SUSTAINABILITY-ORIENTED DESIGN: STUDY OF ALTERNATIVE FABRICS AND DEVELOPMENT OF WAXED WRAP TISSUE

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1. INTRODUCTION

Negative impacts caused by the large volume of plastic waste from single-use packaging are huge, so a proposal is presented that has design as a lead for the solution of this inappropriate disposal. The design and conception of a resolution presents a critical look at the properties of fabrics produced with fibers from natural sources available on the market, pointing at their application in reusable packaging for food known as waxed tissue. To be carried out, the proposal points to an integrated approach between the design and development of materials, which provides a material design since the packaging properties are designed in accordance with a defined design context.

The increasing concern for the environment has encouraged the production of biodegradable materials as an option for rubbish management, as recycling also generates an environmental impact. In this context, especially food industries, seek to develop packaging that uses organic, biodegradable materials and that preferably help in the quality of the product (MARKET INSIGHTS REPORTS, 2020).

An alternative already in the market is the reusable product for food storage made of wraps, known as waxed cloth, reducing the residue from the disposal of single-use packaging. Fibers processed by weaving stand out as potential substitutes for polymeric materials processed in the form of films or three-dimensional volumes in some contexts of food packaging, but there are challenges in the textile industry such as: use of natural resources to minimize the use of water, use of renewable energy sources, increased produce of raw materials, reduction of waste and production costs, in addition to gains in terms of the health of the environment and the population (DE CARLI; MANFREDINI, 2010).

The main objective of the work, focuses on the search for the best alternative for the generation of waxed cloths, aiming at the replacement of plastics in food packaging, from the selection of alternative fabrics, according to the guidelines of the circular economy, being its methodology based on in tools arising from product design and related areas, where the concepts relevant to the project presented throughout the bibliographic

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review, research of consumer and market trends, study of the project's target audience and ideation of solutions and alternatives consistent with the proposed concept.

2. DEVELOPMENT

A product was developed inserted in a commercial logic of production, from the perspective of Strategic Design. The proposed methodological framework for this project was developed using circular economy standards. Understanding (I), when contextualization is completed; Idealize (II), when the data collected in the previous stage is transformed into a project opportunity; Evaluate (III), when strategies are made tangible in the form of a project; and Validate (IV), when prototypes and tests are conducted.

3. RESULTS

The materials for this work were chosen after careful consideration of the factors of the information gathered. Fabrics made from natural textile fibers were the subject of the study. The focus of the analysis is on the fabric, which is the end product of the weaving process; the fibers are thus considered a component. For the material investigation, technical sheets were created with data that supported the selection of the type of fabric that most closely resembles cotton fabric. The sheet begins with a brief summary of the fabric, followed by some of the material's properties and characteristics.

Hemp and banana fibers were used as textiles. These materials were chosen for their low environmental effect, energy efficiency, and product durability, as well as their high compatibility with the Circular Economy. Furthermore, the increased simplicity of acquisition and proximity of the tactile experience with the cotton fabric, having the best user approval.

Other materials were added to the packaging design to add key features for the creation of a product with the potential to transport, protect, be reusable, and be environmentally correct: Because of its anti-inflammatory and emollient properties, which favor its interaction with other products, beeswax has a wide range of functions while being harmless to the body and the environment. (CHEN; ZHAN; ZHONG, 2015). The rosin, which is a resin obtained from pine trees or similar types of plants, brings benefits by having a hydrophobic aspect and high viscosity. The rosin aims to help in the construction of the packaging as a water vapor protector, increase mechanical resistance, flexibility, in addition to providing a barrier of protection against insects, fungi, and bacteria, as it has antiseptic properties. (SILVA, 1995). The rosin aims to help in the construction of the packaging as a water vapor protector, increase mechanical resistance, flexibility, in addition to providing a barrier of protection against insects, fungi, and bacteria, as it has antiseptic properties. (MCKELIVE; BILLS; PEAT, 1994).

The soil biodegradation test was carried out in accordance with ASTM G160-12 – Standard Practice for the Assessment of Microbial Susceptibility of Non-Metallic Materials in Soil by Laboratory Landfill. The samples were measured by visually comparing them after three months of contact with the earth (figure 1). Because alternative textiles were unavailable, the waxed cloth biodegradation test was conducted on a sample constructed of cotton fabric. Having the technical sheets of the materials, it is known that there is a chance that the findings will be

identical or better, making the test decisive. The generated substance, as well as a segment of PVC film (polyvinyl chloride), were buried in the soil at the same time. Following the three-month period specified in the test, the materials were removed and partially cleaned, as shown in figure 1.

Figure 1: Comparative test of biodegradation in soil. SOURCE: prepared by the authors.

Finally, the waxed cloth dissolved nearly completely while the plastic remained virtually unchanged, revealing the potential to reduce the life cycle of the proposed solution in comparison to the plastic film commonly employed for the same purpose in the preservation of fresh food products. The proposed packaging has an acceptable reuse and disposal cycle, resulting in its use being helpful to the biosystem.

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