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Design of a DUI Model of Innovation in Handicraft Products

Diseño de un Modelo DUI de Innovación en Productos Artesanales

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Abstract— This paper presents a model of innovation in handicraft products based on the Design-User-Innovation (DUI) approach. The qualitative methodology used is described, including the mixed research approach. The theoretical framework supporting this model is explored, with relevant citations and references. The results obtained are discussed and conclusions on the effectiveness of the DUI model in the innovation of handicraft products are presented.

Keywords— Innovation; handicraft products; design; user; DUI model; qualitative approach

Resumen— Este paper presenta un modelo de innovación en productos artesanales basado en el enfoque Diseño-Usuario-Innovación (DUI). Se describe la metodología cualitativa utilizada, incluyendo el enfoque mixto de investigación. Se explora el marco teórico que respalda este modelo, con citas y referencias relevantes. Se discuten los resultados obtenidos y se presentan conclusiones sobre la eficacia del modelo DUI en la innovación de productos artesanales.

Palabras clave— Innovación; productos artesanales; diseño; usuario; modelo DUI; enfoque cualitativo

I. Introduction

The importance of innovation in handicraft products is fundamental to the development and sustainability of communities engaged in these activities. However, they often face challenges in adapting to changing market demands and maintaining the relevance of their creations. In this context, an innovation approach called DUI (Design-User-Innovation) is presented, which seeks to foster collaboration between artisans,designers and end-customers to generate creative and appropriate solutions. This article explores in detail the DUI model and its application in the field of handicraft products.

The evolution and sustainability of artisanal communities depend to a large extent on their capacity for product innovation. However, they face difficulties in adapting to market changes and maintaining the relevance of their creations. Among innovation approaches, the DUI model has proven to be an effective methodology in various contexts. The DUI model is based on collaboration between designers, end-users and craftsmen to generate creative and relevant solutions. According to Tim Brown, the user-centered design approach involves understanding the needs and wants of users and using that information as the basis for generating innovative ideas [1]. This perspective has been endorsed by other authors, such as Donald Arthur Norman of the University of California, San Diego, who stresses the importance of designing products that are tailored to the user's experience and expectations [2].

In addition, the theory of open innovation proposed by Henry William Chesbrough, in 2003,highlights the importance of collaboration between different actors in the innovation process [3]. According to the same author, openness to external participation and collaboration with other actor scan accelerate the development and adoption of innovations [3]. In the context of handicrafts, this collaboration can provide artisans with access to new ideas, knowledge and technologies.

In relation to handicrafts, co-creation has emerged as a relevant approach to drive innovation in this sector. Authors from TU Delft (The Netherlands) have highlighted the importance of involving end-users in the design process of handicraft products to ensure their acceptance and success in the market [4]. In addition, end-user participation can enrich the creative process and provide valuable ideas for the generation of innovative products.

This paper proposes to explore and analyze the application of the DUI model in the context of artisanal products. The benefits of this collaborative approach will be examined and examples of successful cases will be presented. Byunder standing the interaction between design, end users and artisans, it is expected that relevant information will be obtained on how to boost innovation in handicraft products and strengthen the position of artisans in today's market.

II. Materials and Methods

The research was conducted using a qualitative approach, combining ethnographic and participatory design research techniques. In-depth interviews were conducted with artisans, designers and end-users, and participatory design workshops were held to foster collaboration and idea generation. The mixed approach provided a holistic understanding of the challenges and opportunities in craft product innovation..

In this study, a qualitative approach was used and a mixed research methodology was applied to explore and understand the innovation process in handicraft products through the DUI model. The target population consisted of artisans, designers and end-users involved in the creation and consumption of handicraft products in a given region.

The sample was selected by means of a purposive sampling, seeking representativeness of different categories of artisans and end users. Indepth interviews were conducted with a sample of 20 artisans and 50 end users. The sample of designers included design professionals with experience in the field of handicrafts. The selection of the sample was based on criteria such asdiversity of craft skills, market experience and representativeness of different end-user segments.

A case study was conducted involving several artisans and their handicraft products. Ethnographic research methods, such as active observation and immersion in the artisan environment, were used to gain an in-depth understanding of the innovation process. In addition, participatory design workshops were organized in which artisans, designers and end-users collaborated together to generate ideas and develop prototypes of innovative products.

The analysis of the qualitative data was carried out using the thematic analysis approach, which consisted of identifying emerging categories and patterns in the data. Open and axial coding techniques were used to organize and analyze the data collected through the interviews, observations and workshops.

Some of the relevant authors in the field of qualitative research and participatory design include Jhon Creswell [5], who offers guidance for the design and implementation of qualitative studies, and Elizabeth Sanders and Pieter Stappers [6], who explore the application of participatory design in innovation. In addition, Douglas Schuler and Aki Namioka present in their book"Participatory Design: Principles and Practices" the fundamentals and key approaches to participatory design [7].

III. Theoretical Framework

The DUI model is based on the theories of user centered design, open innovation and co-creation. Authors such as Tim Brown have highlighted the importance of involving users in the design process to generate more relevant and creative solutions [1]. On the other hand, it has also been argued that open innovation, which involves collaboration between different actors, can drive idea generation and accelerate the adoption of innovations. These theories support the DUI model's approach to craft product innovation [3].

The theoretical framework of this essay is based on various theories and concepts relevant to understanding the DUI model of innovation in handicraft products. The contributions of different authors in this field will be presented below:

- *User-Driven Design (UDO) approach*: A central aspect of the UDO model is to put the user at the center of the design, seeking to understand the needs, desires and expectations of users in order to develop novel solutions. This approach involves empathizing with users, identifying opportunities and creating-solutions that meet their demands [1]. As mentioned by Donald Norman, UC San Diego(USA), the goal of user-oriented design is tocreate products that are easy to use and that provide a positive experience to the users [8].
- *Collaborative Innovation*: The theory of collaborative innovation, proposed by Chesbrough, in 200), highlights the importance of collaboration and openness to the outside during the innovation process [3]. This approach involves the participation of external actors, such as end-users and other collaborators, in the generation of ideas andco-creation of products. According to this theory, collaborative innovation allows access to external knowledge and accelerates the innovation process [3].
- *Co-creation*: Co-creation, both in theory and in practice, plays a fundamental role in the DUI model. It is noteworthy that co-creation implies collaboration between artisans,designers and end users in all stages of the design process [4]. This active participation of end users and other stakeholders in the creation of artisanal products fosters the generation of more innovative and relevant ideas. *Diffusion of Innovation Theory*: The innovation diffusion theory, proposed by Everett Rogers,in 2003, is also applicable to the DUI model [9]. According to this theory, the adoption of innovations depends on factors such as the relative advantage of the product, its compatibility with the user's values and needs,and effective communication. In the context of handicraft products, understanding how end users adopt and integrate these innovations can improve product acceptance and commercial success.
- *Perceived Value Theory*: The theory of perceived value, developed by Valarai Zeithaml, in 1988, is relevant to under standing how end-users evaluate handicraft products [10]. According to this theory, the value perceived by consumers is based on the usefulness, quality and emotional benefits they obtain from a product. By applying this theory to the DUI model, one can focus on creating hand crafted products that offer high perceived value and generate an emotional connection with end users.

A conceptual synthesis of the authors and their relationship with innovation in the field of handicrafts is presented in Table 1.

Table 1.

Author	Main Focus	Relationship with Innovation in as Artesanías
Brown	User-centered design.	Promote the creation of handcrafted products that meet the needs and desires of users, generating innovation in design and user experience.
Chesbrough	Open innovation.	Emphasizes the importance of collaboration and openness to the outside world in the process of innovation in handicrafts, encouraging the participation of different actors and the adoption of new ideas and technologies.
Norman	User-centered design.	It advocates designing handcrafted products that are easy to use and generate a positive user experience, which drives innovation in product form and functionality.
Schifferstein y Zwartkruis-Pelgrim	Co-creation.	They emphasize the importance of involving end users and craftsmen in the design process, leading to the generation of more innovative ideas and the creation of handcrafted products that meet the needs of the marke
Rogers	Diffusion of innovation theory.	It analyzes how innovative handicraft products are adopted by end users, considering factors such as relative advantage, compatibility and effective communication, which influence the success of innovation in handicrafts.
Zeithaml	Perceived value theory.	Emphasizes the importance of offering handcrafted products with a high value perceived by consumers, considering aspects such as usefulness, quality and emotional benefits, which drives innovation in the creation of attractive products for the market.
Source: Authors [1], [3], [8], [4], [9], [10].		

This comparative table shows how each author contributes to the field of innovation in handicrafts from different perspectives (Tabla 1). User centered design, open innovation, co-creation,diffusion of innovation and perceived value theory are key concepts and approaches that influence the generation of innovation in handicraft products.

By considering and applying these elements, the development and relevance of handicrafts in today's market can be boosted, giving artisans the opportunity to create unique and attractive products for end users..

IV. Discussion

The results of this study revealed that the application of the DUI model in handicraft products enabled the creation of more innovative and attractive products for end users. The collaboration between artisans and designers fostered the generation of fresh ideas and the incorporation of new aesthetic approaches. In addition, the active participation of end-users from the early stages of the design process ensured that the resulting products met their needs and preferences.

The discussion on the DUI model of innovation in handicraft products covers various aspects relevant to understanding its impact and potential in the field of handicrafts. In the following, the discussion will be expanded by considering different perspectives and key authors.

- *Participation of the artisan community*: A relevant issue to analyze is the active participation of artisans in the innovation process. When artisans collaborate and get involved in the generation of ideas and decision making,authenticity and the preservation of cultural traditions in the production of handicrafts are fostered [11]. This implies a dynamic relationship between the community and innovation processes, where individual creativity and the preservation of collective cultural identity are balanced.
- *Valorization of traditional craftsmanship*: It is also essential to consider the valorization of traditional craft techniques within the context of innovation. Authors such as Giu Bonsiepe emphasize the importance of maintaining a balance between innovation and the preservation of knowledge passed down through the generations [12]. Innovation in handicrafts can bean opportunity to revitalize and keep alive cultural practices and craft skills, allowing their adaptation to contemporary tastes and needs.
- *Integration of digital technologies*: Another relevant point to consider is the incorporation of digital technologies in the handicraft innovation process. The combination of traditional techniques with digital technologies, such as 3D printing and computer-aided design, can foster the creation of unique and personalized handicraft products [13]. The adoption of these technologies can provide new design, production and marketing opportunities for artisans, increasing the reach and visibility of their creations.
- *Impact on the market and local economy*: It is also essential to analyze the impact of the DUI approach on the market and local economy. Its hould be noted that innovation in handicraft products can generate competitive advantagesfor the arts , promote cultural tourism and createemployment in local communities [14]. In addition, innovation in handicrafts can help differentiate products in the global market,promoting the valuation and recognition of handicraft production.
- *Sustainability and social responsibility*: Another crucial aspect is sustainability and social responsibility in the context of innovation in handicraft products. It is important to consider sustainable practices in the design and production of handicrafts, such as the use of recycled or low environmental impact materials. In addition,innovation in handicrafts can contribute to the generation of decent employment and strengthen local capacities, promoting social inclusion and the sustainable development of communities.
- *Learning and knowledge transfer*: Finally, the discussion should encompass learning and knowledge transfer in the innovation process. The importance of communities of practice in the context of handicrafts, where knowledge is shared, constructed and transmitted in a collaborative manner, is raised. Innovation in handicrafts can foster spaces for continuous learning and knowledge exchange among artisans, designers, users and other actors,strengthening the community and promoting the evolution of handicraft practices.

In summary, the discussion on the DUI model of innovation in handicraft products covers aspects such as the participation of the handicraft community, the valorization of tradition, the integration of digital technologies, the impact on the market and the local economy, sustainability and social responsibility, and learning and knowledge transfer. These elements contribute to understanding the potential and challenges of innovation in handicrafts, highlighting their importance as a cultural expression, a source of employment and a driver of development in communities.

V. Results

The application of the DUI model in the innovation process of handicraft products showed promising results. Through collaboration between artisans,designers and end-users, a wide variety of innovative and creative ideas were generated.

It was observed that the involvement of end-users-from the early stages of the design process led to abetter understanding of their needs, preferences and desires. This led to the creation of hand crafted products that were more relevant and attractive tothe target market..

Results are presented by systematizing three main categories of questions: Design, Materials and Production Process (Table 2). Each category has three main elements highlighted. For each element, the score assigned by the 20 artisans and 50 users is shown on a scale of 1 to 10..

Table 2.

Question Categories	Main Elements	Artisans	Users
Design	Creatividad	4	9
	Creativity	3	7
	Originality	2	6
Materials	Durability	3	8
	Sustainability	5	7
	Textura	4	6
Production Process	Texture	4	7
	Efficiency	3	9
	Customization	5	8

Source: Authors.

Table 2 provided presents a g ene- ral view of the responses of artisans and users in relation to different categories of questions and their main elements. An analysis of the data presented will follow:

A. Design

- *Creativity*: Users place a higher value on creativity in the design of handicraft products, assigning it a promised score of 9, while artisans score slightly lower with an average of 4.
- *Quality*: Both groups, users and artisans, consider quality as an important element in design, although users give it greater importance (average score of 7) compared to artisans (average score of 3).
- *Originality*: Both users and artisans value originality in the design of handicraft products, but users give it a higher score with an average of 6, while artisans obtain an average of 2.

B. Materials

- *Durability*: Users value the durability of the materials used in handicraft products more highly, assigning it a promised score of 8, while artisans give it a slightly lower score with an average of 3.
- *Sustainability*: Both users and artisans consider the sustainability of the materials used to be important, although artisans give it greater importance with an average score of 5, while users obtain an average score of 7.
- *Texture*: Both groups value the texture of the materials in the handicraft products, but users give it a higher score with an average of 6, while artisans obtain an average of 4.

C. Production Process

- *Technique*: Both users and artisans consider the
- application of appropriate techniques in the production process to be important, giving it an average score of 7.
- *Efficiency*: Users value the efficiency of the production process of art products more highly, assigning it an average score of 9, while artisans give it a slightly lower score with an average of 3.
- *Personalization*: Both users and artisans consider personalization important in the production process, although artisans give it greater importance with an average score of 5, while users obtain an average score of 8.

In addition, the incorporation of designers in the process made it possible to introduce new perspectives and aesthetic approaches in the creation of the products. This resulted in more contemporary and fashionable designs, which increased their perceived value to consumers. Overall, the results indicate that the DUI model can be an effective strategy for driving innovation in handicraft products. By involving end-users and fostering collaboration between artisans and designers, products are created that are better suited to market needs and have greater potential for commercial success.

The findings support the importance of adopting collaborative and inclusive approaches to craft product innovation. They highlight the value of working together and involving end-users in the design

process. The results obtained through the handicraft product innovation model show improvements in product quality and diversity, strengthened cultural identity, increased market competitiveness, job creation and local economic development, as well as greater recognition and appreciation for craftsmanship.

VI. Conclusions

The DUI model is presented as an effective methodology to promote innovation in handicraft products. Collaboration between artisans, designers and end-users allows for the generation of creative and relevant solutions. The application of this model in the field of handicraft products can help craft communities adapt to changing market demands and maintain their relevance in today's economy..

The results obtained through the DUI model of innovation in handicraft products reveal a series of important aspects that contribute to the development and improvement of handicraft practices. In the following, the results obtained will be expanded, considering different areas of impact:

- *Improvement in the quality and diversity of handicraft products*: The application of the DUI model in handicraft production has shown a significant improvement in the quality of products, both in terms of the materials used and in terms of finishes and details. This improvement is due to the integration of new design approaches and the exploration of new production techniques. In addition, innovation in handicrafts has led to greater product diversity, expanding the options available to consumers.
- *Strengthening cultural identity*: The positive impact of the DUI model in preserving and strengthening cultural identity through handicrafts is noteworthy. Innovation in this context has allowed craft communities to keep their traditions and cultural practices alive, while adapting to the demands of the contemporary market. This has led to greater recognition and appreciation of handicrafts as an expression of local cultural identity.
- *Increased market competitiveness*: The application of the DUI model has boosted the competitiveness of artisanal products in the market [13]. The incorporation of innovative elements has allowed artisans to differentiate themselves from mass production and compete in specialized niches. Moreover, innovation has opened up new marketing opportunities through online platforms and participation in inter- national events and fairs.
- *Employment generation and local economic developmen*: Innovation in handicraft products has also had a significant impact on employment generation and economic development in local communities. The diversification of production and the incorporation of innovative approaches have allowed the creation of more employment opportunities for artisans and other actors involved in the process. This has boosted the local economy and contributed to the sustainable development of artisan communities.
- *Recognition and appreciation of handicrafts*: An important result of innovation in handicrafts is greater recognition and appreciation for this type of production. There has been an increase in the demand for innovative handicraft products, both locally and internationally. The combination of tradition and modernity has generated renewed interest in handicrafts, positioning them as products of high quality and cultural value.

The use of the DUI model fostered cooperation and knowledge transfer among the various participants. The artisans benefited from the skills and competencies of the designers, who, in turn, acquired knowledge of the artisans' working techniques and craft knowledge. This interaction promoted an environment conducive to reciprocal learning and professional enrichment.

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