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Strategic Design for Leather Tannery Industries

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Abstract. The province of Tungurahua in Ecuador has a participation of 76% at the national level within the leather production chain with the production of raw materials, these are used in the manufacture of 80% of footwear in the country. These production processes generate environmental problems, the greatest impact being on the water, due to the dumping of liquid waste with chemical contents in rivers, this generates bad odors, gases, smoke and polluting solid waste from this process. According to data from tanneries, approximately 88% of the raw material is transformed, while the remaining 12% is considered as waste (leather trimmings), which are used in other manufacturing processes (footwear, textile industry, leather goods and others), the chip obtained from the process is compressed and discarded. As a preventive action, a process is proposed to generate new products through the use of waste obtained from leather processing. The design methodology is the Double Diamond: discover, define, develop and deliver a new product that reuses this waste, a block of dimensions 150 x 75 x 5 mm and 300 grams of weight was obtained, which can be applied in the sector of construction and allow the transition from a linear production process to a circular process.

Keywords: strategic design, solid waste, new products, leather industry, leather industry.

1. Introduction

The current production paradigm is mainly based on the linear economy, i.e., "take, make and dispose"; however, the circular economy also considers the recovery phase and some industries are currently implementing these processes. The province of Tungurahua has a large participation within the leather production chain, with 76% [1] in the production of tanned hides at the national level that are used as raw material for the manufacture of 80% of footwear in the country and other uses.

The production processes of tanneries generate environmental problems, with a greater impact on water due to the dumping of liquid waste containing chemicals in streams and rivers, generating bad odors, gases, smoke and solid waste as pollutants from this process. The manufacturing sector in Ecuador has a 13% share of GDP [2] and is made up of 24 subsectors according to the Expanded Classification of Economic Activities (ISIC). Subsector C15 - Manufacture of leather and related products, has as its main economic activities [3]:

- ✓ Production of footwear, boots and similar articles.
- ✓ Manufacture of artificial leather (regenerated), chamois and parchment leathers, patent and metallized leathers.
- ✓ Activities of fleshing, shearing, shearing, depilation, fatliquoring, tanning, bleaching, dyeing, dressing of skins and leathers of fine skins and leathers with hair on.
- ✓ Manufacture of suitcases, backpacks, handbags and other similar articles.

According to the Coordinating Ministry of Production, Employment, and Competitiveness, the textile and leather intermediate and final industries (IIF) generate a greater contribution to this industry, with a 75.6% share in the province of Tungurahua in handicraft, tanning, leather, and footwear activities.

The leather tanning process is important for obtaining raw material for manufacturing products. Consumers perceive leather as a natural material and associate it with sustainability, so the leather industry will adopt sustainable criteria by implementing circular processes, orange economy, and others in its industries. The use of tanned leather is destined for the production of some products worldwide, being used for the manufacture of furniture, accessories, clothing and others. The key areas in leather production are: resources (hides/skins, chemicals, water, energy), emissions generated during the production process (solid, liquid and gaseous waste), quality and attractiveness of the final product (durability) and use of the product after its useful life [4].

Considering that Ecuador processes more than 350,000 hides per year approximately, an estimated 1,500 tons of leather shavings are generated annually and destined for landfills. Several alternatives have been proposed for the valorization of leather shavings, the most used is directly as an adsorbent of: dyes, motor oils, chromium and arsenic present in wastewater; as well as in reinforcement of composite materials with polymeric matrices of rubber, polyvinyl chloride, polyvinyl pyrrolidone and polyvinyl alcohol (PVA) [5].

It has been shown that one of the viable methods for utilization of chromium-containing leather solid waste resources has been to obtain materials for electrostatic flocking, regenerated leather, adsorbents and construction materials through simple treatment steps without dechroming [6].

In Bangladesh they are using the chip from the debinding process through clay stabilization processes to obtain bricks. For sustainable industrial production they have ensured the mechanical properties of bricks as building materials, in addition, their manufacturing process is energy efficient compared to conventional processes. They have manufactured with different percentages of chip composition (10%, 20%, 30% and 40% in dry weight) in controlled laboratories and in the field, has met all the properties required by a building material such as strength, water absorption, shrinkage, weight loss on ignition and bulk density. The bricks with incorporated chips obtained a compressive strength ranging from 10.98 MPa to 29.61 MPa, with water absorption ranging from 7.2% to 20.9%, and met the established ASTM standards for construction materials [7], [8].

The tanneries in Tungurahua do not currently have circular processes that allow for the use of the waste obtained from the leather trimming process; therefore, the final destination is the landfill in the city of Ambato in Chachoán. Only about 50-55% of the collagen actually ends up as finished leather, so tanneries generate large amounts of solid waste. In fact, the utilization and/or disposal of solid waste is today one of the most difficult challenges [4]. The goal of a sustainable strategy is, as much as possible, to produce no waste and to convert any potential waste into an effective and valuable product. Therefore, it is important that the waste does not contain chemicals of concern, they would only limit its further use.

Within the objectives of tanneries is to have lower water consumption, better absorption of chemicals, decrease the use of hazardous and/or banned substances (Substances of Very High Concern, SVHC), improve the quality/reuse of solid waste and reduced content of specific pollutants such as heavy metals and electrolytes contained in them for their processes [4].

Through the application of strategic design can be obtained the planning of new products and services that reduce waste, reuse waste generated in the industry and through strategies minimize negative impacts on sustainability, to provide benefits

for both the economic, social and environmental sector, by extracting the maximum value from raw materials, products and waste; promoting energy savings and reduction of greenhouse gas emissions [9].

To address this problem, using strategic design and user-centered methodologies, problems or opportunities can be discovered to generate proposals for new products that use waste, reincorporating it into the production chain, which allows moving from a linear production model to a circular one, helping to reduce environmental pollution.

2. Literature Review

Waste management and strategic design

Design methodologies emphasize the importance of investigating user needs and understanding the situation in which a product can be generated or improved. Strategic design through the application of criteria is relevant; design is a complex activity, and failure to consider new strategies that propose the creation or improvement of these processes can be costly in terms of time, people and money for companies [10], [11], [12], [13], [14].

The disposal of solid waste helps to achieve sustainability objectives, the reuse of leather shavings produced in the trimming process is an opportunity that can be presented through the application of strategic design, in which the design process can start from an initiative of the company originated in a detected opportunity (solid waste) or as a result of a proposal of the designer that includes a concept of innovation and product that is interesting for the context and the environment, generating a circular system where the result is the obtaining of a strategic object that proposes values, anticipates the needs of the consumer and is environmentally friendly [15], [16].

The amount of solid waste generated will depend on some variants such as the raw material processed (heavy skins, very fatty skins and light skins), differences in the tanning process and substantial variations in the water content in the waste. Commitment to tannery management is a prerequisite for good environmental performance. Technology alone is not enough; it is accompanied by good housekeeping measures. A key to good performance is awareness of the inputs and outputs of the process with respect to material characteristics, quantities and their potential environmental impacts.

Taking into account the criteria that guarantee better environmental performance, as well as the technological criteria that focus the properties of the final product. In addition, pollution will maintain a bearable level with a reduction of spills, accidents, water waste and chemical use. This can be achieved by choosing appropriate techniques, good maintenance and control of the operation, by monitoring and adjusting process parameters, and good training of personnel [4].

Solid waste management is currently one of the most difficult tasks in environmental management: an established method of reuse and/or disposal may become unfeasible in the short term, either due to changes in regulations or for commercial reasons. The image of solid waste handling in a tannery is a reflection of the company's competence, responsibility and social and environmental commitment. The leather tanning industry is considered an economic activity for the province of Tungurahua that contributes directly to the leather and footwear cluster. This process at a general level produces by-products that have contributed to the environmental footprint, as part of the tanning process it generates large volumes of liquid effluents and solid waste, specifically in what has to do with rawhide trimmings, fleshings, keratin waste, polishing powders and post - tanning leather shavings [5].

The discipline of Design in recent years has been transforming and evolving according to the new challenges of the environment and context. In recent decades, designing with the user in mind and involving sustainability in product development (PD) has generated new design currents [17]. Strategic design management can be considered as an integrated network that does not require a certain sequence and needs the interactivity of some important aspects such as [18]:

- ✓ Idea: temporary formulation of the product program.
- ✓ Preliminary analysis regarding the company, market, society, product sustainability, professional management and project feasibility.
- ✓ Strategic objectives of the project: thematic goals and structure of the objectives.
- ✓ Results to be obtained.
- ✓ Project communication.

For the development of new products and design ideas, they will not be accepted or rejected without first being subjected to a verification analysis. In this way, they are considered as temporary and although they can be withdrawn, they can give rise to others, by analogy or contraposition [15]. It is beneficial to discard within the initial idea, the concept and eventually the prefiguration of the object, which may or may not be present. Once the idea has been deepened, it is important to define and evaluate the concept of the product in all the aspects prioritized in the proposal [15]. The prefiguration is part of the design process, it constitutes a pre-design and suggests a materialized solution of the object, in addition, it allows the evaluation of the product proposal.

The sustainability of the product is considered as an unavoidable condition for the social responsibility of both the design and the company, so that there is a concordance between the economic system, the social and the environment, so it will be part of the aspects to be considered in the new project. Although sustainable development may face a conflict of interests due to the need for expansion of the economy of emerging and developed countries and, on the other hand, the aspiration of a large part of society to preserve the environment. The low industrial development of the peripheral regions can be taken as an opportunity to develop policies to control environmental pollution, but on the other hand, the globalization of business, production and marketing inexorably transfers the interests of the central countries to the peripheral ones.

The identification and sizing of trends in inputs, processes, human capacities, impact on the environment, technology and innovation are the challenges that Ecuador faces in meeting the goals. Therefore, it cannot fail to recognize that cultural and social phenomena determine the change in consumption habits and behavior of human beings, i.e. the SDGs are a macro trend in the medium and long term, directly related to economic, social and political factors that will influence lifestyle and consumption decisions.

Macrotrends such as the incorporation of the Sustainable Development Goals, specifically goal 12: Responsible Production and Consumption invites companies in general to the efficient management of shared natural resources and the way they eliminate toxic and polluting waste, industries, businesses and consumers are called to reduce, reuse and recycle waste generated in these processes to achieve sustainable patterns of consumption by 2030, there is less than a decade to achieve this goal, it is important that industries reduce their ecological footprint through changes in production processes and consumption of goods and services [19].

3. Data and Methodology

The R + D + i (research, development and innovation) is a tool that allows the application of sustainable design in a comprehensive manner, where its principles are the harmony between the economic, social and environmental sectors without compromising the needs of future generations, also considering those of the present, it is directly linked to the achievement of the SDGs. Moreover, design has evolved and now allows consumers to interact directly with what they feel, what they want and need. The personalization of products, spaces and services are becoming short-, medium- and long-term trends.

Design Methodology: double diamond

In the field of user experience (UX) for product development, new concepts must be taken into account. Synthesizing and organizing all this new terminology has led to the development of new design methodologies. Concepts such as: Design Thinking, Design Process, Double Diamond Method, Simplex Method of Creative Problem Solving and the different phases of the UX process, have been formed with similar elements. In the different stages, each one has its particularity, but all of them can overlap each other is, the same path, i.e. all design disciplines share the same creative process.

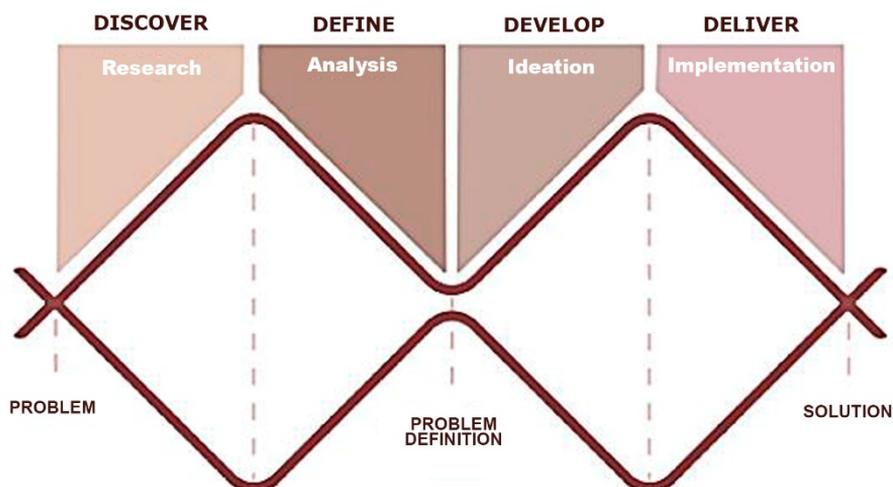


Fig. 1. Stages of the double diamond methodology. The methodological proposal is represented with two diamonds (rhombuses), where the first one symbolizes the Creative process, composed of two stages "Discover and Define", and the second one the Prototyping process, composed of two stages "Develop and Deliver".

Source: Wuth P., Negrete S., Guevara G., & Hojman A. [20]

Each specialization in design has different approaches and ways of working, the Double Diamond methodology is considered as a simple visual map of the design process for the development of a product and / or service [21]. It is based on the initial divergence of thought that investigates several ideas and different points of view and the subsequent convergence of this, as the process progresses, the best findings or solutions that respond to the challenge to be addressed must be selected.

By means of the Strategic Design, the types of waste that are obtained in a tanning process were identified: skin trimmings, raw meat, shavings, leather sanding and sludge. Of these, shavings were selected because of their environmental impact due to their chemical composition (chromium) and because they reduce the volume

of waste in Ambato's landfills. Applying the Double Diamond methodology, a new product has been developed with functional, technical and aesthetic attributes that can be used in the construction sector due to its high growth and innovation in designs and materials.

4. Results

Sustainable design allows the interaction and harmony of the social, economic and environmental sectors, obtaining a new product that meets and satisfies the proposed methodology becomes a challenge. Elaborating the concept of the prototype will comply with specific characteristics such as the reuse of waste from the leather trimming process of tanneries, environmentally friendly, that will boost the local economy, will comply with technical characteristics, functionality and that will be aesthetically attractive to the consumer, makes it possible to become an integral product (insight) that harmonizes each of the needs through the proposed strategic design methodology.

The solid residue coming from leather lowering process has a highly organized structure in the form of fibers $\varnothing = 100$ nm, which are in parallel and very close together, have a significant protein percentage of 78.64 - 78.00% and trivalent chromium of 3 - 3.3% [22]. The same that according to several toxicity manuals do not represent a potential risk, when inhaled or ingested; however, it is necessary to mention that this residue has a possibility of oxidation from CrIII (chromium 3) to CrVI (chromium 6). Acid rain can leach CrIII-containing waste from landfills causing possible oxidation; another possibility of oxidation is by air over a wide pH range. According to Gibbs free energy law, spontaneous oxidation can occur in an acidic or alkaline medium [22], where they mention the possibility of oxidation of CrIII to CrVI, but they have not performed experimental tests to confirm this hypothesis. In the thermal field, for there to be an oxidation of CrIII to CrVI, the temperature must be greater than or equal to 850°C [23], this data is very important and thermal tests must be considered.

In Ecuador, the construction sector in 2019 was the fifth sector with the highest representation in the country's GDP (8.17%) and had a foreign investment of more than 69 million dollars, generating work for more than 480,000 people - between suitable and unsuitable employment (Ekos CEO Panel, 2020). Bangladesh is currently using the chip from the debinding process through clay stabilization processes to obtain bricks. For sustainable industrial production they have ensured the mechanical properties of bricks as building materials, in addition, their manufacturing process is energy efficient compared to conventional processes [24]. At present, there are materials that have a neutral pH and can be used for these processes.



Fig. 2. Analysis for the development of the new product. Strategies such as culture, value chain and possible results to be expected are analyzed. In addition, sketches were made in order to conceive the idea in an adequate and concise manner, and later study prototypes to verify the feasibility of the design.

We obtain the block built with stabilizing material, which allows to confine inside it the shavings from the leather deburring process so that the residue does not come out on the surface. The characteristics are determined and fixed by the composition of the block. With the selected option, Chrome content tests will be carried out. For the application of the prototype to confine the chips inside the block and by the physical-chemical characteristics can propose its use for indoor and outdoor spaces.

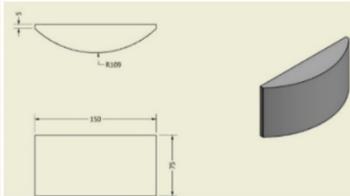
Block

Technical data

Manufactured with stabilizing materials that allow the ideal confinement of the chips (residue).

- Cost per m2**
\$43.29 USD
- Composition**
65% material
35% chips
- Weight**
300 grams
- Amount of CrIII**
0.74 mg/kg

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Dimensions: 150 x 75 x 5mm



**Reduction
Recycling
Reuse**

Fig. 3. Technical data sheet of the proposal. The characteristics of the final prototype are described in relation to cost, composition, weight, dimensions and amount of CrIII.

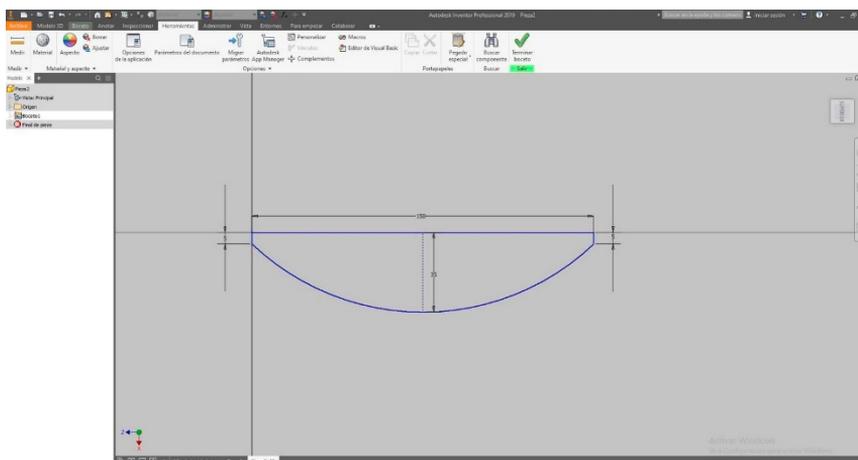


Fig. 4. (a) Computer model of the block. Modeling of the selected morphology with the aid of CAD software (2D).

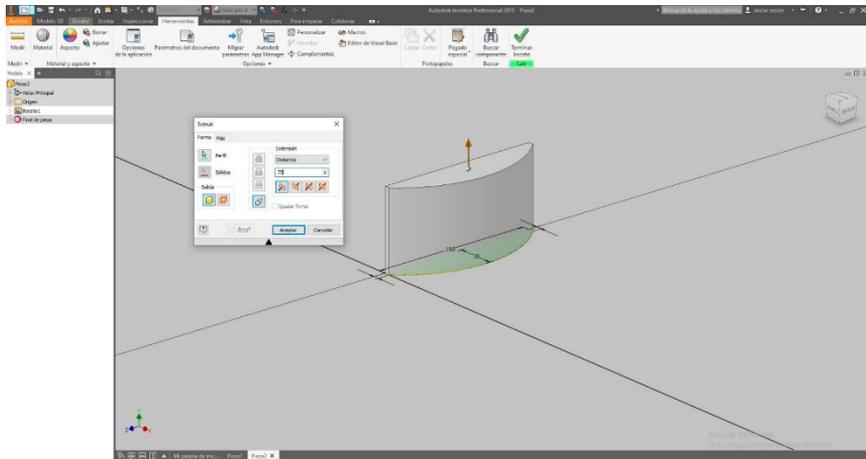


Fig. 4. (b) Computer model of the block. Extrusion process of the selected morphology (3D).



Fig. 5. Rendering of the prototypes of the block with materials



Fig. 6. (a) Proposed application of the block. Application of the prototype in the interior design of shop windows.



Fig. 7. (b) Proposed application of the block. Application of the prototype in the Interior Design of houses.

Product stacking tests were carried out and the results were sent to the ENVIRONOLAB laboratory to test the chromium content in the final product. The Cr values obtained for the long chip samples were 0.74 mg/kg. The maximum permissible limit for heavy metal extraction on a dry basis (acid digestion) for total chromium is 3000 mg/kg. The Double Diamond process can have variations and depends on the role or project. There are two possible uses for the obtained blocks, the first one is the application in commercial display windows and the other one is for applications in living or waiting rooms, as an option for professionals in Interior Design.

With the development of this new product, it is estimated to avoid approximately 120 tons per year of shavings from the leather trimming process of a single tannery. It should be considered that annually in Ecuador this process is estimated to produce more than 1,500 tons of this waste, which are deposited in dumps and landfills of the cities, causing leachates that cause damage to the environment.

5. Conclusion

The theoretical foundation allows us to affirm that Strategic Design relates concepts and languages of design and companies, to achieve through an interactive action the realization of projects, where they define the priority objectives and available resources to respond to the new contexts and problems they present. The generation of waste (solid, liquid and gaseous) in tanneries generates environmental impacts that have not been mitigated. A Strategic Design model allows analyzing and proposing circular processes within tanneries to obtain new products from the use of these wastes.

By means of the Strategic Design model, the types of waste that are obtained in a tanning process were identified: skin trimmings, raw meat, shavings, leather sanding and sludge. Of these, shavings should be selected because of their environmental impact due to their chemical composition (chromium) and because they reduce the volume of waste in the city's landfills. This waste is the raw material for generating new products, reinserting these wastes back into the production chain and preventing them from ending up in the city's landfills, thus reducing the environmental impacts that they can generate when discarded.

A new product has been developed with functional, technical and aesthetic attributes that can be used in the construction sector due to its high growth and innovation in designs and materials. A product was obtained that confined the chip in its interior with a chromium content of 0.74 mg/kg, weight of 300 grams, modular and aesthetically attractive to the user. The weighted cost is 43.29 USD which makes it competitive in the market with respect to the price offered for 3d panels used for the design of spaces that range from 30 to 60 USD/m².

The Strategic Design Model developed is a contribution to the macro trend of achieving the SDGs, specifically goal 12, in which through the convergent and divergent phases have identified a problem, defined the solution, developed and delivered a new product that responds to the management of waste (shavings) generated in the tanning industry to mitigate the negative effects on the environment.

The application of the Double Diamond Methodology allows the interaction of actors that form a network between academia (researchers), decentralized autonomous governments, industry and the construction sector, who are the appropriate ones to jointly develop research projects that contribute positively to society in general with social responsibility.

6. Recommendations and Future research lines

It is recommended that mechanical strength and water absorption tests be performed on the new product to determine if the confinement of the chip inside the product does not allow chromium leaching under aqueous conditions. In addition, a hydrolysis process can be added for the chip, which will allow the total removal of CrIII.

The Double Diamond Methodology can be used for the generation of new products and services that allow diversifying its use and help the reuse of waste from the leather trimming process. In addition, further research is suggested to determine whether the block can contribute as an acoustic or thermal insulator in its final use.

At the governmental level, incentives can be developed through public policies for companies that reuse their waste to obtain new products, as is done in other countries around the world.

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References

1. Ruiz M., Mayorga C., Mantilla L. y López P., «Gestión económica ambiental del sector curtiembre de Ambato,» *Augusto Guzzo Revista Académica*, vol. 1, nº 17, p. 133, 2016.
2. Banco Central del Ecuador, «Indicadores Económicos,» 2020. [En línea]. Available: <https://www.bce.fin.ec/index.php/informacioneconomica>.
3. Camino S., Vera S., Bravo D. y Herrera D., «Estudios sectoriales: manufacturas,» Superintendencia de compañías, valores y seguros del Ecuador, Guayaquil - Ecuador, 2017.
4. United Nations Industrial Development Organization, «The framework for sustainable leather manufacture,» UNIDO, Vienna - Austria, 2019.
5. Viteri A., Valle V., Bonilla O. y Quiroz F., «Valorización de virutas de cuero post - curtición para la obtención de mezclas termoplásticas,» *Revista Iberoamericana de Polímeros y Materiales*, vol. 17, nº 5, pp. 248 - 260, 2017.
6. Li Y., Guo R., Lu W. y Zhu D., «Research progress on resource utilization of leather solid waste,» *Journal of Leather Science and Engineering*, vol. 1, nº 6, pp. 1 - 17, 2019.
7. M. A. I. Juel, A. Mizan y T. Ahmed, «Sustainable use of tannery sludge in brick manufacturing in Bangladesh,» *Waste Management*, 60, pp. 259-269, 2017.
8. B. Saha y F. A. B. Azam, «Probable Ways of Tannery's Solid and Liquid Waste Management in Bangladesh—An Overview,» *Textile & Leather Review*, 4(2), pp. 76-95, 2021.
9. S. I. Hallstedt, «Sustainability criteria and sustainability compliance index for decision support in product development,» *Journal of Cleaner Production*, pp. 1-16, 2015.
10. Byggeth S., Broma G. y & R. Karl-Henrik, «A method for sustainable product development based on a modular system of guiding questions,» *Journal of Cleaner Production*, vol. 15, nº 1, pp. 1-11, 2007.
11. Akturk M., Serkan, Abbey J. y Geismar H., «Strategic design of multiple lifecycle products for remanufacturing operations,» *IISE Transactions*, pp. 1-28, 2017.
12. Baez I., Carrillo C., Castelblanco O., Betancourt F., Leguizamón G., García R. y Mendoza D., «Product Design Methodology under the structure of Innovation and Creativity. Review study,» *ESPACIOS*, vol. 39, nº 11, pp. 20 - 42, 2018.
13. N. d. P. B. v. d. G. B. Bocken, «Product design and business model strategies for a circular economy,» *Journal of Industrial and Production Engineering*, vol. 33:5, pp. 308-320, 2016.

14. Ramírez R. y Ariza R., *Diseño de productos : una oportunidad para innovar : programa: gestión del diseño como factor de innovación*, Buenos Aires: INTI, 2015.
15. R. Leiro, *Diseño: estrategia y gestión (1a ed.)*, Buenos Aires: Ediciones Infinito, 2008.
16. S. M. A. A. Mariam A., «A simulation-optimization model for sustainable product design and efficient end-of-life management based on individual producer responsibility,» *Resources, Conservation & Recycling*, vol. 140, pp. 246-258, 2019.
17. Royalty A., Ladenheim M. y Roth B., «Assessing the Development of Design Thinking: From Training to Organizational Application,» *Understanding Innovation*, 2015.
18. S. De Pietro y P. Hamra, *Diseñar hoy: visión y gestión estratégica del diseño*, Buenos Aires: Nobuko, 2010.
19. Comisión Económica para América Latina y el Caribe , «La Agenda 2030 para el Desarrollo Sostenible en el nuevo contexto mundial y regional: escenarios y proyecciones en la presente crisis,» LC/PUB.2020/5, Santiago, 2020.
20. Wuth P., Negrete S., Guevara G. y Hojman A., «DI: Diseño para Innovar,» Pontificia Universidad Católica de Chile, Santiago de Chile, 2019.
21. O. Castillo, «Designthinking y el Método del Doble Diamante para el desarrollo de prototipos de Emprendimientos o StartUps,» *Perspectivas: Revista Científica de la Universidad de Belgrano*, 2(2), pp. 84 - 91, 2019.
22. H. Lakrafi, S. Tahiri, A. Albizane y M. El Otmani, «Effect of wet blue chrome shaving and buffing dust of leather industry on the thermal conductivity of cement and plaster based materials,» *Construction and Building Materias*, pp. 590 - 596, 2012.
23. X. Elias, *Reciclaje de residuos sólidos industriales: residuos sólidos urbanos y fangos de depuradora (2 da edición ed.)*, España: Díaz de Santos, 2009.
24. I. Ariful, M. Al y A. Tanvir, «Sustainable use of tannery sludge in brick manufacturing in Bangladesh,» *Waste Management*, 60, pp. 259 - 269, 2017.

Aims and Objectives

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The main goal of the journal is the effective dissemination of original incites/results generated by the human brain and presented/reflected in articles using modern information/digital technology.

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