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R&D-BASED COMMUNITY MERCHANDISE INNOVATION: MERGING SYMBOLIC IDENTITY AND FUNCTIONAL DESIGN WITHIN INFORMATICS AND COMPUTER ENGINEERING COMMUNITIES

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Abstract

Through Research and Development (R&D), this project seeks to create novel, community-focused products by fusing functional design with symbolic identity. A total of 106 respondents — comprising students, alumni, and academic staff from Politeknik Negeri Jakarta — participated in the study, which focused on the fields of information and computer engineering. The study examines how product concepts that also meet real-world user needs can incorporate symbolic values, such as professional identity, community logos, and shared pride. Surveys and focus groups were used to collect user preferences, which were then used to develop product prototypes. These included customized mousepads, hoodies, and tech-integrated products that utilized augmented reality (AR), NFC, and QR codes. The results indicate that consumers are very interested in products that combine digital, functional, and symbolic elements, especially when personalization is included. The study effectively demonstrates how community identity can be leveraged to inform effective marketing and product strategies. However, it also identifies certain drawbacks, including a lack of a thorough business model framework, a restricted range of demographics, and a lack of validation of purchase intent. This study contributes to the growing body of research on community-based creative industries, emotional branding, and product innovation. It provides valuable insights into how specialized academic and technological communities can shape the development of products that are both commercially successful and emotionally engaging.

Keywords: Product Innovation, Community Identity, R&D, Merchandise, Emotional Branding, Informatics, and Computer Engineering

Introduction

Within academic and professional ecosystems, the Informatics and Computer Technology (ICT) community possesses a distinct identity, shaped by shared culture, symbols, and values. This identity is reflected not only through scholarly work and technological innovation but also in the ways its members foster solidarity, a sense of belonging, and self-expression. Such a dynamic presents a compelling opportunity to develop creative products that capture and represent the spirit of the community, including merchandise or personalized accessories.

Community-based merchandise serves more than just a decorative or functional purpose. It acts as a medium for self-expression, an emotional connector, and a symbol of pride and affiliation with a particular group. However, to design products that genuinely reflect the ICT community, developers must go beyond assumptions or general trends. A deeper understanding is required of who the members are, what they take pride in, and how they wish to be perceived. These questions form the foundation for meaningful product innovation.

Beyond capturing identity, the next challenge lies in creating relevant and meaningful innovations. For a community that thrives on dynamism and creativity, innovation must extend beyond aesthetics to encompass functionality, symbolic value, and alignment with the community's lifestyle. Without these elements, products often fail to establish an emotional connection with their intended audience.

Therefore, it is equally important to examine how consumers—in this case, members of the ICT community, respond to the developed products. Do they feel represented? Does the product resonate with them? Their response is not merely an evaluation; it is a reflection of how deeply the product resonates with the community's identity and aspirations.

The study is closely connected to the field of management, particularly in the areas of innovation, marketing, and strategy. Through an R&D approach, this study highlights how creative ideas can be transformed

into tangible products that convey both functional value and the symbolic identity of a community. This aligns with the concept of innovation management, which highlights the creation of competitive advantage through the integration of creativity, technology, and market needs.

Furthermore, the integration of symbolic identity and functional design directly relates to marketing management, where community merchandise is positioned not only as a consumer product but also as a representation of shared values, image, and collective pride. Such integration reflects a differentiation strategy, one of the core principles in strategic management, aimed at building sustainable competitiveness. In this way, the study contributes not only to the discourse on community-based product innovation but also demonstrates the practical relevance of management science in nurturing creativity, managing community organizations, and fostering entrepreneurial opportunities.

Methods

This research employs a Research and Development (R&D) design with a mixed-methods approach, integrating both qualitative and quantitative methods in a cohesive framework. This approach was selected to enable a comprehensive process that not only focuses on designing and developing the product but also evaluates its overall effectiveness. The qualitative component was applied during the exploratory phase, which included observations and interviews, to uncover the needs and preferences of the target market. Meanwhile, the quantitative component was utilized in the measurement and evaluation phase through the distribution of questionnaires.

The research subjects include business practitioners, students, alumni, members of technology communities, and potential consumers with an interest in ICT-themed products. The objects of study encompass the design of innovative merchandise products and the development of marketing strategies that effectively reach the intended market. The data analysis techniques employed in this study include descriptive analysis to identify patterns and trends in market interest, as well as a SWOT analysis to assess the strengths, weaknesses, opportunities, and threats influencing both product development and marketing efforts.

Data collection in this study employed a quantitative approach, utilizing primary data gathered through the distribution of questionnaires. These questionnaires were specifically targeted at members of the ICT community within the Department of Information and Computer Engineering at Politeknik Negeri Jakarta. A total of 106 respondents participated in the study, comprising students, alumni, lecturers, and staff members selected based on criteria such as age, educational background, and professional experience.

The collected data were analyzed using a SWOT framework to identify and evaluate both internal factors (strengths and weaknesses) and external factors (opportunities and threats). This analysis served as the foundation for formulating appropriate product development and marketing strategies, grounded in actual conditions and market responses drawn from the survey participants.

Results and Discussions

The Profile and Attributes of The ICT Community

Based on the analysis of demographic data and community affiliation within the ICT domain, several key insights emerge that serve as the foundation for designing product and marketing strategies:

1. Gender Distribution
   The data reveal that the majority of respondents are male (57.5%), while females account for 42.5%. This composition aligns with general trends in ICT-related fields but also reflects a meaningful level of participation from both genders. Therefore, the development of merchandise products should incorporate visual and functional design considerations that are inclusive and appealing to both male and female users.
2. Age Distribution
   The 18–22 age group dominates the sample (78.3%), indicating that the primary market consists primarily of university students or younger individuals. This segment is known for being digitally engaged, receptive to modern visual trends, and possessing high purchasing and sharing potential—particularly when the products resonate with their identity and lifestyle.
3. Community Affiliation
   Approximately 51.9% of respondents are formally affiliated with ICT-related communities, while 48.1% are not. This suggests that community identity is not limited to official membership but also extends to those who feel an informal or interest-based connection to the field. This insight broadens the potential market, indicating that merchandise products can be relevant not only to official community members but also to individuals who identify with the field on a personal or professional level.

Overall, these findings suggest that the development and marketing strategies for ICT-themed merchandise should be segmental and adaptive—designed to evoke a collective sense of identity while remaining flexible to diverse user backgrounds. A community-based approach, incorporating both formal and informal connections, holds strong potential for fostering brand loyalty and expanding reach through social networks and active user participation.

These findings are significant in the context of merchandise development, as they highlight the need for innovation and product design strategies to consider the preferences of both genders. For example, aspects such as visual style, color, function, and product form can be made more inclusive or even tailored segmentally for male and female users. This consideration is equally relevant in shaping marketing strategies, ranging from communication messages and promotional media to the visual approaches used, so that they can more effectively reach diverse targets within the community.

By understanding the gender distribution within the community, the development of merchandise can be directed more precisely, ensuring that products are relevant and responsive to the actual needs of the Informatics and Computer Engineering community.

Furthermore, the data reveal that the majority of respondents are between 18 and 22 years old, accounting for 78.3% of the sample. Meanwhile, 12.3% are in the 23–27 age group, 8.5% are older than 27, and only 0.9% are under 18 years of age.

SWOT Analysis Based on Respondent Demographics and Community Characteristics:

Table 1. SWOT Analysis of ICT Community

Aspect	Description
Strengths	- Diverse respondent backgrounds, particularly in terms of gender and community affiliation. -Significant female participation (42.5%) supports gender-inclusive design potential. - Majority of respondents aged 18–22, representing a dynamic, visually responsive, and digitally active market. -High potential for product acceptance and viral dissemination through social media and word-of-mouth.
Weaknesses	- Homogeneity of age group (mostly 18–22) may limit diversity in market preferences. - Overemphasis on a specific generation's taste risks alienating other segments. - Lack of in-depth exploration of gender-based visual and functional preferences may hinder inclusivity. - Risk of gender-biased designs reducing broader appeal.
Opportunities	- Nearly half of the respondents feel connected to the ICT community despite not being formal members. - Community identity extends beyond formal affiliation to academic, professional, and personal interests. - Broadens market potential beyond core community members. - Marketing strategies can engage emotionally and professionally connected individuals.
Threats	- Competition from visually appealing or more affordable non-community-based products. - Risk of weak brand loyalty if products fail to reflect authentic community identity. - Poor market segmentation may lead to perceptions of exclusivity, limiting broader appeal.

This analysis indicates that the greatest strength lies in the closeness of community identity and the digital-native characteristics of the target market. Therefore, product development and marketing strategies should integrate adaptive visual approaches, narratives that reflect the collective values of the community, and distribution channels that respond to the behaviors of young consumers within the digital ecosystem.

Product Innovation

The findings of this study highlight the critical role of community identity, specifically within the ICT domain, as a strategic foundation for developing merchandise products. The symbolic and emotional dimensions of community affiliation have a significant influence on product appeal, particularly for items that represent collective identity, such as community-themed merchandise.

Survey results from 106 respondents reveal that functionality remains the most desirable attribute, with 42.5% of participants preferring practical products, such as mousepads and cable pouches. This reinforces the view that successful product innovation must not only be visually appealing but also deliver tangible benefits, consistent with the principles of customer value (Kotler & Keller, 2016). Additionally, 28.3% of respondents value personalization features—such as the inclusion of names or community identifiers—underscoring the relevance of self-expressive benefits in brand identity theory (Escalas & Bettman, 2005). Such personalization transforms merchandise into a medium for expressing identity and fostering community pride.

The appeal of technology-integrated products (e.g., QR codes, NFC, and AR) was also evident, with 61.3% of respondents expressing interest. This trend aligns with the principles of technology-driven innovation (Rogers, 2003), which is particularly relevant for digital-native audiences familiar with emerging technologies. While interest levels varied, the data suggest a strong openness to products that merge traditional identity elements with modern digital experiences.

Moreover, over 70% of respondents expressed interest in customized products, supporting the relevance of mass customization strategies (Pine II, 1993). In a community context, personalizing products with individual identifiers fosters deeper emotional bonds between the user and the community, enhancing both the symbolic and practical value of the merchandise.

These insights carry several strategic implications. First, product development must achieve a balance between symbolic representation and utility to meet the dual expectations of community pride and day-to-day functionality. Second, personalization is not a niche preference but a central component of perceived product value among ICT community members. Third, the integration of digital technology not only supports innovation but also expands opportunities for interactivity and user engagement.

In summary, the successful development of community-based merchandise in the ICT domain depends on a holistic design approach that fuses function, identity, and technological innovation. This integrated model can enhance user relevance, strengthen emotional connection, and offer a competitive edge in a market increasingly driven by personalization and digital experience.

SWOT analysis for product innovation:

Table 2. SWOT Analysis for Product Innovation

Aspect	Description
Strengths	- Strong alignment between community identity and product concept, reinforcing emotional attachment. - High interest in functional merchandise (42.5%), indicating precise consumer needs. - Significant demand for personalization (over 70%), enhancing self-expression and user engagement. - High digital literacy among target users supports the adoption of tech-integrated products.
Weaknesses	- Potential market concentration on a specific age group (18–22), risking narrow appeal. - Limited exploration of gender-based preferences may hinder inclusive product design. - Overemphasis on customization without balance may affect production efficiency.
Opportunities	- Broad market potential beyond formal community members due to informal identity affiliation. - Personalization aligned with mass customization trends (Pine II, 1993), increasing perceived value. - Integration of QR codes, NFC, and AR aligns with digital innovation trends and user expectations. - Potential for viral growth through social media due to digital-native user behavior.
Threats	- Competition from non-community-based products with strong visual appeal or lower prices. - Risk of weak brand loyalty if product identity lacks authenticity or emotional resonance. - Lack of user education on tech-integrated features may hinder full adoption. - Over-customization may reduce scalability and increase production complexity.

The SWOT analysis shows that community-based merchandise benefits from strong identity alignment, high demand for functional and personalized products, and tech-savvy users. Challenges include a narrow age focus, limited gender-based insights, and potential inefficiencies from over-customization. Opportunities lie in expanding beyond core members, leveraging digital trends, and driving social media engagement. Key threats involve competition, weak brand loyalty, low user readiness for tech features, and scalability issues.

Conclusion

The findings of this study emphasize the importance of combining symbolic representation, functional value, and digital innovation in the development of community-based merchandise within the ICT field. By focusing on a demographic that is young, tech-savvy, and emotionally connected to their academic or professional community, the research demonstrates that merchandise is more than just a product; it is a medium for expression, connection, and representation.

Functional items such as mousepads and cable pouches are highly favored, especially when personalized with names, batch identifiers, or community symbols. The interest in technology-integrated features, such as QR codes, NFC, and AR, also suggests that this market segment is open to products that offer interactive and immersive experiences. These preferences indicate a growing demand for products that not only meet practical needs but also reflect personal and collective values.

One notable insight is that community affiliation extends beyond formal association. Many individuals who are not officially part of a community still identify with its culture, values, or aspirations. This broadens the potential user base and highlights the need for more inclusive product and marketing strategies.

While this study reveals strong opportunities, it also acknowledges key challenges—such as the risk of narrow audience targeting, production complexity due to customization, and the need for inclusive design. Moving forward, merchandise development in the ICT domain should be approached as a dynamic process that blends identity, usability, and innovation. When done well, it can foster stronger community bonds, increase product relevance, and open new pathways for creative engagement in both academic and professional settings.

Based on the analysis and theoretical implications, the direction of product development can be guided by three main strategies:

1. Product Personalization Strategy
   By adopting an experiential marketing approach (Schmitt, 1999), community merchandise can be designed to provide a personalized experience, such as including the user's name, community, or username. This fosters a stronger sense of pride and engagement, which, according to Pine and Gilmore (1999), reflects the concept of the "experience economy," where the core value of a product lies not only in its physical form but also in the experiences it delivers.
2. Relevant Functionality
   Multifunctional products—such as mousepads with cable slots, multipurpose pouches, or organizers—are more likely to be well received because they address real, practical needs. This aligns with the principle of product utility, which emphasizes that design should accommodate usability, convenience, and relevance in the context of users' daily lives (Ulrich & Eppinger, 2012).
3. Technology Integration as Added Value
   The addition of digital features, such as QR codes linking to community profiles or NFC for accessing exclusive content, represents a concrete example of product augmentation (Kotler, 2016), where a basic product is enhanced with technology-driven value. In a technology-oriented community such as ICT, this approach not only increases product appeal but also reflects the very character of the community itself—adaptive and responsive to digital advancements.

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