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Analysis For The Valorization Of Solid Wood Waste From A Door Manufacturing Company

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Abstract:
"Brazil's forestry sector is witnessing a surge in production and trade, primarily fueled by the burgeoning demand in the construction industry, rich forest reserves, and substantial technological investments. While Santa Catarina spearheads the export of wooden doors, this upswing in production generates waste, necessitating efficient management to meet sustainability objectives. This initiative targets the valorization of wood chips stemming from door manufacturing, employing the CPQvA framework (Classification, Potentiality Quantity/Viability, and Applicability). This comprehensive process includes legally categorizing waste, exploring avenues for reuse, evaluating solution feasibility, and selecting the best option based on a criticality index. The focus of this research is on wood chips, a byproduct with specific dimensions produced during the cutting of dry boards, within a company based in Santa Catarina that manufactures and exports wooden doors to the United States. The procedural sequence involves legal classification, selection of valorization strategies, feasibility evaluations, considerations of regulations and market dynamics, culminating in determining the most suitable valorization pathway.

Key Word*: Waste valorization, CPQvA systematic approach, Sustainability.*

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I. Introduction

Brazil's forestry industry is witnessing a surge in production and trade owing to escalating demand in the construction sector, abundant forest reserves, and substantial technological investments. The nation boasts expansive forested areas, predominantly comprising native forests, with notable cultivation of Eucalyptus and Pine in planted regions (ABIMCI, 2019).

A significant output of this sector is wooden doors, available in hollow, solid, or MDF forms. The export of wooden doors, primarily to the United States, is on the upswing, led by Santa Catarina.

Nonetheless, wooden door manufacturing results in waste, particularly in cases of wood defects. Effectively managing this waste is pivotal for enhancing productivity and meeting sustainability benchmarks mandated by regulations like Law No. 12,305/2010, advocating for proper solid waste handling (MINISTRY OF THE ENVIRONMENT, 2022).

Prioritizing the valorization of industrial solid waste, including wood waste, is paramount, with the utilization of the CPQvA methodology (Classification, Potentiality Quantity/Viability, and Applicability) to evaluate and devise solutions for these residues (RAUPP PEREIRA, 2006).

This project focuses on valorizing wood remnants derived from door production, following the CPQvA methodology. The aim is to legally categorize the waste, explore reuse possibilities, scrutinize the feasibility of chosen alternatives, and determine the optimal solution based on a criticality index.

Beyond enhancing the sustainability of door manufacturing, this initiative aligns with the UN's Sustainable Development Goals, encompassing the safeguarding of terrestrial ecosystems, advocating responsible consumption, and fostering sustainable economic growth.

The waste valorization process, following the CPQvA approach, adheres to a structured sequence based on specific criteria. Initially, the Classification phase involves scrutinizing the waste in accordance with relevant legislation. Subsequently, the Potentiality stage explores potential avenues for reusing the waste. The Quality/Viability phase then evaluates the overall feasibility of proposed solutions. Lastly, the Applicability stage assesses if the solution is feasible for implementation. RAUPP PEREIRA (2006) introduced this methodology as a guiding framework for waste valorization.

The assessment process begins with the Classification (C) phase, which considers the legal prerequisites pertinent to the specific waste. Progressing to the Potentialities (P) phase, it delves into potential methods for waste reuse. Subsequent to this, the process moves to the Quality/Viability (Qv) stage, analyzing selected solutions based on technical, economic, and environmental feasibility. Finally, the outcome undergoes evaluation in the Applicability (A) phase to ascertain its suitability and practical application (OLIVEIRA, 2017).

Throughout each stage, queries are posed to enable qualitative evaluations, producing quantitative responses. Scores, ranging from 0 for scenarios fostering seamless progression in the process to 10 for challenges hindering advancement to subsequent phases, are assigned. Intermediate scores, such as 5, reflect responses falling between these extremes (OLIVEIRA, 2017).

Scores acquired at each stage contribute to the creation of a criticality index, computed both individually for each phase (C), (P), (Qv), and (A), and for the entire process. The formula for this index involves summing the products of question weights by assigned scores, divided by the total sum of question weights. The resulting value from this calculation determines the suitability of the proposed solution for the waste being analyzed (OLIVEIRA, 2017).

II. Material And Methods

The research blends qualitative and quantitative methodologies, employing judgment-based assessment and classification for qualitative aspects, along with numerical data collection to gauge waste volume and conduct financial analyses. Consequently, it leans towards qualitative aspects while integrating quantitative elements (PROVDANOV; FREITAS, 2013).

In its essence, the research is categorized as applied, as its focus lies in devising practical waste management solutions within a door manufacturing company, employing scientific expertise. In terms of research goals, it assumes a descriptive role, recording and delineating events and patterns without manipulation (ZANELLA, 2011).

The research methodology employed is a case study, encompassing the gathering and analysis of data about the company and its production processes, with the aim of comprehending its operations and addressing waste-related issues, aligning with the definition of case studies by PROVDANOV; FREITAS (2013).

The scrutinized company is headquartered in Forquilhinha, SC, specializing in door production, particularly emphasizing the export market. This research primarily seeks to explore the production sector to identify waste generated during the manufacturing process.

The study focuses on examining wood scraps from the Pinus Elliottii species, standardized at a width of 12 cm, thickness of 3.5 cm, and variable lengths ranging from 12 to 40 cm. These scraps emanate from the cutting phase of dry boards in the company's production line. Employing software called Opticore aids in identifying wood defects, prioritizing larger sizes for production while these scraps are remnants collected from smaller, unsuitable parts for primary production.

This research follows a sequential multi-stage process. Initially, it involves an analysis of the legal and environmental implications of the scraps, referring to PNRS, CONAMA, and ABNT regulations, to determine their classification and any legal constraints.

Subsequent steps involve selecting strategies to add value to the scraps based on their physical and chemical attributes. The viability of these approaches is evaluated concerning their adaptation to scrap variations, compliance with legal boundaries, necessity for waste management modifications, and alignment with prevailing legislation.

Following this, an assessment is conducted to ascertain the applicable regulations for products resulting from these chosen strategies, as well as their market availability. The final phase entails analyzing the practicality of these products in the market, taking into account their commercial viability.

Cumulatively, these phases yield scores contributing to the computation of a criticality index, which facilitates the classification of the most suitable valorization strategy to be adopted by the company.

III. Result

The research aims to demonstrate the significant contribution of utilizing wood scraps to sustainability, aligning with Sustainable Development Goals and governmental directives. It emphasizes that valorizing solid waste is a powerful tool benefiting both businesses and society, guiding them toward a more prosperous future.

Expectations encompass the scholarly impact of the project, with published articles influencing further research endeavors. Furthermore, it aims to underscore the importance of interdisciplinary approaches in problem-solving, emphasizing that holistic solutions often require collaboration across disciplines, rather than relying solely on isolated studies.

Throughout the project's execution and upon completion of the dissertation, the objective is to cultivate harmonious relationships among all participants, promoting respect and ethical behavior in every interaction. Additionally, the goal is to produce concrete outcomes that tangibly enhance the socioeconomic landscape of the region, striving for practical applicability and ensuring the project's relevance and benefits for the involved community.

IV. Conclusion

The effective management of these wastes is crucial to enhance productivity and meet sustainability targets set by legislation. The CPQvA approach (Classification, Potentiality Quantity/Viability, and Applicability) stands as a critical tool to assess and find solutions for these wastes, aiming at their valorization.

The primary objective of this project is to valorize wood scraps resulting from the door production process, following the CPQvA methodology. This encompasses legally categorizing the waste, exploring reuse opportunities, analyzing the feasibility of selected options, and determining the optimal solution based on a criticality index.

Beyond contributing to the sustainability of the door manufacturing company, this project aligns with the UN's Sustainable Development Goals, fostering the protection of terrestrial ecosystems, responsible consumption, and sustainable economic growth.

Expected outcomes involve advancements in academia through influential article publications and showcasing the importance of interdisciplinary approaches in seeking solutions. Furthermore, the project aims to cultivate ethical and constructive relationships with all involved parties, aiming to effectively enhance the socio-economic landscape of the region and make the project pertinent and beneficial for the community at hand. This illustrates that solid waste valorization is an effective tool to drive sustainability and economic development.

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