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Paint Bank: Project to implement a platform for the reuse of leftover paints

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Banco de Pinturas: Proyecto para implementar una plataforma para la reutilización de pinturas sobrantes

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Abstract:

A growing number of people live in cities and need to guarantee sustainable urban development. One of the significant waste management problems is the lack of adequate treatment and disposal infrastructure for waste from daily activities such as painting. This study proposes the creation of a paint bank at *Complexo Expressa* to reduce its environmental footprint and help create a greener and cleaner future. The methodology includes exploratory research based on literature and developing a digital platform to facilitate the information flow between donors and recipients. A paint bank's implementation would promote cultural change and is also aligned with the United Nations Sustainable Development Goals (SDGs), SDG 11 - Sustainable Cities, contributing to enhancing sustainable practices.

Keywords: *sustainability; paint bank; circular economy.*

Resumo:

Um número crescente de pessoas vive nas cidades e precisa garantir um desenvolvimento urbano sustentável. Um dos principais problemas de gestão de resíduos é a falta de infraestrutura adequada para tratamento de resíduos de atividades diárias, como pintura. Este estudo propõe a criação de um banco de tintas no Complexo Expressa, de forma a reduzir a pegada ambiental e ajudar a criar um futuro mais verde e limpo. A metodologia inclui pesquisa exploratória baseada na literatura, bem como o desenvolvimento de uma plataforma digital para facilitar o fluxo de informações entre doadores e receptores. A implementação de um banco de tintas promoveria a mudança cultural e também estaria alinhada aos Objetivos de Desenvolvimento Sustentável (ODS) das Nações Unidas, ODS 11 - Cidades Sustentáveis, e assim contribuiria para aprimorar práticas sustentáveis.

Palavras-chave: sustentabilidade; banco de tintas; economia circular.

Resumen:

Cada vez son más las personas que viven en ciudades y necesitan garantizar un desarrollo urbano sostenible. Uno de los principales problemas de la gestión de

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residuos es la falta de infraestructuras adecuadas para el tratamiento de los residuos de las actividades cotidianas, como la pintura. Este estudio propone la creación de un banco de pinturas en el Complejo Expresso, con el fin de reducir la huella ambiental y ayudar a crear un futuro más verde y limpio. La metodología incluye una investigación exploratoria basada en la literatura, así como el desarrollo de una plataforma digital para facilitar el flujo de información entre donantes y receptores. La implementación de un banco de pintura promovería el cambio cultural y además estaría alineada con los Objetivos de Desarrollo Sostenible (ODS) de las Naciones Unidas, ODS 11 - Ciudades Sostenibles, y así contribuir a mejorar las prácticas sostenibles.

Palabras clave: *sostenibilidad; banco de pinturas; economía circular.*

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1. INTRODUCTION

Urban sustainability is becoming increasingly crucial on a global scale. Data from the United Nations Brazil (2022) indicate that 55% of the world's population already lives within cities, which could rise to 68% by 2050. Therefore, future generations will need initiatives that guarantee their sustainable development in the long term.

In this context, one of the main problems encountered is managing waste generated by everyday activities. Paint, for example, is one of these typical types of waste. During a construction project or even a home renovation, when more paint is purchased than is used, this can occur for many reasons, such as the sale of pre-determined quantities in specific volumes, precautions against accidents or the need for an extra hand for finishing or touch-ups, as well as a miscalculation when sizing the quantities needed for placement on the project. The result is that, in the end, part of the paint purchased is not used at all and can be disposed of incorrectly, later affecting the soil and water.

Thus, the circular economy and reverse logistics practice are promising approaches to both issues. The circular economy seeks to reduce, reuse and recycle materials to reduce waste production and optimize resource efficiency. Applying the principles of the circular economy, aligned with effective reverse logistics, can help reduce the impact caused by waste from painting processes, preserve water quality, stimulate the circulation of products and improve the quality of life of low-income families.

Therefore, this article proposes creating a project to implement a paint bank in the *Complexo Expressa*, where Fatec Jundiaí is located. The bank would act as an intermediary between the generators of paint waste and potential consumers through a digital platform. The project will be developed in an interdisciplinary manner, with the participation of several courses at Fatec Jundiaí, including the Environmental Management Technology course and the Systems Analysis and Development Technology course, which will assist in developing software or an application for managing the project data.

2. THEORETICAL BASIS

2.1 CIRCULAR ECONOMY

The Circular Economy, according to Abdalla and Sampaio (2018), represents a significant innovation in the system of production processes, contrasting with the established paradigm of the Linear Economy; while it follows the "extract-produce-discard" model, the Circular defends practices such as repair, reuse, remanufacturing and 'super-cycling,' its objective is to maximize the use and reuse of industrial products, from the design of the project to its reuse, based on studies of non-linear systems, the concept aims not only to minimize the disposal of products but also to reduce the demand for natural resources, promoting local economic stability and job creation, while seeking to eliminate harmful consequences to the environment.

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The comparative analysis between circular and linear economies, according to Vela (2023), highlights fundamental differences in approaches to resource management, waste generation, environmental impact and economic sustainability. The Circular Economy prioritizes the efficient and sustainable use of resources, emphasizing reducing consumption and promoting closed recycling systems. At the same time, the Linear Economy follows a single-use model of resources, resulting in waste and environmental degradation.

According to Skidar (2019), environmental policy in an industrial context points to a movement toward the circular economy as the latest approach. It highlights that previous initiatives to control emissions and waste have evolved to minimize waste and pollution. However, greenhouse gas emissions are now the focus, especially carbon dioxide. He still questions the feasibility of achieving zero waste through infinite recycling, especially in chemical processes, and points to the worldwide failure of plastics recycling efforts. Despite decades of testing, only a tiny fraction of plastics is successfully reused. This underlines the difficulty in implementing effective recycling solutions within the circular economy.

2.2 Reverse Logistics

As the population of cities increases, and the consumption of products and the generation of large quantities of urban solid waste increases, the search for procedures to align population growth, consumption and waste management with sustainability practices has been challenging for companies, society and governments. Some instruments and principles guide these economic and social development actions that, when applied efficiently, provide guidance on the correct disposal of solid waste, reverse logistics, and shared responsibility for the life cycle of products, which, according to the terms of the PNRS, shared responsibility is:

> Set of individualized and linked attributes of manufacturers, importers, distributors and traders, consumers and holders of public urban cleaning and solid waste management services, to minimize the volume of solid waste and rejects generated, as well as to reduce the impacts caused to human health and environmental quality resulting from the life cycle of products, under the terms of this Law. (Brazil, 2010, our translation)

Using many solid wastes as a sustainable generation of jobs and income is an important tool for preserving the environment and conserving natural resources since each product that returns to the production cycle contributes to the conservation of natural resources. The National Solid Waste Policy also defines reverse logistics as:

> A set of actions and procedures characterizes economic and social development instruments. It is designed to facilitate solid waste collection and return to the business sector for reuse in its cycle, other production cycles, or another environmentally appropriate final destination. (Brazil, 2010, our translation)

As UNIVASF (2018) described, effective Reverse Logistics implementation requires a collaborative approach between the public and private sectors. Establishing sectoral agreements and creating structures such as the Steering

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Committee for the Implementation of Reverse Logistics Systems (Cori) demonstrates the government's commitment to promoting sustainable practices.

The benefits of Reverse Logistics go beyond mere waste management. By integrating waste into the production cycle, reverse logistics contributes to the Circular Economy, transforming discarded materials into new raw materials. Nevertheless, the success of Reverse Logistics depends not only on government policies and business initiatives but also on the active engagement of the population. Consumers play a crucial role by returning products to designated collection points, thus contributing to a sustainable cycle of production and consumption (UNIVASF 2018).

2.3 Environmental Challenges of Paint Packaging

Packaging management in the paint industry presents different challenges depending on the type of customer for which the products are intended. For companies that serve other industries, reverse logistics is a complex issue since the return of packaging to the supplier is not always guaranteed. Mariath and Figueiró (2018) highlight that the understanding of reverse logistics varies according to the type of company, with the return of packaging often being determined by its commercial value. Value-added packaging is more likely not to be returned to producers since its resale or use in other means is more considered by certain companies.

According to the World Coatings Sustainability Report Council (2022), many companies in the paint sector end up facing specific problems with the circularity of their products at different levels, with the main one being the appropriate final disposal of paint remains and their packaging by both consumers and professionals, also saying that, depending on factors such as quality and quantity, paints can be recycled for different purposes. Their individual components can be recovered, thus preventing their inappropriate disposal, which would cause damage to the environment.

According to Dabo (2023), different challenges are associated with managing paint packaging, including quality preservation, environmental concerns, raw material costs, comfort and convenience. Nonetheless, the appearance and appeal of paint packaging have historically been critical for brands in the sector. There is a growing awareness about the environmental impact of paint packaging materials. Nevertheless, some progress has been made in developing more sustainable choices, but it is still slow. Even so, producers are exploring options such as biodegradable plastics, recycled materials and reusable containers to reduce the environmental impact of paint packaging.

3. Method

For this article, applied and exploratory research was carried out, using mainly bibliographic research to support the decisions and concepts presented to implement a paint bank at Fatec Jundiaí, a project designed by Professor Ana Carolina and presented at the Circular Challenge 2023. Initially conceived as a

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physical space for storage and provision of surplus paints, the project will act as an intermediary for the disposal of paint remains to reduce waste and promote environmental sustainability. The proposed paint bank will exclusively accept water-based paints, aiming to guarantee the healthiness of the environment.

One of the central stages of the planning process involves developing the aforementioned digital platform, whether through a mobile app or a website. This platform will register both those interested in donating paint and those interested in receiving it. Table 1 lists some of the information and features planned for implementation on the platform.

Table 1 – Suggestions of features for implementation on the digital platform

Interested in Donating	Storage Location	Interested in Receiving
Registration: Full name; Address; Contact number (telephone and email)	Total storage capacity	Registration: Full name; Address; Contact number (telephone and email)
Quantity and type of paints	Alert functionality for ink quantity reached	Quantity and type of paints
Selection of colors to be donated	Provision of instruction/care/handling manual	Selection of desired colors for receipt
Notice regarding non-acceptance of oil-based, solvent-based or varnish-based paints	Record of organizations or individuals who received donated paints	Notice regarding non-shipment of oil-based, solvent-based paints or varnishes
Available delivery time	Donation/Delivery Certificate Issuance Functionality	Available time for pick-up
Sector of activity of donor organizations (education, health, environment, and others)	-	Sector of activity of the receiving organizations (education, health, environment, and others)
Type of organization (company, school, NGO, and others)	-	Type of organization (company, school, NGO, and others)
Demographic information about donors (age, gender, geographic location, and others)	-	Demographic information about recipients (age, gender, geographic location, and others)
Date of donation	-	Feedback from organizations or individuals who received the inks
Packaging type (18L gallon, 2L PET, 3.6L can, 1L can)	-	Purpose of donated paints (e.g.: school renovation, painting of community buildings, and others)

Source: Authors (2024)

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Additionally, other features are being considered, including:

- Paint Information: Details such as brand, type, color, barcode or unique identifier, container size, and retail price will be recorded for each donation;
- Impact Assessment: Possibility of applying metrics and indicators to assess the social and environmental impact of paint donations;
- Quality Records: Quality test results of donated paints will be documented (if applicable), date of manufacture and information regarding the condition of cans (if opened or damaged);
- Data Security and Privacy: Robust cybersecurity measures will be implemented to protect sensitive user data, ensuring compliance with data privacy regulations such as GDPR, LGPD, among others;
- Integration with External Systems: Consider integrating the paint database with other systems, such as volunteer management and logistics systems, for more efficient collaboration and real-time information exchange;
- Geospatial Mapping: A functionality to graphically visualize the distribution of donors, recipients and storage locations; this can help identify gaps in coverage and optimize delivery routes.

This project is highly multidisciplinary, involving the participation of several courses within Fatec Jundiaí. The platform's user manual will be developed with students from the Events course, while the platform is currently being made with the support of the ADS course. By integrating knowledge from different areas and adopting a collaborative approach, it is expected that the proposed paint bank will not only meet the needs of the community but also promote a culture of sustainability and environmental responsibility within the institution and beyond.

4. Results and Discussion

Significant progress has been made in developing the Fatec Jundiaí Paint Bank project since its initial conception when it was decided what format the platform would take. As an app, it is currently under development and should be ready by May 30th of this year. This technological approach constitutes a real step forward while expanding the scope and effectiveness of this project.

One of the strategies underway is the search for partnerships that use the Paint Bank initiative to raise funds for renovation projects. Raising awareness and engaging academic community members is essential for the project's success. In this sense, internal publicity has begun at Fatec Jundiaí about the paint donation. Information about the project is already available on the TV feeds in the corridors of Fatec Jundiaí to inform and raise awareness among students, teachers and staff about the importance and benefits of the paint bank.

The possibility of establishing a storage point within the Fatec Jundiaí space, shown in Figure 1, is also being considered. This initiative aims to facilitate and encourage donations by providing a convenient and accessible place for donors to deposit their excess paint. Integrating the paint bank with the academic environment strengthens community ties and promotes a culture of

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sustainability within the institution. To increase visibility and awareness of the project, a stand dedicated to the project was planned at the 2024 Fateclog event. This event is a valuable opportunity to publicize the project to a broader audience, including local community members, companies, and partner organizations.

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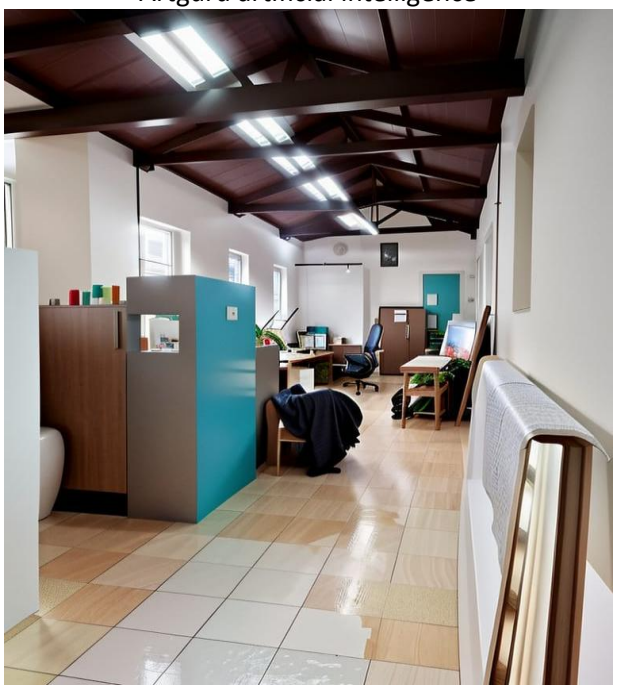

Source: Authors (2024)

5. Conclusion

In searching for sustainable solutions to the challenges faced in urban areas, implementing the Paint Bank project at Fatec Jundiaí represents a significant step towards a more conscious and responsible future. Promoting the circular economy not only addresses the critical issue of waste management but also promotes a cultural shift towards resource efficiency and environmental preservation. By adopting a multidisciplinary approach, the project not only offers a practical solution to excess paint but also actively engages the academic community in promoting sustainability. The development of a digital platform that facilitates the processes of paint donations and requests represents the dedication to technological innovations and environmental well-being.

By applying sustainability within all spheres of government and society, a satisfactory response to environmental changes caused by human activities will achieve the sustainable development goals advocated by the United Nations and aligned with the 2030 agenda and the sustainable development goals appropriate to global goals. Within the 17 sustainable development goals advocated by the United Nations, this article seeks to align SDG 11 – Sustainable Cities with the proposal of the Paint Bank project, which aims to make use of the product cycle, emphasizing leftover paint from small home renovations and intended for families in vulnerable situations, thus avoiding their incorrect disposal.

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REFERENCES

ABDALLA, Fernando Antônio; SAMPAIO, Antônio Carlos Freire. Os novos princípios e conceitos inovadores da Economia Circular. **Revista Entorno Geográfico** , [*s. l.*], n. 15, p. 82-102, 13 jul. 2018. DOI https://doi.org/10.25100/eg.v0i15.6712. Disponível em: https://entornogeografico.univalle.edu.co/index.php/entornogeografico/article/view/6712. Acesso em: 27 abr 2024.

BRASIL. Lei Nº 12.305, de 2 de agosto de 2010. **Institui a Política Nacional de Resíduos Sólidos; altera a Lei nº 9.605, de 12 de fevereiro de 1998; e dá outras providências**. Diário Oficial da União, Brasília, DF, 2 ago. 2010.

DABO, Mohamed. Packaging: An intense battleground for the paint industry. **Package Gateway**, 4 maio 2023. Disponível em: https://www.packaging-gateway.com/comment/packaging-battleground-paint-industry/:~:text=Preservation%20of%20Paint%20Quality:%20Paint%20packaging%20must%20preserve%20the%20quality%20of%20the%20paint%20and%20prevent%20it%20from%20deteriorating%20over%20time?cf-view. Acesso em: 20 abr. 2024.

MARIATH, Anelice Margth Kotz; FIGUEIRÓ, Paola Schmitt. SUSTENTABILIDADE COM FOCO NA LOGÍSTICA REVERSA DA INDÚSTRIA DE TINTAS E VERNIZES. **GESTÃO E DESENVOLVIMENTO**, Centro Universitário Feevale, v. 15, n. 1, p. 127-144, 2018. Disponível em: https://www.redalyc.org/journal/5142/514253830007/html/. Acesso em: 26 abr 2024.

NAÇÕES UNIDAS BRASIL. ONU-Habitat: população mundial será 68% urbana até 2050. **Nações Unidas Brasil**,1 jul. 2022. Disponível em: https://brasil.un.org/pt-br/188520-onu-habitat-popula%C3%A7%C3%A3o-mundial-ser%C3%A1-68-urbana-at%C3%A9-2050#:~:text=As%20%C3%A1reas%20urbanas%20j%C3%A1%20abrigam,das%20Na%C3%A7%C3%B5es%20Unidas%2C%20Ant%C3%B3nio%20Guterres. Acesso em: 18 abr. 2024.

ORGANIZAÇÃO DAS NAÇÕES UNIDAS - ONU. **Objetivo de Desenvolvimento Sustentável 11**: Cidades e comunidades sustentáveis. [*S. d.*]a. Disponível em: https://brasil.un.org/pt-br/sdgs/11. Acesso em: 5 abr. 2024.

PORWAL, T. PAINT POLLUTION HARMFUL EFFECTS ON ENVIRONMENT. **International Journal of Research -GRANTHAALAYAH**, *[S. l.]*, v. 3, n. 9SE, p. 1–4, 2015. DOI: 10.29121/granthaalayah.v3.i9SE.2015.3204. Disponível em: https://www.granthaalayahpublication.org/journals/granthaalayah/article/view/IJRG15_S09_150. Acesso em: 25 abr. 2024.

SIKDAR, Subhas. Circular economy: Is there anything new in this concept?. **Clean Technologies and Environmental Policy**, ano 2019, v. 21, p. 1173–1175, 21/06/2019. Disponível em: https://link.springer.com/article/10.1007/s10098-019-01722-z. Acesso em: 27 abr. 2024.

DOI: https://doi.org/10.29327/2384439.3.2-1

UNIVASF. O que é logística reversa?. **Universidade Federal do Vale do São Francisco**, Ministério da Educação, 5 out. 2018. Disponível em: https://portais.univasf.edu.br/sustentabilidade/noticias-sustentaveis/o-que-e-logistica-reversa. Acesso em: 14 abr. 2024.

VELAS, Rafael A. Circular vs. Linear Economy - A Comparative Analysis. **Linkedin**, 12 set. 2023. Disponível em: https://www.linkedin.com/pulse/circular-vs-linear-economy-comparative-analysis-rafael-a-vela. Acesso em: 28 abr 2024.

WORLD COATINGS COUNCIL. **SUSTAINABILITY IN THE GLOBAL PAINT & COATINGS INDUSTRY**: Contributions to the United Nations' Sustainable Development Goals. [*S. l.*: *s. n.*], 40 p, 2022.