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New design and manufacturing technologies for craft products

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Abstract

Considering the principles characterising the craftsman and industrial production systems as a starting point, this article explores mechanisms that promote the interdisciplinary relationship between industrial designers, industrial manufacturers and craftsmen. The main objective is to enhance knowledge contributing to the development and consolidation of the craft activity. The performed analysis demonstrated that some fundamental concepts and strategic plans can be applied to craft processes. These factors support a viable proximity between the three centres of industrial production, technological innovation and craftsmanship. This study allows the definition of a strategic plan for restructuring the craft activity, providing the craftsman with upgraded skills to new media and industrial technologies, allowing them to adapt its work to the current market demands. This proposal has been validated by a qualitative research work performed using collaborative tools, which was conducted in the field of wicker crafts in Madeira, Portugal.

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1. Introduction

Throughout the twentieth century there has been a steady decline in the craft activity due to increasing market demands. Even the concept of need has changed, creating the society that we know today, which is characterised by a permanent dependence on objects that solve its problems. This situation led to a consumer-oriented society, given that man no longer felt the need to create and develop his own solutions and started consuming low-cost mass-produced objects by industries.

This problem led craftsmen to lose their market competitive capacity. In this sense, and from the socio-economic point of view, we are facing a clash of values: on one hand, the cultural value associated with craftsman know-how often under extinction threat and, and on the other hand, the technological advances from the industrial sectors which have a high response capacity regarding the growing demands of society.

However, in order to find a solution to this problem, we have been witnessing renewed attention to the crafts sector during the last decades of the twentieth century and the first decades of the present century. Thus, with the emergence of new craftsmen with a background and culture very different from their predecessors, new motivations and ways of approaching the concept of craftsmanship are emerging today.

Recognising this complex paradigm in which the craftsman activity finds itself, and recognising that the new tendencies of the industrial system are set to implement methodologies that privilege the personalisation and singularisation of the products, in order to satisfy the needs of each consumer, it is fundamental and urgent to consider methodologies that can promote both productive sectors. Taking into account the evolution of the handicraft and industry, in the relationship between R & D & I activities since the industrial revolution, today deserves special attention, within the industrial sectors, the design and the manufacture as well as the proximity of the "Industry 4.0" [1], which aims at excellence in production through technology, focusing its innovation potential on the introduction of technological facilitators such as the internet of things, additive manufacturing, augmented reality, cloud computing, big data, etc., allowing (among other things) product customisation.

It should be noted that although the focus of "Industry 4.0", regarding the development of productive activity, is centred on the industrial activity, it is transversal and projectable to other areas such as the crafts activity.

Analysing the opportunities provided within "Industry 4.0" [2], digital facilitators constitute an opportunity to streamline craftsman production processes without changing its identity traits; They offer great application flexibility and can enhance, not only the expressiveness of the activity, but also its value in global markets in an economically sustainable way. However, it is also possible to identify one of the greatest obstacles to the modernisation of the craft sector as the rejection of emerging technologies [3].

Generally, these technological incursions are still considered by craftsman as disturbing elements of their procedures and as a challenge to the sustainability of their activity [3, 4]. Nevertheless, due to the exponential development of means and technologies and to the constant evolution of society, craftsmanship will necessarily have to integrate innovation in order to survive. Given its amplitude and complexity, this type of study requires a holistic observation and analysis of the framework to which each process is associated. It is necessary to emphasise that the very foundations of industrial manufacturing derive and evolved from the concepts of craft production. Their conceptual approximation is evident, although both sides assume distinct trajectories in the way they focus on the development of the product life cycle [5, 6].

Considering the current situation regarding craftsmanship, and recognising that new trends in the industrial system are focused on automating, digitising and maximising the personalisation of product and service results [7], it is necessary to compare and evaluate new paradigms, techniques, models and procedures from Industry 4.0 that can be applied and add value to the crafts productive activity [8,9]. Within the industrial background, the comprehensive use of technological facilitators currently provides the creation of more elaborate and complex forms [10, 11].

Without loss of the characteristic identity of the handicraft, the factors previously discussed can establish a synergistic and viable proximity between the approaches of industrial and artisanal production systems. To this end, a methodology is developed that allows exploring the benefits of the methodological and technical resources of the production in Industry 4.0 that can contribute to the recovery and optimisation of the craftsman processes, from a professional and collaborative approach between craftsmen, design and product development engineers and production engineers.

2. Presentation

This section presents the development of a methodology based on case studies, combined with procedures allowing the comparison and evaluation of the data. The purpose of this methodology is to establish the guidelines to explore the potential value that results from the joint intervention of craftsmen, design engineering and production under the articulation of technology facilitators. With its application, the sustainability of the crafts activity is sought through the definition of a strategic plan. The characterisation of this interdisciplinary cooperation allows defining a proposal

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