. Design thinking often involves exploring new materials and innovative designs, which can be expensive. Balancing the need for cost-effective solutions with the desire for innovative packaging can be a major challenge for companies

4.0 Conclusion

Design thinking has emerged as a transformative approach in both the automotive and consumer packaging industries. By prioritizing user experience and sustainability, organizations can drive innovation and create products that resonate with consumers. However, overcoming internal resistance and ensuring diverse perspectives are critical to maximizing the benefits of design thinking. Future research should explore the long-term impacts of design thinking on product success and consumer satisfaction in these sectors.

The synergy between customer engagement and product development is essential for businesses striving to innovate in today's competitive landscape. By adopting design thinking methodologies that emphasize empathy, collaboration, and iterative testing, companies can create products that resonate with users and foster loyalty. As industries continue to evolve, maintaining a focus on customer-centric approaches will be crucial for driving meaningful innovation.

The application of design thinking in consumer packaging enhances the relevance and effectiveness of packaging solutions. By focusing on empathy, ideation, sustainability, and iterative testing, companies can create packaging that not only meets consumer needs but also contributes positively to their brand image and environmental goals. As the market continues to evolve, the integration of design thinking will be essential for driving innovation in consumer packaging.

Design thinking presents both opportunities and challenges across various industries, including automotive and consumer packaging. In the automotive sector, its user-centered approach can drive innovation and enhance user experiences. However, complexities in supply chains, high costs, technological integration, and resistance to cultural change can impede its effectiveness.

Similarly, in the consumer packaging industry, design thinking can foster sustainable and creative packaging solutions. Yet, challenges such as sustainability pressures, rapid market changes, cost constraints, and regulatory compliance can complicate its implementation.

Overall, while design thinking encourages innovation and empathy in product development, its successful application requires addressing these challenges through strategic planning, collaboration, and adaptability. As industries continue to evolve, embracing design thinking while navigating its limitations will be crucial for fostering innovation and meeting consumer demands effectively.

References

1. Brown, T. (2008). Design thinking. *Harvard Business Review*, 86(6), 84-92.
2. Fischer, T., Hübner, A., & Wills, J. (2019). Design thinking in the automotive industry: A case study of BMW. *International Journal of Automotive Technology and Management*, 19(2), 97-112.
3. Kelley, T. (2016). *Creative confidence: Unleashing the creative potential within us all*. Crown Business.
4. Kelley, T., & Kelley, D. (2013). *Creative confidence: Unleashing the creative potential within us all*. Crown Business.
5. Liedtka, J. (2011). Teaching design thinking to college students. *Journal of Management Education*, 35(5), 708-728.
6. Luchs, M. G., Swan, S., & Griffin, A. (2016). Design thinking: New product development essentials from the PDMA. *Wiley*.
7. Michels, C. (2016). Ford's design thinking approach to product development. *Automotive News*, 90(5), 34-36.
8. Smith, J. (2014). Coca-Cola's 'Share a Coke' campaign: A case study in packaging design. *Packaging Technology and Science*, 27(3), 147-155.
9. Unilever. (2020). Unilever sustainable living plan: Our vision. Retrieved from https://www.unilever.com/sustainable-living/
10. Fischer, T., Hübner, A., & Wills, J. (2019). Design thinking in the automotive industry: A case study of BMW. *International Journal of Automotive Technology and Management*, 19(2), 97-112.
11. Kimbell, L., 2009. Beyond design thinking : Design-as-practice and designs-in-practice. European Academy of Management, pp.1–15
12. https://star.global/
13. Ming Li, Packaging Design and the Changing Needs of End Consumers, Vol 4 No 6 (2021): Proceedings of Business and Economic Studies
14. Chao-Ming Yang, "Applying Design Thinking as a Method for Teaching Packaging Design
15. , Journal of Education and Learning 7(5):52, June 2018, DOI: 10.5539/jel.v7n5p52

16. Kuo, T. H., & Chiu, H. C. (2019). The influence of packaging design on consumer purchase intention: The mediating role of product attitude. *International Journal of Retail & Distribution Management*, 47(4), 467-484. doi:10.1108/IJRDM-10-2018-0245
17. Koller, M., Huber, M., & Schuster, A. (2020). Prototyping in packaging design: A systematic review. *Journal of Design Research*, 18(3), 207-220. doi:10.1504/JDR.2020.109800
18. Bocken, N. M. P., Short, S. W., Rana, P., & Evans, S. (2016). A literature and practice review to develop sustainable business model archetypes. *Journal of Cleaner Production*, 65, 42-56. doi: 10.1016/j.jclepro.2013.11.039
19. McMahon, C. A., Dorr, M., & O'Leary, M. (2021). Iterative testing in packaging design: Implications for consumer products. *Packaging Technology and Science*, 34(3), 145-158. doi:10.1002/pts.2528
20. Brennan, L. *et al.* (2021). The Wicked Problem of Packaging and Consumers: Innovative Approaches for Sustainability Research. In: Muthu, S.S. (eds) Sustainable Packaging. Environmental Footprints and Eco-design of Products and Processes. Springer, Singapore. https://doi.org/10.1007/978-981-16-4609-6_6
21. https://www.inorigin.eu/how-can-design-thinking-enhance-industrial-product-development/