

Transforming Product Concepts in Digital Ecosystems: A Systematic Review of Offering, Personalization, and Co-Creation Strategies

Early Harison Mahardika^{1*}, Dinda Ocvita Windi Pratiwi², Resty Agustin³, Titis Shinta Dewi⁴

Universitas Negeri Malang

Corresponding Author: Early Harison Mahardika

earlymahardhika.2404138@students.um.ac.id

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ABSTRACT

This study systematically examines the trends, key themes, and research gaps in the literature concerning personalization and customization of digital product offerings. Utilizing a Systematic Literature Review (SLR) approach based on the PRISMA protocol, a total of 36 selected articles from the Scopus database covering the period 2020–2025 were analyzed descriptively, thematically, and in terms of content. Findings indicate that personalization has now extended into strategic, emotional, and predictive dimensions, through the application of AI technologies, affective-based user experience (UX), and consumer self-values. Identified research gaps include the lack of integration between technological and behavioral aspects, limited exploration in social contexts such as digital health and education, as well as a shortage of longitudinal and cross-cultural studies. This study contributes a conceptual map and thematic taxonomy that support the development of theory and more adaptive and ethical digital personalization business strategies. These findings also enrich the formation of a future research agenda that is reflective and multidisciplinary in nature.

INTRODUCTION

This advancement of digital technologies such as artificial intelligence (AI), big data, the Internet of Things (IoT), and the transition toward Industry 4.0 and 5.0 has fundamentally transformed the market landscape, driving an increase in the individualization of products and the personalization of consumer experiences. Consumers today not only demand high-quality products but also expect personalization that encompasses features, aesthetics, and even the purchasing process—aligning with their personal preferences, values, and emotions. In this context, the personalization and customization of digital products are no longer merely competitive advantages, but essential prerequisites for maintaining customer loyalty and engagement (NielsenIQ, 2022; Choi et al., 2021). Companies in the digital era are expected to implement data-driven personalization strategies, adaptive interfaces, and product designs that are flexible and modular (Tseng et al., 2020; Bouchard et al., 2023).

The urgency of this study is underscored by the fact that digitalization not only shifts consumer behavior but also redefines the value proposition of companies. Personalization has been shown to enhance customer retention, drive purchase conversion, and strengthen brand image by creating emotionally relevant experiences (Doe et al., 2023; Ghann, 2024). In service-based digital marketing, personalization has become a key element, requiring the integration of technological systems, behavioral modeling, and in-depth UX approaches (Märtin et al., 2021; Mereu, 2024). Even in the manufacturing sector and luxury product industries, there has been increased adoption of customization through smart configurations, co-creation, and digital transformations that support real-time adaptive production (Paul et al., 2024; El Assad et al., 2025).

Despite a growing number of publications on digital product personalization and customization, several conceptual and methodological gaps remain unaddressed. Much of the existing literature remains confined to theoretical frameworks and has yet to integrate cross-industry approaches or reconcile technological aspects with behavioral dimensions. For example, Thomas et al. (2021) focus on mass personalization in the manufacturing industry without accounting for real-time consumer data integration. Tseng et al. (2020) present modular design concepts but do not connect them with UX or digital marketing contexts. Meanwhile, Pallant et al. (2021) emphasize psychological aspects such as self-congruity, without discussing supporting technologies for customization behavior. The study by Wang et al. (2022) reviews the shift from mass customization to mass personalization, but remains limited to the manufacturing context and does not explore emotional dimensions in digital interactions. Bouchard et al. (2023) raise issues regarding manufacturing SMEs but fall short of exploring the relationship between digital readiness and data-driven personalization strategies.

Furthermore, Märtin et al. (2021) discuss emotion-based interface personalization, but without direct linkage to product customization. Triangle Town Center (2024) and Lim et al. (2022) highlight personalization trends in e-commerce but fail to propose a conceptual framework that integrates technological, behavioral, and value dimensions. Piepponen et al. (2022) examine

value transformation through personalization, yet do not distinguish its impact across different sectors. Pech and Vrchota (2022) develop a digital customization model within Industry 4.0, but overlook the affective aspects of users. Smith (2023) reviews personalization strategies in general, without differentiating between user-based and product-based approaches. Choi et al. (2021) explore consumer preferences in luxury products but do not relate them to digital recommendation systems. The works of Hornstein et al. (2023) and Shen et al. (2021) investigate personalization in the contexts of healthcare and the metaverse, respectively, yet fail to provide a comprehensive cross-context synthesis. Even publications such as Contentful (2023) and Okorie et al. (2024) tend to be exploratory and trend-based, lacking a robust research taxonomy.

These gaps highlight the need for a systematic review capable of integrating cross-sectoral, interdisciplinary, and methodological approaches in examining the evolution and implementation of personalization and customization in digital products. Therefore, this study adopts a Systematic Literature Review (SLR) approach to synthesize key findings from the past five years, while identifying trends, conceptual taxonomies, and untapped research opportunities. The SLR approach not only filters methodologically relevant literature but also maps emerging patterns and crucial cross-sectoral connections essential for a comprehensive understanding of digital personalization dynamics.

This study aims to systematically examine the trends, key findings, and research directions related to the personalization and customization of digital products. It also seeks to identify dominant methodologies, construct a thematic classification, and formulate a future research agenda based on the identified gaps. Thus, the study's contribution is expected to be not only theoretical—advancing the body of knowledge in digital marketing and innovation management—but also practical, by supporting the design of adaptive, customer-centric personalization strategies.

Based on the above background, this article proposes three main research questions: (1) How have trends and approaches in the study of digital product personalization and customization evolved over the past five years? (2) What are the dominant conceptual and methodological dimensions? (3) What gaps in the literature can serve as a foundation for future research?

THEORETICAL REVIEW

The evolution of digitalization has revolutionized the relationship between producers and consumers, shifting from transactional interactions to emotional and adaptive relationships driven by data. Within this context, two central concepts underpinning innovation in digital product offerings are personalization and customization. Although often used interchangeably, these two concepts differ fundamentally in both ontological and epistemological terms. Customization requires direct user intervention to determine product attributes prior to consumption, whereas personalization is automated, controlled by systems or algorithms that respond to users' historical and contextual data (Wang et al., 2024). The evolution of these concepts reflects a shift from modular-

based mass customization to mass personalization powered by artificial intelligence and real-time data processing (Thomas et al., 2021; Roberts, 2023).

Theoretically, studies on personalization and customization are grounded in strategic frameworks, consumer psychology, and advancements in digital technologies. The customer-centricity approach emphasizes the importance of deeply understanding customer behavior in achieving competitive advantage (Doe et al., 2023). From a psychological perspective, the theory of self-congruity posits that consumers are more likely to choose products that reflect their self-identity, and effective personalization can enhance emotional engagement and perceptions of authenticity (Pallant et al., 2021; Choi et al., 2021). Meanwhile, the paradigm of value co-creation positions consumers as active participants in value generation through dynamic interaction with digital systems (Agarwal et al., 2022).

From a technological standpoint, innovations such as recommendation engines and data-driven UX enable product adaptation down to micro-level and emotional preferences (Ghann, 2024; Märtin et al., 2021). Big data analytics and machine learning provide the capacity to identify granular patterns in user behavior and predict their needs—even before they are consciously realized (Okorie et al., 2024). Concurrently, product modularization is now reinforced by configuration-as-a-service systems, allowing users to customize product specifications flexibly within a real-time digital ecosystem (Tseng et al., 2020; Bouchard et al., 2023).

The implementation of personalization and customization in practice spans a range of significant contexts. In the manufacturing sector, including SMEs and smart manufacturing, digitalization enables high product variety without compromising efficiency (El Assad et al., 2025; Pech & Vrchota, 2022). In digital retail, personalization serves as a key tool for enhancing customer retention and conversion through tailored visual content and responsive interfaces (NielsenIQ, 2022; Smith, 2023). In the luxury goods industry, luxury personalization strategies allow users to configure designs that reflect their personal identity (Paul et al., 2024). Even within immersive technologies such as the metaverse, personalization strategies have been shown to enhance purchase intentions and engagement by delivering user-centric virtual experiences (Shen et al., 2021).

Despite the breadth of contributions in the literature, the connections among them remain fragmented. Thomas et al. (2021) and Wang et al. (2022) focus on technology and manufacturing but overlook psychological dimensions of consumer behavior. Conversely, Choi et al. (2021) and Pallant et al. (2021) emphasize consumer motivations and identity, yet do not link these insights with technological dimensions. Technical studies such as those by Ghann (2024) and Okorie et al. (2024) address AI and big data but lack sectoral context. Contentful (2023) presents trend-based observations but offers limited scholarly conceptualization. Hornstein et al. (2023) and Malthouse et al. (2023) underscore the importance of relevance in personalization, yet fall short of developing cross-sector adaptive approaches. Piepponen et al. (2022) and Sissonen (2024) highlight the importance of digital value, but do not systematically connect it to user

behavior and business models. Therefore, the current body of literature still requires a comprehensive synthesis capable of integrating strategy, behavior, and technology across a broader industrial spectrum

METHODOLOGY

This study adopts a Systematic Literature Review (SLR) approach as the primary method to identify, evaluate, and synthesize scholarly literature relevant to the topics of personalization and customization in digital product offerings. This approach enables the development of scientific knowledge that is not only cumulative but also reflective of the dynamics and evolving directions of the research field (Snyder, 2019). The SLR procedure in this study follows the framework of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), which is widely recognized across disciplines as the gold standard for systematic reporting (Page et al., 2021).

The initial stage of the research design involved literature retrieval from credible sources. All articles were sourced from the Scopus database, selected for its comprehensive coverage of reputable journals across quartiles Q1 to Q4, and its capability to provide bibliometric metrics such as citation counts, journal rankings, and author affiliations, which are essential for subsequent analytical purposes (Elsevier, 2023).

Article selection was conducted by applying strict inclusion and exclusion criteria. The inclusion criteria were as follows: (1) studies that discuss personalization, customization, or both in the context of digital products; (2) publications indexed in Scopus (Q1-Q4); (3) published between 2020 and 2025; (4) full-text availability; and (5) written in English. Conversely, articles were excluded if they were non-academic in nature (e.g., editorials, opinion pieces, blogs), duplicates, or lacked relevant theoretical or conceptual contributions.

Data collection was carried out through the use of strategic keywords designed to capture various dimensions of the topic. Key phrases included: "digital product personalization", "product customization", "mass personalization", "customer-centric digital strategy", "digital experience customization", and "Industry 4.0 personalization". The search was expanded using Boolean operators "AND" and "OR", for example: ("product personalization" OR "product customization") AND ("digital experience" OR "Industry 4.0").

All retrieved articles were screened through the four PRISMA stages: identification, preliminary screening (based on title and abstract), eligibility assessment (full-text review), and final selection. This process yielded 36 articles that met all criteria and were included in the final synthesis. The entire process is illustrated in a PRISMA diagram in accordance with systematic reporting guidelines (Page et al., 2021).

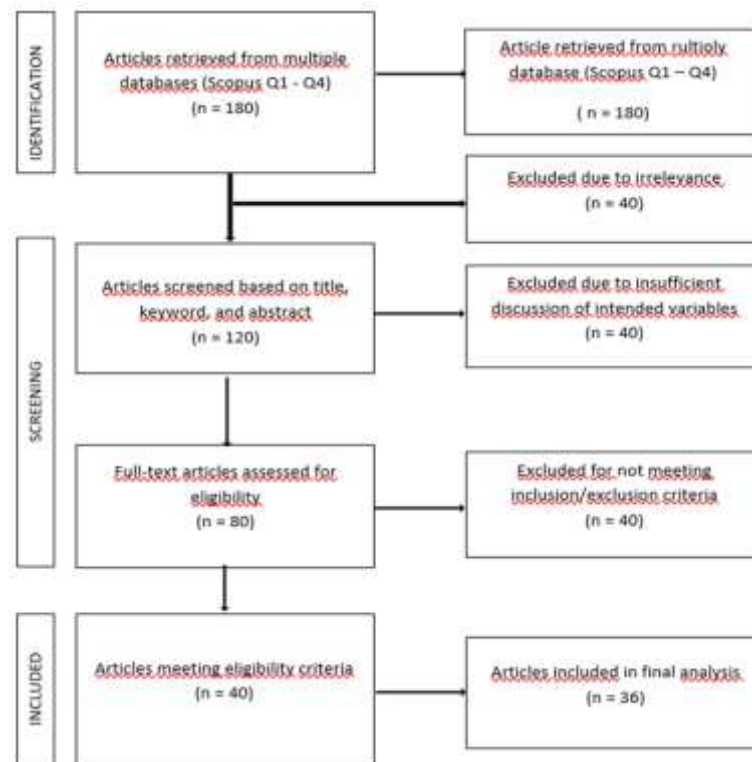


Figure. 1 PRISMA Flowchart

Data analysis was conducted through three approaches: descriptive, thematic, and content analysis. Descriptive analysis was used to map the distribution of articles based on publication year, research methods, industry sectors, and journal sources (Salvador et al., 2020). Thematic analysis categorized articles according to main themes such as personalization strategies, enabling technologies, consumer behavior, and application contexts (Wang et al., 2024; Ungerman & Dědková, 2023). Meanwhile, content analysis was employed to examine the conceptual structures, theoretical contributions, and key models presented in each study (Basu & Muylle, 2023; Pech & Vrchota, 2022).

By applying a rigorous methodology and comprehensive analytical techniques, this study establishes a robust and well-structured scientific foundation for mapping the current research landscape on digital product personalization and customization. The use of this method is intended to ensure credibility, data traceability, and to minimize bias in the processes of synthesis and interpretation (Snyder, 2019; Page et al., 2021).

RESULTS

General Description of the Literature

This study analyzed 36 scholarly articles selected through the SLR process, all of which were published between 2020 and 2025. These articles reflect a growing academic and practical interest in the topics of personalization and customization in digital product offerings, in line with the accelerated pace of digital transformation and the adoption of Industry 4.0 and 5.0 technologies. The distribution of articles by year reveals an upward trend, with the highest concentration of publications appearing in 2023 and 2024. Studies such as

Bouchard et al. (2023), Paul et al. (2024), Okorie et al. (2024), Asta and Bissinger (2025), and Wang et al. (2024) highlight the role of big data, smart configuration, and digital platforms in personalization strategies. Meanwhile, articles from the 2020–2022 period, including Salvador et al. (2020), Tseng et al. (2020), Pallant et al. (2021), Wang et al. (2022), and Pech and Vrchota (2022), provide the theoretical groundwork, particularly concerning modularization and the self-congruity approach.

Geographically, although not all studies explicitly state their location, the majority originate from regions with advanced digital research ecosystems, such as Germany, the United Kingdom, the United States, the Netherlands, and the Nordic countries. European institutional dominance is evident in works such as Thomas et al. (2021), Bosch and Olsson (2021), and Märtin et al. (2021), which focus on smart manufacturing and affective-based UX. In contrast, studies from Asia and the Nordics, such as those by Shen et al. (2021), Piepponen et al. (2022), and Micken et al. (2020), explore contexts related to digital media and virtual commerce.

The methodologies employed are diverse. Qualitative studies and case analyses are found in Bouchard et al. (2023), El Assad et al. (2025), Bosch and Olsson (2021), and Sissonen (2024). Quantitative approaches based on experiments and surveys are utilized by Pallant et al. (2021), Choi et al. (2021), and Malthouse et al. (2023). The SLR and bibliometric methods are explicitly adopted by Shen et al. (2021), Wang et al. (2024), and Salvador et al. (2020), strengthening the accuracy of the conceptual synthesis. Several other studies are conceptual and descriptive in nature, such as those by the Contentful Team (2023), Dholakia (2022), Mereu (2024), and Smith (2023), which present narratives on the evolution and trends in personalization strategies.

Thematically, the scope of the literature is broad. The integration of personalization in manufacturing and Industry 4.0/5.0 is addressed in Wang et al. (2022), Thomas et al. (2021), and Asta & Bissinger (2025). Digital retail and e-commerce are examined in studies by NielsenIQ (2022), Triangle Town Center (2024), and Doe et al. (2023). Research focusing on UX and affective interfaces appears in Märtin et al. (2021), Sissonen (2024), and Hornstein et al. (2023). Personalization within the metaverse and luxury product domains is explored by Shen et al. (2021) and Paul et al. (2024), while digital value and co-creation are emphasized by Micken et al. (2020) and Agarwal et al. (2022).

In terms of publication quality, the majority of articles come from Scopus-indexed journals in quartiles Q1 and Q2, indicating a high level of credibility. Articles by Choi et al. (2021), Piepponen et al. (2022), Wang et al. (2024), and Paul et al. (2024) were published in well-regarded journals in the fields of business and digital technology. Although not indexed in academic databases, publications such as those by the Contentful Team (2023) and Roberts (2023) are still included due to their valuable insights into practical applications within the industry.

Overall, the reviewed literature demonstrates that the study of personalization and customization is evolving progressively, characterized by multidimensional perspectives and cross-sectoral applications. The diversity of

methodologies, domain coverage, and publication quality reinforces the validity and relevance of the findings analyzed in this study.

DISCUSSION

Key Research Trend: The Evolution from Mass Customization to Mass Personalization

One of the most prominent findings in this literature mapping is the conceptual and practical shift from mass customization to mass personalization. This transformation is not merely a terminological change but reflects a fundamental reconfiguration in production approaches, marketing strategies, and patterns of interaction between companies and consumers in the digital era. While mass customization emphasizes modular product adjustments based on explicit customer choices, mass personalization relies on predictions derived from users' historical data and real-time behavioral inputs (Wang et al., 2022; Wang et al., 2024).

Theoretically, this transition is rooted in the foundations of product modularization, as articulated by Tseng et al. (2020), Salvador et al. (2020), and Bouchard et al. (2023), who underscore the importance of configurative design in enabling efficient customization. The application of this approach in the manufacturing sector is reinforced by studies such as Thomas et al. (2021) and Pech and Vrchota (2022), which link modularization and digital readiness to the implementation of personalization services. In the context of SMEs, personalization emerges as both a strategic challenge and opportunity to enhance competitiveness through technological adoption (Bouchard et al., 2023; El Assad et al., 2025).

The progression toward hyper-personalization is evident in studies by Wang et al. (2024), Asta and Bissinger (2025), and Ghann (2024), which demonstrate the utilization of big data, AI, and predictive interaction to craft precise digital experiences. Paul et al. (2024) extend this context to the luxury goods industry, where smart configurations informed by customer insights are supplanting exclusivity as the central differentiating element. Meanwhile, recent industry trends outlined by the Contentful Team (2023), Okorie et al. (2024), and Lim et al. (2022) indicate that dynamic interfaces and real-time AI-driven personalization are becoming increasingly dominant practices.

This transformation also aligns with the shift in digital marketing strategies toward a genuinely customer-centric approach. Studies by Doe et al. (2023), Dholakia (2022), and Mereu (2024) emphasize the importance of personalization systems that are attuned to users' needs, values, and identities. Emotional and psychological aspects are further reinforced through the concepts of self-value and authenticity, as discussed by Pallant et al. (2021) and Choi et al. (2021), who assert that the effectiveness of personalization depends on its ability to foster emotional resonance.

The application of personalization is also expanding into other digital sectors, including virtual UX and mental health platforms. Shen et al. (2021) and Hornstein et al. (2023) demonstrate that personalization approaches in digital environments can enhance user engagement and intervention effectiveness. In the digital media sector, personalization becomes a key differentiator in the value

proposition, as shown in studies by Piepponen et al. (2022) and Micken et al. (2020), which highlight the significance of user control and co-creation models in shaping digital experiences.

Recent literature also reveals a growing tendency to integrate the concepts of servitization and co-creation into personalization strategies (Agarwal et al., 2022; Basu & Muylle, 2023; Sissonen, 2024). This approach reinforces the view that personalization is no longer a supplementary feature but a central pillar in creating customer value and fostering loyalty in the digital age.

Thus, the shift from mass customization to mass personalization reflects a paradigmatic transformation in the design of products, services, and consumer relationships, shaped by the integration of digital technologies, deep psychological understanding, and the complexity of modern industrial contexts (Roberts, 2023; Malthouse et al., 2023; Smith, 2023; Triangle Town Center, 2024).

Key Themes in the Literature

The synthesis of the 36 analyzed articles reveals five dominant themes that shape the conceptual and practical trajectory of research on personalization and customization in digital products. These five clusters illustrate the convergence of design strategies, technological advancements, consumer behavior, and value-based marketing approaches within digital contexts.

First, modular design strategies serve as the technical foundation for the efficient development of customizable products. Studies by Tseng et al. (2020), Salvador et al. (2020), Bouchard et al. (2023), and Wang et al. (2022) emphasize the importance of product architectures that are adaptable to user preferences. In the context of SMEs, the integration of smart manufacturing and modular design opens pathways for affordable mass customization (El Assad et al., 2025; Pech & Vrchota, 2022).

Second, technology-driven personalization emerges as a rapidly evolving theme, particularly through the implementation of recommender systems, big data analytics, and artificial intelligence. These technologies enable real-time and predictive personalization (Ghann, 2024; Okorie et al., 2024; Contentful Team, 2023). Studies by Märtin et al. (2021), Shen et al. (2021), and Hornstein et al. (2023) expand this technological scope into emotion-based UX and digital health, while Lim et al. (2022) and Malthouse et al. (2023) highlight the importance of contextualizing user preferences for the success of these strategies.

Third, psychological factors and self-concept play a critical role in shaping consumer preferences for personalization. Self-congruity, authenticity, and personal identity are shown to influence consumer responses to tailored products (Pallant et al., 2021; Choi et al., 2021; Paul et al., 2024). The emotional and symbolic dimensions of products further reinforce perceived value, particularly in the luxury goods and high-tech sectors (Micken et al., 2020; Smith, 2023; Roberts, 2023).

Fourth, industry contextualization demonstrates that the application of personalization is significantly influenced by sector-specific characteristics. In manufacturing, strategies are directed toward the integration of digital supply chains (Thomas et al., 2021; Bosch & Olsson, 2021). In contrast, the digital and e-

commerce sectors emphasize personalized UX and granular customer journeys (Doe et al., 2023; Triangle Town Center, 2024; Sissonen, 2024). In digital media, co-creation and servitization are key drivers of value through deeper consumer engagement (Piepponen et al., 2022; Agarwal et al., 2022).

Fifth, value-based digital marketing highlights the role of personalization as an integral element in data-driven and empathy-oriented marketing strategies. Studies such as Dholakia (2022), Mereu (2024), and Ungerman & Dědková (2023) underscore the importance of customer data, empathy design, and AI-enabled engagement in fostering long-term loyalty. These strategies support precision targeting and enhance digital communication through customer experience-based interactions (Malthouse et al., 2023; Okorie et al., 2024; Wolniak & Grebski, 2023).

Research Gaps and Future Research Directions

Although the literature on digital product personalization and customization has expanded rapidly over the past five years, several critical gaps remain, offering ample opportunities for further academic exploration. These gaps span conceptual, methodological, and contextual domains that have yet to be fully addressed.

First, there is a lack of integration between technological aspects and consumer behavior. Many studies emphasize the technical dimension, yet overlook psychological variables such as perceived value, identity affiliation, and affective preferences (Ghann, 2024; Okorie et al., 2024; Contentful Team, 2023). Conversely, approaches that highlight self-authenticity and identity motivation, as seen in Pallant et al. (2021) and Choi et al. (2021), are rarely linked to the adaptive capabilities of AI-based personalization technologies. This imbalance reveals a weak integration between theory and practice in developing holistic personalization systems.

Second, much of the current research remains concentrated on the manufacturing, retail, and luxury product sectors (Bouchard et al., 2023; Roberts, 2023; Paul et al., 2024), while non-commercial domains such as digital health, adaptive education, and public services remain underexplored. Although Hornstein et al. (2023) have demonstrated the potential of mental health platforms, their study does not delve into the long-term intervention aspects. Similarly, preference-based learning systems (smart education) are still scarcely addressed in the recent literature.

Third, the limited use of longitudinal and experimental approaches constrains the understanding of personalization's long-term impact. Most studies adopt cross-sectional or conceptual designs without longitudinal testing (Malthouse et al., 2023; Wang et al., 2024). Yet, the dynamics of consumer perception and its influence on customer loyalty require deeper investigation through field experiments and AI-based behavioral analytics.

Fourth, geographic bias toward Western Europe and North America remains a critical issue (Bosch & Olsson, 2021; Ungerman & Dědková, 2023). The underrepresentation of Southeast Asia, Africa, and Latin America limits our understanding of cultural variability and digital readiness, both of which affect

the effectiveness of personalization. Thus, comparative cross-cultural studies are urgently needed.

Fifth, ethical, privacy, and regulatory concerns are rarely discussed in depth. While Piepponen et al. (2022) and Micken et al. (2020) touch on the issue of user data control, broader debates around algorithmic transparency, potential manipulation, and impacts on consumer autonomy have not yet been integrated into the dominant theoretical frameworks.

Sixth, there is significant potential to develop hybrid models that combine co-creation with machine-based personalization. Studies by Agarwal et al. (2022), Basu and Muylle (2023), and Sissonen (2024) highlight the need for systems that allow consumers to play an active role, rather than remaining passive targets of algorithmic processes.

Based on these findings, future research agendas should be directed toward: (1) developing integrative models that bridge technology and consumer psychology; (2) applying personalization strategies in social and public sectors; (3) strengthening methodological rigor through longitudinal and experimental approaches; (4) expanding research into diverse geographic and cultural contexts; and (5) constructing ethical frameworks that ensure personalization practices are fair, transparent, and responsible.

Theoretical and Practical Implications

The findings of this study offer significant contributions both theoretically and practically. From a theoretical standpoint, the results of the SLR expand the understanding that personalization and customization are no longer merely viewed as marketing strategies or product innovations. Rather, they represent a new epistemological framework that integrates product design, consumer behavior, and digital technologies into a unified value system. This development marks a shift from explicit user choice-based approaches to predictive and contextual systems that combine AI, big data, and emotion-driven UX (Märting et al., 2021; Ghann, 2024).

The primary theoretical implication is the need to revise classical models in marketing and product innovation. Concepts such as value co-creation (Agarwal et al., 2022), self-congruity theory (Pallant et al., 2021), and customer experience design (Mereu, 2024) must be recontextualized within a hybrid interaction framework between humans and autonomous personalization systems. This transformation also demands the development of theories that bridge modular design, flexible manufacturing, and the evolving dynamics of consumer preferences (Bouchard et al., 2023; Wang et al., 2024).

Methodologically, the findings underscore the importance of multi-method approaches in personalization research. Conceptual studies should be complemented with experiments, longitudinal research, and user data-driven simulations to capture the adaptive dynamics of consumers in rapidly evolving digital ecosystems (Malthouse et al., 2023; Sissonen, 2024). Accordingly, interdisciplinary approaches—spanning behavioral science, information systems, and industrial engineering—are increasingly essential in enriching the academic foundation of this field.

Practically, this study presents a strategic framework relevant to companies seeking to design differentiation strategies and foster customer loyalty. First, personalization has become a core component of the value proposition, no longer merely a segmentation tool. In digital marketing practice, systems such as real-time recommenders and adaptive content interfaces determine the effectiveness of emotionally engaging and contextually relevant campaigns (Contentful Team, 2023; Okorie et al., 2024). Second, customization goes beyond offering choices; it creates a sense of ownership that strengthens emotional affiliation with the brand (Choi et al., 2021; Micken et al., 2020).

For manufacturing firms and SMEs, this study reinforces the importance of digitalization that enables flexible product configuration, as emphasized by Bouchard et al. (2023), El Assad et al. (2025), and Thomas et al. (2021). Modularization, IoT integration, and the capacity for rapid market responsiveness are key to maintaining relevance and competitive advantage. In service sectors and immersive technologies such as the metaverse and digital health, the importance of UX design that is sensitive to micro-preferences and emotional dimensions is a central concern (Shen et al., 2021; Hornstein et al., 2023).

Finally, this study stresses that the implementation of personalization systems must also account for ethical dimensions, data privacy, and algorithmic transparency. The collection of sensitive data, risks of manipulation, and biases in recommendation systems demand the development of a robust and sustainable governance framework (Piepponen et al., 2022; Micken et al., 2020).

CONCLUSIONS AND RECOMMENDATIONS

The analysis of 36 articles from Scopus-indexed, high-impact journals over the past five years reveals several critical findings. First, regarding research trends, this study highlights a fundamental shift from mass customization to mass personalization driven by predictive technologies. Personalization has evolved from limited modular choices to adaptive and contextual systems powered by big data, artificial intelligence, and emotionally attuned user experiences. This reflects a convergence of product design, consumer behavior, and digital technology within an increasingly complex ecosystem.

Second, the literature synthesis identifies five dominant themes: the strategic design and modularization of digital products; the implementation of technologies such as recommender systems and affective-based UX; the influence of self-concept and emotion on user experience; the sectoral diversity of applications – from manufacturing to the metaverse; and the use of data-driven marketing approaches alongside value-based differentiation. These findings underscore the necessity of a multidisciplinary approach to comprehensively understand digital personalization.

Third, in terms of research gaps and directions, the study reveals that the existing literature remains fragmented and has yet to effectively integrate advanced technologies with deep psychological insights into consumer behavior. Areas such as personalization in digital healthcare services, adaptive education, and non-Western geographic contexts remain underexplored. Methodological

shortcomings—particularly the lack of longitudinal research, long-term experimental studies, and cross-cultural comparisons—highlight the need for more reflective and normatively integrated research approaches.

The main contribution of this study lies in its ability to formulate a cross-sectoral conceptual map and thematic taxonomy, as well as to propose a strategic and responsible future research agenda. Beyond offering a comprehensive academic synthesis, this article provides a conceptual framework and critical reflection to support the development of more human-centered, adaptive, and sustainable innovations in digital personalization.

FURTHER STUDY

Future research is encouraged to examine this topic using broader data sources, diverse contexts, and more advanced analytical approaches to deepen the understanding of digital product transformation strategies.

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REFERENCES

- Abbad, M., Jaber, F., AlQeisi, K., & Eletter, S. (2021). Artificial intelligence, big data, and value co-creation: A conceptual model. In *Lecture Notes in Networks and Systems* (pp. 465–480). Springer. https://link.springer.com/chapter/10.1007/978-3-030-62796-6_28
- Agarwal, G. K., et al. (2022). Value-capture in digital servitization. *Journal of Business Research*. https://research.cbs.dk/files/96202383/girish_kumar_agarwal_et_al_value-capture_in_digital_servitization_acceptedversion.pdf
- Asta, P., & Bissinger, B. C. (2025). Human-centered personalization in Industry 5.0: Toward hyper-customized digital products. *Computers in Industry*. <https://doi.org/10.1016/j.compind.2024.103910>
- Barile, S., Bassano, C., Piciocchi, P., & Saviano, M. (2024). Empowering value co-creation in the digital age. *Journal of Business & Industrial Marketing*. <https://www.emerald.com/insight/content/doi/10.1108/JBIM-12-2019-0553/full/html>
- Basu, A., & Muylle, S. (2023). Creating new digital products. In *Business Model Innovation and Data-Driven Strategies*. Springer. https://link.springer.com/chapter/10.1007/978-3-031-23440-8_4

- Bosch, J., & Olsson, H. H. (2021). Digital transformation of companies in the embedded systems domain. *Journal of Software: Evolution and Process*. <https://onlinelibrary.wiley.com/doi/pdfdirect/10.1002/smr.2333>
- Bouchard, Stéphanie., Gamache, Sébastien., Abdounour, Georges. (2023). Operationalizing mass customization in manufacturing SMEs. *Sustainability*. 15(4). <https://doi.org/10.3390/su15043028>
- Chandra, B., & Rahman, Z. (2024). Artificial intelligence and value co-creation: A review, conceptual framework and directions for future research. *Journal of Service Theory and Practice*. <https://www.emerald.com/insight/content/doi/10.1108/JSTP-03-2023-0097/full/html>
- Choi, Dayeon., Seo, Yuri., Septianto, Felix., Ko, Eunju. (2021). Luxury customization and self-authenticity. *Journal of Business Research*. <https://www.sciencedirect.com/science/article/abs/pii/S0148296321009383>
- Contentful Team. (2023). 9 exciting personalization trends to watch for in 2024. *Contentful Blog*. <https://www.contentful.com/blog/personalization-trends/>
- Contentful Team. (2023). 9 exciting personalization trends to watch for in 2024. *Contentful Blog*. <https://www.contentful.com/blog/personalization-trends/>
- Dholakia, U. (2022). *Advanced introduction to digital marketing*. Edward Elgar Publishing. <https://books.google.com/books?hl=en&lr=&id=d2-VEAAAQBAJ&oi=fnd&pg=PR1>
- Doe, J., et al. (2023). *Mass customization and customer centricity*. Springer Professional. <https://www.springerprofessional.de/en/mass-customization-and-customer-centricity/25839786>
- El Assad, N., et al. (2025). Smart manufacturing paradigms in the context of Industry 4.0: Bibliometric analysis. *E3S Web of Conferences*. https://www.e3s-conferences.org/articles/e3sconf/pdf/2025/01/e3sconf_icegc2024_00035.pdf
- Gao, L., Li, G., Tsai, F., Gao, C., Zhu, M., & Qu, X. (2023). The impact of artificial intelligence stimuli on customer engagement and value co-creation: The moderating role of customer ability readiness. *Journal of Research in Interactive Marketing*, 17(3), 429–453. <https://www.emerald.com/insight/content/doi/10.1108/jrim-10-2021-0260/full/html>

- Ghann, J. (2024). Personalization technology in 2025 explained. Fast Simon. <https://www.fastsimon.com/ecommerce-wiki/personalization/personalization-technology-explained-upcoming-trends/>
- Hornstein, S., et al. (2023). Personalization strategies in digital mental health interventions. *Frontiers in Digital Health*. <https://www.frontiersin.org/articles/10.3389/fdgth.2023.1170002/full>
- Jain, G., Paul, J., & Shrivastava, A. (2021). Hyper-personalization, co-creation, digital clienteling and transformation. *Journal of Business Research*, 136, 651–663. <https://www.sciencedirect.com/science/article/pii/S0148296320307918>
- Lim, M., et al. (2022). Personalization in personalized marketing: Trends and ways forward. *Journal of Consumer Behaviour*. <https://onlinelibrary.wiley.com/doi/full/10.1002/mar.21670>
- Malthouse, E. C., et al. (2023). Personalisation (in)effectiveness in email marketing. *Journal of Retailing and Consumer Services*. <https://www.sciencedirect.com/science/article/pii/S2666954423000066>
- Manser Payne, E. H., Dahl, A. J., & Peltier, J. (2021). Digital servitization value co-creation framework for AI services: A research agenda for digital transformation in financial service ecosystems. *Journal of Research in Interactive Marketing*, 15(4), 570–586. <https://www.emerald.com/insight/content/doi/10.1108/JRIM-12-2020-0252/full/html>
- Märting, C., Bissinger, B. C., & Asta, P. (2021). Optimizing the digital customer journey – Improving user experience by exploiting emotions, personas, and situations. *Journal of Consumer Behaviour*. 22(5). 1050-1061. <https://doi.org/10.1002/cb.1964>
- Mereu, S. (2024). The age of digital services marketing. In *The Digital Journey of Banking and Insurance*. Taylor & Francis. <https://www.taylorfrancis.com/chapters/edit/10.1201/9781003384960-13/age-digital-services-marketing-sebastiano-mereu>
- Micken, K. S., et al. (2020). The digital continuum: Ownership, access, and cocreation. *Journal of Strategic Marketing*. <https://link.springer.com/article/10.1007/s13162-019-00149-5>
- Moghrabi, I. A. R., et al. (2023). Digital transformation and its influence on sustainable manufacturing and business practices. *Sustainability*. <https://www.mdpi.com/2071-1050/15/4/3010>

- Nair, P., & Kumar, S. (2025). Crafting couture: AI's role in personalizing unique consumer experiences through co-creation. In *Artificial Intelligence for Fashion, Retail, and Apparel Management* (pp. 101-120). IGI Global. <https://www.igi-global.com/chapter/crafting-couture/359105>
- NielsenIQ. (2022). Personalizing product pages for customer loyalty. NielsenIQ Insights. <https://nielseniq.com/global/en/insights/education/2022/personalizing-product-pages-for-customer-loyalty/>
- Okorie, E., et al. (2024). Leveraging big data for personalized marketing campaigns: A review. *International Journal of Management & Entrepreneurship Research*. <https://www.researchgate.net/publication/378293643>
- Pallant, Jessica L., Karpen, Ingo O., Sands, Sean J. (2021). What drives consumers to customize products? The mediating role of self-congruity. *Journal of Retailing and Consumer Services*. <https://www.sciencedirect.com/science/article/abs/pii/S0969698921003398>
- Paul, J., et al. (2024). Mapping the future of tech-infused luxury: A roadmap and research agenda. *International Journal of Consumer Studies*. <https://onlinelibrary.wiley.com/doi/10.1111/ijcs.13103>
- Pech, M., & Vrchota, J. (2022). The product customization process in relation to Industry 4.0 and digitalization. *Processes*. <https://www.mdpi.com/2227-9717/10/3/539>
- Piepponen, A., Ritala, P., & Keränen, J. (2022). Digital transformation of the value proposition: A case study in the media industry. *Journal of Business Research*. <https://www.sciencedirect.com/science/article/pii/S0148296322004404>
- Roberts, G. (2023). Why mass customisation will dominate in 2025. LinkedIn Articles. <https://www.linkedin.com/pulse/why-mass-customisation-dominate-2025-gethin-roberts-jlrse>
- Sabrin, A., Alviansyah, A., & Anca, A. (2024). Analyzing the role of AI and Big Data in personalized branding experiences. *SSRN Electronic Journal*. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5112905
- Salvador, J., et al. (2020). New product development for mass customization: A systematic review. *International Journal of Flexible Manufacturing Systems*. https://www.researchgate.net/publication/271759594_New_product_development_for_mass_customization_a_systematic_review

- Shen, Y., et al. (2021). How to promote user purchase in metaverse? A systematic literature review. *Applied Sciences*. <https://www.mdpi.com/2076-3417/11/23/11087>
- Sissonen, M. (2024). Utilizing customer preferences to enhance digital services. LUT University Master's Thesis. https://lutpub.lut.fi/bitstream/handle/10024/168439/Masters%20Thesis_Sissonen_Miida.pdf
- Smith, F. (2023). The power of personalization in marketing: Strategies for 2025 and beyond. *LinkedIn Articles*. <https://www.linkedin.com/pulse/power-personalization-marketing-strategies-2025-beyond-fredrick-tbq4c>
- Thomas, T. R., et al. (2021). Mass personalisation as a service in Industry 4.0: A resilient response case study. *Procedia CIRP*. <https://www.sciencedirect.com/science/article/abs/pii/S1474034621001907>
- Triangle Town Center. (2024). The rise of personalized shopping: How customization is changing retail in 2025. *Triangle Town Center Blog*. <https://www.triangletowncenter.com/article/66165-the-rise-of-personalized-shopping-how-customization-is-changing-retail-in-2025>
- Tseng, M. M., et al. (2020). Design for mass personalization. *CIRP Annals*. <https://www.sciencedirect.com/science/article/abs/pii/S0007850610000983>
- Ungerma, O., & Dědková, J. (2023). Industry 4.0 and marketing: Towards an integrated future research agenda. *Journal of Open Innovation: Technology, Market, and Complexity*. <https://www.mdpi.com/2199-8531/9/1/30>
- Visconti, R. M., Larocca, A., & Marconi, M. (2017). Big data-driven value chains and digital platforms: From value co-creation to monetization. In *Digital Business and Innovation* (pp. 301–318). CRC Press. <https://api.taylorfrancis.com/content/chapters/edit/download?identifierName=doi&identifierValue=10.1201/b21822-16&type=chapterpdf>
- Wang, Y., et al. (2024). From mass customization to personalization: A review and research agenda. *Technological Forecasting and Social Change*. <https://doi.org/10.1016/j.techfore.2023.122169>
- Wang, Yi., Ma, Hai-Shu., Wang, Ke-Sheng. (2022). Industry 4.0: A way from mass customization to mass personalization production. *Advances in Manufacturing*. 5. 311-320. <http://dx.doi.org/10.1007/s40436-017-0204-7>

Wolniak, R., & Grebski, W. (2023). The customization and personalization of product in Industry 4.0. *Scientific Papers of Silesian University of Technology*. <https://www.researchgate.net/publication/375895933>

Zheng, P., Lin, Y., Chen, C. H., & Xu, X. (2019). Smart, connected open architecture product: An IT-driven co-creation paradigm with lifecycle personalization concerns. *International Journal of Production Research*, 57(6), 1760–1778.
<https://www.tandfonline.com/doi/abs/10.1080/00207543.2018.1530475>