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Article

# Exploring Consumer Preference for Sustainable Design Attributes in Music-Inspired Products: Integration of Sustainable Development Goals

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**Abstract:** Music, as a transcultural art form, offers auditory enjoyment and conveys profound emotion and distinctive imagery. In the era of emotional consumption and within contemporary consumer culture, elements of musical imagery have become intricately entwined with product design, providing consumers with deeper visual and emotional experiences. We explored consumers' cognitions and preferences concerning the integration of Sustainable Development Goal (SDG) indicators into the attributes of music-related imagery products. The Attractiveness Ergonomics IPA (Importance-Performance Analysis) and IRPA (Importance-Relative Performance Analysis) methods were used to evaluate attractiveness and impact on consumer satisfaction. The results showed how music-related imagery products integrate art, culture, and social responsibility to attain a more profound influence. They also unveiled product design elements such as "visual aesthetics" and "color selection" to attract consumers. Additionally, the significance of incorporating SDG indicators into the design of music-related imagery products was found to increase social responsibility and sustainable development. The study's outcomes allow for a deeper understanding of consumers' preferences and requirements concerning the design attributes with SDG indicators in music-related imagery products. Valuable insights for the design and marketing of such products propel the application and dissemination of sustainable development goals within the realm of music.

**Keywords:** Music imagery products, SDG indicators, Importance-Performance Analysis, Impact Range Performance Analysis

## 1. Introduction

Music, across cultures and epochs, intricately weaves melodies, harmonies, and rhythms, creating unique emotional layers and narratives. Music not only offers auditory enjoyment to its listeners but also presents a diverse range of emotions and imagery, capable of resonating deeply with individuals' innermost feelings. While the fundamental essence of music resides in its sound and melody, in contemporary consumer culture, the significance of visual design has become increasingly prominent. The visual presentation of products often becomes the primary consideration for consumers when making purchase decisions. The value of music extends beyond auditory experiences; its representations of imagery and emotions are frequently applied in other domains, particularly in product design to enhance consumer preferences and identification through the emotional connection to music. Therefore, the transformation of the depth and richness of music into visual elements, in response to consumer expectations is important in design. Considering the inherent visual potential of music, when consumers choose products featuring musical imagery, they make an ideological choice among numerous products. This underscores consumers' profound desire for the integration of music and product design and highlights the pivotal role of musical imagery in market segmentation. Considering this, we delved into consumers' perceptions and preferences regarding the attributes of music-related imagery product designs. By employing a model of preference for product design quality attributes, we defined the attractiveness attributes between musical imagery and product design, thereby evaluating their impact on consumer satisfaction.

Currently, when discussing product design, its core has expanded from single functionality and aesthetics to how it reflects deeper societal values and cultural meanings. Music, as an artistic expression, inherently embodies rich cultural backgrounds and emotional depths. Simultaneously, the Sustainable Development Goals (SDGs) have become a global pursuit, encompassing environmental concerns and considerations of social and economic development. Hence, for music-related imagery product design

with SDG indicators, we explored how to organically fuse art, culture, and social values into products, endowing them not only with commercial value but also with profound social impact.

## 2. Literature Review

### *2.1. Visual Design of Musical Elements*

Materials and methods are described to allow others to replicate and build on published results. The relationship between music and visual graphics represents an intersection of visual and auditory which are two crucial sensory modalities in human interaction with the external world, namely, vision and audition. These two modalities are distinctive and mutually complementary. Communication with music visualization is a trend as individuals increasingly rely on visual perception to acquire information. Contemporary society has disseminated visual culture. Focusing on music imagery, abstract qualities including emotions and atmospheres are conveyed through music with concrete visual symbols and design elements. In product design, methods were investigated for visually conveying the emotional resonance and characteristics of music. The incorporation of music imagery into visual design provides creative expression and enriches consumers' comprehension of the relationship showing possibilities for expanded sensory experiences and creative exploration（Bai & Zong, 2022）.

The relationship between the aesthetics of visual communication design and "musicality" reveals commonalities between these two aspects at the level of emotional cognition and demonstrates artistic characteristics in rhythm and expression. For "musicality," the inherent connection between design sensibility and "musicality" was determined（Fang, 2015）. In music visualization design in various domains, the relationship between musical and visual information was investigated. Artists, directors, and designers convey the essence of music and emotional resonance through visual means. Furthermore, additional prospects were determined for the utilization of music visualization, promoting human-centered design approaches（Hsu, 2016）. From the perspective of music visualization, the inherent patterns were explored in the visualization of independent music by analyzing the cultural characteristics and musical elements compared with visual language. Methods such as perceptual analysis and shape grammar were used to transform music into visual elements. This integration of musical and visual components enhances the correlation between music-derived design and music itself. It caters to consumers' spiritual needs for multisensory experiences and effectively enhances the efficiency and communicative impact of independent music visual design (Jia & Zhao, 2022). The relationship between music and visual design has attracted extensive attention. The aforementioned studies on the design of music imagery products and visual communication design indicated a way for new creativity and possibilities. Concurrently, they strengthened the symbiotic connection between music and visual elements. The results show the diversity of the arts and contemporary society's inclination towards the appreciation of visual culture communication. They showed a deeper understanding and heightened appreciation of the allure of musical art among a broad spectrum of consumers. Thus, it is necessary to explore how the emotions and atmospheres conveyed by music are translated into tangible visual symbols and elements and how music visualization extends beyond the similarities between music and visual elements. The mechanism by which music connects auditory and visual experiences also needs to be explored to offer consumers a more profound and multisensory engagement.

### *2.2. Importance-Performance Analysis*

Martilla and James introduced the Importance-Performance Analysis (IPA) method. The IPA theory has been widely adopted to identify core areas for optimization and corresponding action priorities. IPA emphasizes two primary dimensions, namely 'importance' and 'performance level,' and categorizes different attributes into four quadrants, providing a more systematic assessment of existing business strategies and the necessary adjustments for specific attributes（Martilla & James, 1997; Wang et al., 2019）. As an analytical tool, IPA is used to understand how consumers perceive a product's performance and its relative importance. By combining these two elements, products are characterized on a two-dimensional four-quadrant chart. Unlike traditional consumer survey methods, IPA allows for a more intuitive and rapid identification of a product's strengths and weaknesses. Each quadrant represents distinct strategic implications. For example, attributes with high importance are regarded as strengths, while attributes with high importance but low performance indicate a need for improvement. With this information, the understanding of consumer expectations and the actual performance of their products or services are obtained（Yang & Liu, 2022）. IPA, founded on importance scores (horizontal axis) and performance scores (vertical axis), uses the mean values of all attributes to establish the intersection of the X and Y axes, thereby partitioning the two-dimensional space into four quadrants. Subsequently, the importance and performance assessments of each attribute are plotted in the quadrant. Following this, concrete strategies for quality improvement are determined based on the position of each attribute as depicted in Fig. 1. The positioning of the quadrants aids decision-makers in articulating future improvement strategies with clarity. Each quadrant represents distinct strategic facets as follows.

(1) Quadrant 1 (High Importance, High Performance): Attributes in this quadrant represent the strengths of an organization or product. It implies that these attributes are of paramount importance to consumers and excel in their perception. The strategy for this quadrant should prioritize the maintenance and reinforcement of these strengths.
(2) Quadrant 2 (high Importance, Low Performance): Attributes in this category need improvement. While these attributes hold significant importance for consumers, their current performance falls short of consumer expectations. Organizations must prioritize resource allocation to enhance performance in these areas and meet consumer demands. The research methodology involves a consumer questionnaire survey.
(3) Quadrant 3 (Low Importance, Low Performance): Attributes in this quadrant may not currently be the primary focus of consumers, and their performance in these areas is somewhat subpar. Although improvements in these attributes may not return, continuous monitoring is essential to ensure that significant disparities or neglect do not occur.
(4) Quadrant 4 (Low Importance, High Performance): Attributes in this quadrant represent areas where the organization may have allocated excessive resources, yet these investments are not of utmost importance to consumers. Organizations must contemplate reallocating resources to ensure that more investments are directed toward attributes in Quadrant 2, thus more effectively meeting consumers' core needs.

The analysis of these four quadrants allows for a comprehensive and profound understanding of consumers' genuine needs and expectations to adjust their strategies accordingly for maximizing consumer satisfaction and optimizing resource allocation. Given the distinctive characteristics, we used IPA to explore how SDG indicators were incorporated into the design of music-themed products and their relevance to consumer preferences. Considering that music-themed product design consists of a relatively specialized and unique domain, the IPA method result can be used for an in-depth comprehension of consumers' needs and expectations. The results show the design attributes highly valued by consumers and the required improvement to meet consumer expectations

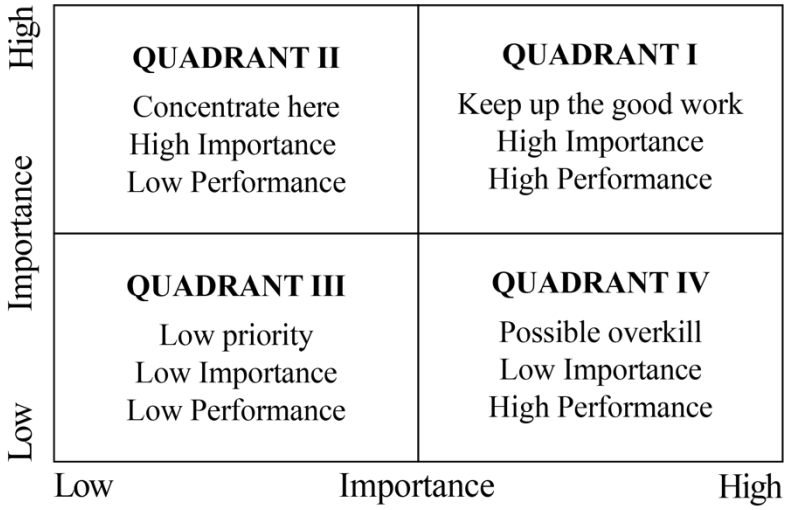


**Fig. 1.** IPA quadrant chart.

*2.3. Impact Range Performance Analysis*

Impact Range Performance Analysis (IRPA) was proposed by Mikulić and Prebežac to address the limitations of Importance-Performance Analysis (IPA). In the IRPA methodology, Penalty-Reward Contrast Analysis (PRCA) constitutes a pivotal component of data analysis to evaluate the influence of quality attributes on Overall Customer Satisfaction (OCS). In PRCA analysis, quality attributes are converted into two sets of virtual variables: Penalty Index (PI) and Reward Index (RI) [8]. The first set of dummy variables is used to measure the impact of the lowest-quality performance on OCS. For each quality attribute, performance data is collected, and the lowest value is replaced with "1," while the other values are replaced with "0." This set of dummy variables reflects the degree of penalty imposed on OCS when quality performance is poor, known as RI. The second set of dummy variables is used to measure the impact of the highest-quality performance on OCS. Performance data for each quality attribute is gathered, and the highest value is replaced with "1," while the other values are replaced with "0." This set of dummy variables reflects the degree to which OCS gradually increases when quality performance is excellent, known as PI. Using these two sets of dummy variables as independent variables and the average OCS as the dependent variable, multiple regression analysis is conducted. Two sets of regression coefficients are obtained for each quality attribute. The first set of coefficients represents the degree of penalty

imposed on OCS when quality performance is extremely poor, referred to as the penalty index. The second set of coefficients represents the degree to which OCS gradually increases when quality performance is excellent, referred to as the reward index. To determine the Range of Impact on Overall Customer Satisfaction (RIOCS) for each attribute, the absolute values of the reward index and penalty index coefficients are summed as follows.

$$RIOCSi = |Ri| + |Pi| \quad (1)$$

$$SGPi = Ri / RIOCSi \quad (2)$$

$$DGPi = |Pi| / RIOCSi \quad (3)$$

$$IAi\ index = |SGPi| - |DGPi| \quad (4)$$

$$|SGPi| + |DGPi| = 1 \quad (5)$$

where Ri represents the reward index coefficient for attribute i, and Pi represents the penalty index coefficient for attribute i. A higher reward index score signifies that with superior quality performance, overall customer satisfaction (OCS) increases. Conversely, a lower reward index score suggests that outstanding quality performance does not influence OCS and does not need enhancement. A higher penalty index score indicates that in the case of subpar quality performance, OCS shows adverse effects. A lower penalty index score indicates that suboptimal performance reduces the impact on OCS and mandates targeted improvement initiatives. "Relative Importance of Customer Satisfaction" (RICS) represents the relative importance of customer satisfaction concerning quality attributes to determine the relative importance of quality attributes in influencing customer satisfaction. RIOCS is used to compare the coefficient of each quality attribute with its respective standard error to ascertain which attributes hold the most significance. In the RIOCS matrix, each quality attribute's impact on overall customer satisfaction is estimated. Each quality attribute is assigned to a corresponding RIOCS value, indicating the magnitude of its influence on overall customer satisfaction. In this matrix, a higher RIOCS value shows a greater influence of the quality attribute on overall customer satisfaction. "Satisfaction-Generation Potential" (SGP) refers to the likelihood magnitude with which a quality attribute positively affects customer satisfaction. Conversely, "Dissatisfaction-Generation Potential" (DGP) presents the magnitude of the likelihood that a quality attribute negatively impacts customer satisfaction. In PRCA, the comparison between SGP and DGP is used to calculate the impact of asymmetric quantification indicators. "Impact-Asymmetry" (IA) is used to quantify situations where the impact of an improvement or deterioration in a quality attribute on customer satisfaction exhibits asymmetry. For instance, when the improvement of a quality attribute impacts satisfaction positively and the same attribute deterioration negatively, the quality attribute shows a positive IA value. Conversely, if the deterioration more negatively impacts satisfaction than the improvement's positive impact, the quality attribute has a negative IA.

## 3. Research Methodology

We investigated consumer preferences regarding the integration of SDG indicators into the attributes of music-themed products. In the initial stage of this study, the Expert-Guided Model (EGM) of Kansei Engineering was employed to conduct preliminary interviews with a sample population, followed by inductive analysis. We established a practical and value-oriented correlation assessment model to understand the relevance of consumer preferences concerning SDG indicators. The result served as a reference for companies when incorporating SDG indicators and formulating marketing strategies with a music-themed product design. In the second stage, we used an appropriate IPA questionnaire identified through EGM analysis based on the selected attractiveness factors. The factors were selected by the focus group through discussions. Seven experts including four product designers, two music creators, and one product marketing planner were invited. Each possessed an average work experience of over ten years. After reaching the desired sample size for the IPA survey, IPA analysis was conducted. IPA was used to explore attractiveness factors associated with consumer preferences regarding the integration of SDG indicators into the attributes of music-themed product design. Strengths and weaknesses were determined to sustain or remove attractiveness factors as reference criteria. In the third stage, the IRPA was applied to conduct PRCA to explore the extent of an attribute's impact on overall customer satisfaction, RIOCS. With such methods, we examined how consumers assessed the integration of SDG indicators into music-themed product design. Variations in satisfaction, the relative importance of various elements, and a thorough analysis of these aspects were studied based on the result. The research results provide precise strategies and recommendations for integrating music-themed product design with SDG indicators.

## 4. Research Results

### *4.1. EGM Interview*

The concept of Kansei Engineering and its factors are indispensable components in product design. Each attractiveness factor represents an observation and assessment of the relationship between products and users. The simplified attractiveness factor diagram (Fig. 2) shows the "pattern and imagery" as well as "visual design" attractiveness factors. The factors were used to explore how to translate the abstract concept of music into a tangible, sensory experience. Consequently, the transformation of product design imagery needs a profound knowledge of art and design based on an understanding of human psychology and perception.

(1) The attractiveness factors related to product attributes such as "pattern and imagery," "visual design," "color selection," and "material texture" represent inquiries into human sensory experiences. They directly shape the visual identity of products, and consumers generally hold a positive attitude toward these design elements. Through the visual design of music-themed products, appealing color choices, pattern designs, and rich textures visually captivate consumers, generate interest, evoke emotional resonance, and enhance the appeal of products. Music is an intangible art form that establishes a direct emotional connection with users through concrete materials and colors and is related to perceptual psychology and cognitive science.

(2) Attractiveness factors such as "environmental protection," "sustainable development," and "integration into the economy" signify consumers' concerns about the incorporation of SDG indicators into products and sustainable development. This reflects a sense of corporate responsibility for society and the environment and increases product appeal to consumers. Furthermore, the integration of "sustainable development" and "SDG indicators" into the design of music-themed products represents an interdisciplinary integration. It integrates design into environmental protection and social responsibility to explore how these global issues can be seamlessly integrated into everyday life and consumer choices.

(3) Attractiveness factors such as "value" and " memory points" underscore that consumers, when purchasing products, consider the intrinsic value of the products and the emotional value and memories associated with them. For consumers, these elements pertain to emotional and cognitive aspects and deepen the connection between consumers and music-themed products. They consider products with heightened emotion and value and put the products to a level of special significance.

The success of music-themed product design is based on a complex interplay of various interwoven attractiveness factors. Visual symbols and symbol resonance influence consumers' attitudes when selecting music-themed products. Visual elements form the foundational basis for establishing initial appeal, and these factors are used to determine how products present their musical imagery to consumers. "Product design attributes" and "preferences and styles" underscore the importance of design personalization and alignment with specific target market trends. Within the integration of music and visual arts, this convergence extends beyond artistic integration and encompasses emotional resonance. Music-themed products contribute to a distinct interplay between the visual and auditory senses. When the interplay is integrated into product design, particularly in the case of music-themed products, its effects become markedly pronounced（Yang, 2023）.

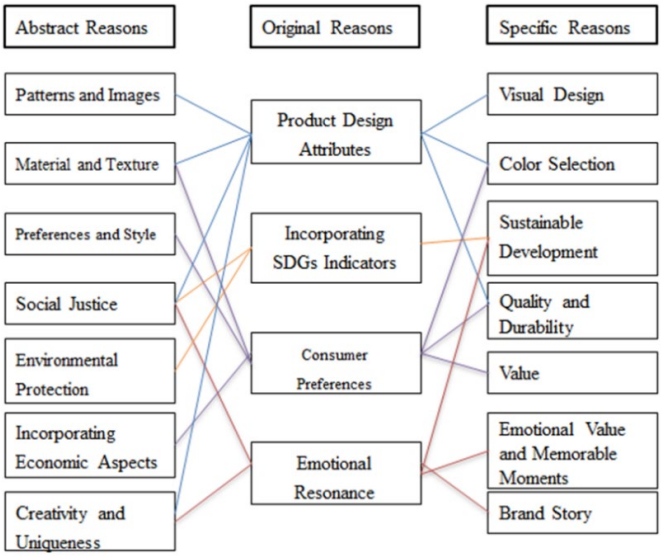


**Fig. 2.** EGM interview content.

*4.2. IPA Questionnaire*

The design of the IPA questionnaire was conducted for master's and doctoral students and experts in art, design, and cultural creativity who understood SDGs. In July 2023, an online questionnaire was distributed and collected using Google Forms, resulting in a total of 110 valid responses. The Cronbach's α values for reliability and internal consistency of the IPA questionnaire are presented in Table 1. The Cronbach's α values for importance and satisfaction in the IPA questionnaire exceeded 0.70, indicating a high level of consistency and stability. The overall reliability was measured by Cronbach's α with a value of 0.964. Cronbach's α after item deletion was $0.7 < \alpha \leq 0.9$, signifying a high degree of reliability. Consequently, all items were retained. Table 1 displays Cronbach's α values when individual items were deleted.

**Table 1.** Reliability test of IPA questionnaire.

| Questionnaire Title | Importance | Satisfaction |
|---|---|---|
| 1. Visual Design | 0.964 | 0.963 |
| 2. Color Selection | 0.964 | 0.963 |
| 3. Patterns and Images | 0.964 | 0.963 |
| 4. Material and Texture | 0.964 | 0.963 |
| 5. Incorporating SDGs | 0.964 | 0.963 |
| 6. Social Justice and Equity | 0.964 | 0.963 |
| 7. Environmental Protection | 0.964 | 0.963 |
| 8. Economic Sustainability | 0.964 | 0.962 |
| 9. Creativity and Uniqueness | 0.964 | 0.962 |
| 10. Personal Preferences and Style Alignment | 0.964 | 0.963 |
| 11. Quality and Durability | 0.964 | 0.963 |
| 12. Price and Value | 0.964 | 0.963 |
| 13. Emotional Expression and Resonance | 0.964 | 0.962 |
| 14. Brand Story and Background | 0.963 | 0.962 |
| 15. Emotional Engagement and Connection | 0.964 | 0.962 |
| 16. Emotional Value and Memorable Moments | 0.964 | 0.962 |

The design of music-themed products required a set of elements, and IPA analysis was used for objectively assessing the importance and actual performance of these elements. The results are presented in Table 2 and Fig. 3.

**Table 2.** IPA analysis results.

|  | Importance (M = 4.23) | Satisfaction (M = 3.29) | IPA are |
|---|---|---|---|
| 1. Visual Design | 4.47 | 3.37 | I. |
| 2. Color Selection | 4.35 | 3.28 | II. |
| 3. Patterns and Images | 4.48 | 3.30 | I. |
| 4. Material and Texture | 4.27 | 3.34 | I. |
| 5. Incorporating SDGs | 4.00 | 3.36 | IV. |
| 6. Social Justice and Equity | 3.53 | 2.92 | III. |
| 7. Environmental Protection | 3.95 | 3.51 | IV. |
| 8. Economic Sustainability | 3.94 | 3.43 | IV. |
| 9. Creativity and Uniqueness | 4.54 | 3.24 | II. |
| 10. Personal Preferences and Style Alignment | 4.26 | 3.23 | II. |
| 11. Quality and Durability | 4.11 | 3.65 | IV. |
| 12. Price and Value | 4.20 | 3.37 | IV. |
| 13. Emotional Expression and Resonance | 4.45 | 3.29 | I. |
| 14. Brand Story and Background | 4.30 | 3.17 | II. |
| 15. Emotional Engagement and Connection | 4.51 | 3.10 | II. |
| 16. Emotional Value and Memorable Moments | 4.36 | 3.05 | II. |

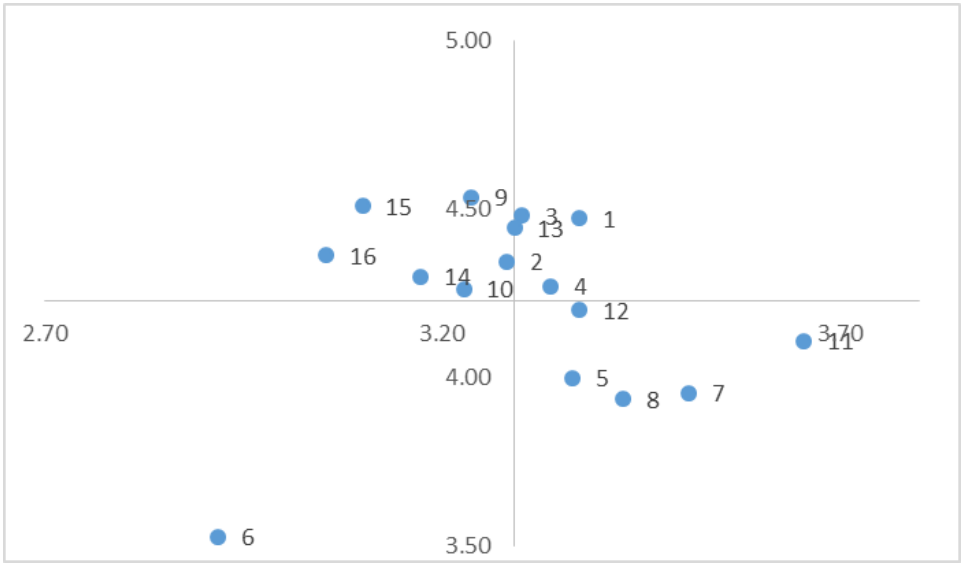


**Fig. 3**. IPA matrix distribution.

*1)Maintain Dominance*

Music-themed product designs incorporate musical elements to align with their brand identity and purpose. Design elements such as "visual design," "patterns and imagery," "material and texture," as well as "emotional expression and resonance," abstract emotional depth inherent in music. These attributes connect the auditory and visual realms, enabling consumers to immediately perceive the rhythm and emotions of music when interacting with the product. This connection transcends material. It narrates a story and evokes emotional resonance between the brand and consumers. More specifically, visual design and patterns allude to specific musical symbols or images of musicians, while material choices inspire specific instruments. Most significantly, all these endeavors are to create an emotional resonance for consumers when they engage with these products to embark on a musical journey.

*2) Prioritize Improvement*

Design aspects such as "color selection" and "creativity and uniqueness" reflect the diversity of music and illustrate how music influences perceptions and emotions. For instance, colors are associated with specific musical emotions, while creativity and uniqueness embody the innovation and originality of music. These attributes necessitate research and optimization to ensure the essence of music and the brand's positioning. However, musical elements alone are insufficient; music-themed product design needs to contain factors such as "color selection" and "creativity and uniqueness." Although color choices may involve subjectivity, in the context of music-themed products, they resonate with particular musical styles or emotions. For example, jazz music may be linked with gold or silver, while classical music may be associated with deeper hues. Additionally, creativity and uniqueness are not solely for aesthetic purposes; they ensure that products in the market genuinely reflect the musical philosophy underpinning them.

*3)Overemphasis*

With the "integration with SDGs" and "environmental conservation integration," music-themed product design aligns with global sustainability objectives. This entails moving beyond the material realm and giving more consideration to the connections between music and society, the environment, and the economy, and how these connections can be embodied in the design. While overemphasizing the "integration with SDGs" and "environmental conservation integration", their incorporation into music-themed product design needs to be measured, ensuring it does not deviate from the design principles of the product. Undoubtedly, music serves as a tool for the awareness of these issues. Nevertheless, product design ensures that these sustainability goals are genuinely considered throughout the design, production, and marketing processes. This challenge extends beyond design; it also tests brand positioning and marketing strategy.

*4)Secondary Improvement*

Concerning "integration with social fairness and justice," contemplation is necessary regarding how music-themed product design authentically reflects societal diversity and inclusivity and conveys a message of fairness and justice. This extends beyond design considerations and encompasses brand identity and social responsibility. The design of music-themed products encompasses surface-level visual and material elements and the underlying emotions, values, and meanings. In summary, we posited that consumer preferences for the incorporation of SDG indicators into the attributes of music-themed product design demonstrated a concern for visual symbols and symbol resonance. The visual design of music-themed products emphasizes creativity and uniqueness while aligning with consumers' individual preferences and styles. Simultaneously, it must incorporate the elements of

environmental protection and sustainability to establish an emotional connection and evoke resonance. Such design strategies contribute to satisfying consumers' needs for emotional expression and value reminiscence, thereby enhancing the attractiveness and competitiveness of the products.

### *4.3. IRPA Questionnaire Survey*

Based on the analysis of product attributes using IPA, we used IRPA with PRCA to determine the RIOCS of the attributes. RIOCS of each attribute was used to calculate IA for the influence of each attribute on customer satisfaction, thereby leading to the proposal of effective problem-solving strategies. A lower reward index score implies excellent quality performance with minimal impact on OCS for improvement. Conversely, a higher reward index score indicates that superior quality performance corresponds to an increase in OCS. A lower penalty index score signifies subpar quality performance with limited impact on OCS, warranting targeted improvement efforts. Conversely, a higher penalty index score implies that poor quality performance results in a more significant negative impact on OCS. As demonstrated in Table 3, each quality attribute showed its corresponding RIOCS value, indicating the extent of its influence on overall customer satisfaction. Higher RIOCS values indicate a broader range of influence on overall customer satisfaction. The threshold for RIOCS is not fixed but varies based on the RIOCS values. We categorized attributes into high, medium, and low impact levels. 1.5 times the standard deviation was used for testing data variability. The established threshold value in this study was 1.128.

- RIOCS > 1.128: High-Impact Attributes
- 1.128 ≥ RIOCS ≥ 1.125: Medium-Impact Attributes
- RIOCS < 1.125: Low-Impact Attributes

**Table 3.** IRPA Analysis Results.

| Questionnaire | RI | PI | RIOCS | SGP | DGP | IA |
|---|---|---|---|---|---|---|
| 1. Visual Design | 0.567 | −0.541 | 1.108 | 0.512 | 0.488 | 0.023 |
| 2. Color Selection | 0.548 | −0.550 | 1.098 | 0.499 | 0.501 | −0.002 |
| 3. Patterns and Images | 0.590 | −0.512 | 1.102 | 0.535 | 0.465 | 0.071 |
| 4. Material and Texture | 0.665 | −0.392 | 1.057 | 0.629 | 0.371 | 0.258 |
| 5. Incorporating SDGs | 0.533 | −0.540 | 1.073 | 0.497 | 0.503 | −0.007 |
| 6. Social Justice and Equity | 0.463 | −0.636 | 1.099 | 0.421 | 0.579 | −0.157 |
| 7. Environmental Protection | 0.554 | −0.535 | 1.089 | 0.509 | 0.491 | 0.017 |
| 8. Economic Sustainability | 0.552 | −0.565 | 1.117 | 0.494 | 0.506 | −0.012 |
| 9. Creativity and Uniqueness | 0.609 | −0.499 | 1.108 | 0.550 | 0.450 | 0.099 |
| 10. Personal Preferences and Style Alignment | 0.567 | −0.558 | 1.125 | 0.504 | 0.496 | 0.008 |
| 11. Quality and Durability | 0.611 | −0.519 | 1.130 | 0.541 | 0.459 | 0.081 |
| 12. Price and Value | 0.583 | −0.524 | 1.107 | 0.527 | 0.473 | 0.053 |
| 13. Emotional Expression and Resonance | 0.590 | −0.482 | 1.072 | 0.550 | 0.450 | 0.101 |
| 14. Brand Story and Background | 0.554 | −0.490 | 1.044 | 0.531 | 0.469 | 0.061 |
| 15. Emotional Engagement and Connection | 0.535 | −0.517 | 1.052 | 0.509 | 0.491 | 0.017 |
| 16. Emotional Value and Memorable Moments | 0.585 | −0.477 | 1.062 | 0.551 | 0.449 | 0.102 |

RI reflects the relative significance attributed by consumers to the quality and durability attributes of music-themed products. Specifically, the RI value for "quality and durability" was the highest (0.611), signifying that consumers consider the quality and durability of products to be of paramount importance when incorporating SDG indicators. Particular attention to the quality and durability of products was required in the design and marketing of music-themed merchandise. High-quality raw materials, durable production processes, and extended product warranties also are needed. By emphasizing quality and durability, consumer expectations can be met to enhance product sustainability and achieve SDGs. Therefore, the high RI value for "quality and durability" is important in product design and marketing to increase the social value of products, enhance brand reputation, and fulfill consumer demands for quality and durability.

PI is used to assess the potential adverse effects that different design attributes of music-themed products have on overall customer satisfaction. "Incorporating social equity and justice" exhibited the highest PI value (−0.636). This indicated that if music-

themed products perform poorly in terms of incorporating social equity and justice, it negatively impacts overall customer satisfaction. This result highlighted the necessity for companies to pay particular attention to the incorporation of social equity and justice when designing and marketing music-themed products. If companies successfully integrate social equity and justice such as fair wages and human rights protection, overall customer satisfaction is enhanced and contributes to brand image enhancement and broadening consumer base. Consequently, the increased PI value for "Incorporating social equity and justice" shows a pivotal direction for companies in product design and marketing, ultimately enhancing overall customer satisfaction while aligning with societal values of equity and justice.

RIOCS represents the importance of different exterior design attributes of music-themed products on overall customer satisfaction. "Quality and durability" exhibited the highest RIOCS value (1.130). With SDG indicators, customers consider the impact of product quality and durability on overall customer satisfaction to be of paramount importance. This outcome underscores the necessity for particular attention to be devoted to the quality and durability of products in the design and marketing of music-themed merchandise. If companies ensure that their products excel in this regard, customers are more likely to experience heightened overall satisfaction, thereby enhancing brand reputation, customer loyalty, and the realization of sustainable development goals. Therefore, the increased RIOCS value for "Quality and durability" highlighted a pivotal direction for companies in product design and marketing and improved overall customer satisfaction while promoting the practical implementation of sustainable development goals.

In this research, SGP showed the degree to which various external design attributes of music-themed products influenced overall customer satisfaction. Specifically, "Material and Texture" attains the highest score within the SGP framework (0.629). This observation implied that, when incorporating SDG indicators, the material quality and textural characteristics of music-themed products significantly enhance customer satisfaction. This outcome underscores the importance of material selection and textural properties in the design of music-themed products. By opting for high-quality materials with a pleasing tactile experience, enterprises increase the allure of their products and fortify overall customer satisfaction. This, in turn, contributes not only to enhanced product sales but also reinforces brand loyalty and impacts the realization of sustainable development goals. Thus, the increased SGP value attributed to "Material and Texture" underscores the need for companies to prioritize material quality and textural attributes in product design, facilitating the attainment of heightened customer satisfaction and a more substantial societal impact.

In this study, DGP indicates the primary growth pattern of different exterior design attributes of music-themed products concerning overall customer satisfaction. Specifically, "Incorporating social equity and justice" showed the highest score within DGP (0.579). The integration of social equity and justice elements constituted the predominant growth pattern in the exterior design of music-themed products. This result shows the significance of considering design attributes encompassing social equity and justice. By incorporating social equity and justice into the design of music-themed products, enterprises better align with customer expectations, thus enhancing overall customer satisfaction. This increases product competitiveness and bolsters a company's social responsibility image and fosters the realization of sustainable development goals. Therefore, the increased DGP value associated with "Incorporating social equity and justice" suggests that companies must prioritize social equity and justice as a primary growth pattern in the design of music-themed products to achieve heightened customer satisfaction and a broader societal impact.

IA represents the extent to which different exterior design attributes of music-themed products have fulfilled their perceived level of importance by consumers. Specifically, "Material and Texture" showed the highest score in IA (0.258). Consumers regard material and texture as important in the design of music-themed products. Companies must pay particular attention to the material and texture of music-themed products to meet consumer expectations. By enhancing the quality of material and texture, enterprises appeal products, increase customer satisfaction, and attain SDGs. Conversely, "Incorporating social equity and justice" showed an IA score of -0.157, suggesting that the incorporation of social equity and justice elements did not meet consumer expectations and harmed customer satisfaction. Consequently, companies need to integrate social equity and justice elements to ensure detrimental effects on overall customer satisfaction. IA analysis results showed the importance of material and texture in the design of music-themed products and the potential for the incorporation of social equity and justice elements. This helps companies meet consumer demands, enhance the societal value of their products, and realize SDGs. The study results determined the pivotal role of design in music-themed products when integrating SDGs. Quality and durability need to be unequivocally established as the most crucial determinants to ensure product quality for customer expectations. Simultaneously, the adverse effects of incorporating elements of social equity and justice accentuate the significance of social responsibility. The substantial positive impact on customer satisfaction reaffirms the importance of material quality and texture. Finally, the incorporation of social equity and justice elements is required for growth with identifiable opportunities for refinement. These results provide a reference for the enhancement of the social value of products, the augmentation of customer satisfaction, and the advancement of the realization of SDGs.

## 5. Conclusion

In emotional consumerism, the incorporation of SDG indicators into the design of music-themed products allows for brand positioning and market strategy. Using IPA and IRPA, we analyzed the characteristics of music-themed products and investigated the relationship between music and product design. Through the examination and discussion of each design attribute, consumer preferences for the design attributes of music-themed products were elucidated to present the principles and opportunities for the design of music-themed products. The research findings unveiled diverse consumer preferences regarding the design attributes of music-themed products, thereby furnishing insights into product design. Consumers need to recognize the significance of attributes in visual design, patterns and imagery, emotional expression, and resonance with their satisfaction. Consumers are assigned to the visual presentation of products and emotional connections. Therefore, in product design, emphasis must be placed on optimizing to enhance these attributes to increase consumer satisfaction and cultivate brand loyalty. Consumers perceive the importance of attributes such as creativity, uniqueness, alignment with personal preferences, and style as surpassing their actual satisfaction levels. Companies need to refine these design attributes. By providing more creative and personalized design options, companies can attract a broader spectrum of target consumers and fortify their brand competitiveness. The research results guide companies to be engaged in the design of music-themed products according to consumer preferences and the attainment of a competitive edge in an intensely competitive market environment. The reinforcement of the visual and emotional connection of music-themed products is emphasized to optimize visual design, patterns, and imagery, as well as emotional expression and resonance. Creating visual effects for emotional resonance enhances the attractiveness of products and brand image. Alternatively, actively incorporating SDG indicators into product design, encompassing sustainability, social responsibility, and environmental conservation mitigates consumer concerns related to social and environmental issues and enhances the brand's societal impact. The recommendations help companies design music-themed products for consumer expectations and integrate SDGs. By considering consumer demands and sustainability principles, companies need to offer a more appealing consumer experience to gain a competitive edge in a competitive market.

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