Systemic Design for Collaborative Circular Fashion Initiatives: A Case Study in Surabaya

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ABSTRACT

The environmental and social issues raised by the linear fashion industry are addressed through circular fashion. It utilizes a closed-loop method that encourages mindful behavior along the entire fashion value chain, from creation to disposal. This article describes the application of a systemic design approach to collaborative circular fashion initiatives with a focus on creating sustainable partnerships and promoting circular fashion initiatives between fashion design Universitas Ciputra, the Surabaya city government Environmental Office, and representatives of 40 Kampung Zero Waste. The methodology used in this research study was based on a systemic design approach, which recognized the interconnection and interdependencies within the circular fashion system. Although the research study did not specifically assess the program's impacts it was a crucial first step in creating awareness and initiating collaborative efforts to promote the adoption of circular fashion in Indonesia. Focusing on the early stages of fostering circular fashion with the help of the Surabaya City Government Environmental Office and zero-waste communities produced insightful findings. Future projects and interventions could be built upon a strong foundation that was provided by the systemic design approach and interdisciplinary collaboration. The research results advance knowledge of comprehensive models and collaborative strategies for encouraging circularity in the fashion industry.

Keywords: Circular Fashion, Surabaya, Systemic Design

ABSTRAK

Berbagai tantangan lingkungan dan sosial yang ditimbulkan oleh sistem industri fashion linear berupaya dijawab melalui fashion sirkular. Pendekatan ini menggunakan metode lingkar tertutup yang mendorong perilaku bijaksana dalam seluruh rantai nilai fashion, mulai dari pembuatan hingga pembuangan. Artikel ini menjelaskan penerapan pendekatan desain sistemik pada inisiatif fashion sirkular kolaboratif dengan fokus pada penciptaan kemitraan yang berkelanjutan dan mempromosikan inisiatif fashion sirkular antara desain mode Universitas Ciputra, Dinas Lingkungan Hidup pemerintah kota Surabaya, dan perwakilan dari 40 Kampung Nol Sampah. Metodologi yang digunakan dalam studi penelitian ini didasarkan pada pendekatan desain sistemik, yang mengakui interkoneksi dan saling ketergantungan dalam sistem fashion sirkular. Meskipun studi ini tidak secara khusus menilai dampak program, studi ini merupakan langkah awal yang penting dalam menciptakan kesadaran dan memulai upaya kolaboratif untuk mempromosikan adopsi fashion sirkular di Indonesia. Berfokus pada tahap awal dalam mempromosikan fashion sirkular dengan bantuan Dinas Lingkungan Hidup Pemerintah Kota Surabaya dan komunitas kampung nol sampah menghasilkan kontribusi gagasan. Proyek dan intervensi di masa depan dapat dibangun di atas fondasi yang kuat yang disediakan oleh pendekatan desain sistemik dan kolaborasi interdisipliner. Hasil penelitian ini menambah wawasan mengenai model komprehensif dan strategi kolaboratif untuk mendorong sirkularitas dalam industri fashion.

Kata Kunci: Desain Sistemik, Fashion Sirkular, Surabaya

INTRODUCTION

Circular fashion is a concept that has been growing in recent years due to various problems in the fashion and textile industry. The wasteful and polluting character of the current fashion and textile system presents immense challenges to the environment, society, and the global economy. The current textile and fashion industry is primarily linear. According to the linear system, this industry utilizes 98 million tons of non-renewable resources annually, principally oil to make synthetic fibers, fertilizers to grow cotton, and chemicals to make, dye, and finish textiles. [1] If this pattern continues, the fashion industry might consume more than 26% of the carbon budget by 2050, exceeding the 2 degrees Celsius global warming limit. [2]

The fashion and textile industry holds a significant role in economic, cultural, and social importance in Indonesia, both as producers and consumers. Based on data from The Indonesia Bureau of Statistics (2021), Mordor Intelligence (2022) stated that the fashion sector was projected to produce at least USD 9.30 billion in revenue in 2022. Additionally, the industry provides employment for nearly 2 million people. [3] Given its size, the fashion industry in Indonesia has a responsibility to investigate issues of sustainability and circularity to help address the previously mentioned global challenges. However, the government's efforts are already evident, with fashion and textiles being one of the five industries that must adopt a circular economy approach by 2030. [4]

As evidenced by different studies and talks undertaken by various study centers and research firms throughout the world over the last five years, the study of circular economy in the fashion industry has grown. [5] [6] Circular fashion is believed to be a solution to the fashion industry's challenges, which are also a cause of environmental problems. Circular fashion is a holistic approach to the fashion value chain that is part of the fashion industry's shift away from a linear 'take-make-dispose' paradigm and toward one in which every fashion 'product' is responsibly designed to live a longer life, be reused, and eventually returned to the biosphere once it is no longer usable.

For the fashion sector to become more sustainable and accountable, it needs to shift toward circular fashion processes that put resource efficiency, waste reduction, and sustainable consumption first. Besides that, despite it is difficult to estimate the economic value of these negative externalities, the recent Pulse of the Fashion Industry report estimated that in 2030, addressing the environmental and societal consequences of the status quo would provide an overall benefit to the global economy of about EUR 160 billion (USD 192 billion). [7]

However, moving in the direction of a circular fashion system represents a break from the traditional approaches intended to reduce the negative effects of the linear system. It represents a profound transition to a wholly new paradigm, requiring more than minor modifications, it demands embracing a whole new system. [2]

It is relevant to the term "wicked problems", which Rittel and Webber (1973) refer to describe complex circumstances that are difficult to resolve by using conventional techniques. They include enduring global problems with several origins and impacts, such as climate change. Since they are influenced by social norms and have a propensity to persist for a long time, becoming comparable to their own complicated systems, they are difficult to fix. We can refer to these complex issues as "problem systems." These systems demonstrate how components are interconnected and how issues can be persistent and stable. The systemic design employs techniques from design thinking as well as systems

thinking to direct the design of complex projects involving numerous systems and people. The goal is to combine these approaches to produce better answers to significant problems. [8]

Through previous research, Handayani (2023) explained that the development of the discourse on fashion and circularity is currently dominated by Western countries with well-integrated stakeholder roles. While the field of fashion and circularity is growing in importance, its intellectual and term origins are deeply embedded in Western discourse. This makes them lead the charge in pioneering research around circularity in the fashion and textile industries [9] Some studies range from the fundamental knowledge regarding fashion and circularity [10][11][12] [13] To the implication of circular fashion in design context and framework [14] [15] [16] [17] [18] [19] Countries like India are currently growing their evident interest in a circular fashion, as indicated by a small but growing number of studies and scholarly articles originating from the region. [20][21] On the other hand, Indonesia is at the beginning of this conversation, with the term "circular fashion" being a new addition to both the academic and the fashion industry. The various degrees of participation in these regions highlight the dynamic character of the fashion industry as well as the varying rate at which the notion of circularity is being adopted globally. [9]

Therefore, this study represents a key step in encouraging circular fashion practices in Indonesia. The study emphasizes the necessity of a complete framework in addressing the various issues associated with the adoption of circular fashion by using a systemic design approach and combining features like systems thinking, stakeholder participation, and a community-based perspective. While the concept of circular fashion is mostly established in Western discourse, contextual investigation is required to fully comprehend its applicability and subtleties across other cultural landscapes.

The fundamental methodology in this study was a systemic design approach. Systemic design combines principles from both design thinking and systems thinking, offering a solid foundation for tackling complex problems by viewing them as parts of a larger system. This method is especially useful for dealing with "wicked problems," which, due to their complexity, defy conventional solutions. Systemic design provides a way to identify underlying patterns, relationships, and structures that would otherwise be hidden by combining multiple parts into a holistic perspective. In addition, using a localized case study approach in Surabaya provides for a better understanding of how circularity concepts, which were originally formulated in a Western setting, can be interpreted, altered, and implemented in a uniquely Indonesian context. This method not only bridges the knowledge gap, but it also underlines the significance of customizing global concepts to local sensibilities, practices, and challenges. Researchers can delve into the complexities of the local fashion ecosystem by focusing on Surabaya, extracting insights that can highlight the road for integrating circularity in fashion sectors across similar non-Western contexts. A case study like this reinforces the idea that, while circular fashion has Western beginnings, its concepts are universal, but its application and impact are very localized and differ between regions.

To conclude, the results of this study provide insight into how holistic frameworks and community-driven strategies might advance circularity in the fashion sector. The Surabaya case in point is an example of how systemic design has the potential to serve as a compass in directing the future of fashion toward sustainability and circularity as the push for more compassionate and environmentally conscious fashion practices expands on a global scale.

LITERATURE REVIEW

Circular Fashion

The circular economy is described as a complete framework created to address urgent global concerns like climate change, biodiversity loss, waste generation, and pollution. [22] The circular economy, as opposed to the linear model, places a focus on a design-driven strategy that gives waste and pollution reduction a top priority. Reducing harmful environmental effects involves rethinking product design, production techniques, and consumer habits. To ensure that items and materials maintain their value within the economy, the circular economy also promotes ongoing reuse, renovation, and recycling of them. The circular economy is a comprehensive strategy that balances economic success with environmental sustainability by complying with these principles and striving toward the regeneration of natural systems. [23] Design plays a very important role because 80% of the environmental impact is determined in the design process.[24]

In the meantime, the term "Circular Fashion" was introduced in 2014 and has since late 2018 become one of the industry's most widely accepted sustainability concepts. Over the last five years, there has been an increase in worldwide awareness of the circular fashion business due to the efforts of several organizations to develop diverse circular economy models for fashion. It can be found at Lablaco [5] as follows:

- Circular Economy Diagram for Circular Design by Ellen MacArthur Foundation
- Circular Business Model on the value of consumer fashion by Global Change Award 2020 (H&M Foundation) & Accenture
- Fashion Circular Value Chain by Business of Fashion and McKinsey Company
- Circular Economy in Action by A Closed Loop Partners
- Circular Fashion Ecosystem by Circular Fashion Report

Figure 1 illustrates the many steps of a circular fashion within the ecosystem, which range from the supply chain to design to consumer consumption and end-of-life management with intricate interdependencies. Because of the interconnection and interdependence of these stages, a change in one can influence the entire system. The circularity of the process is made possible by collaborative efforts at all levels.
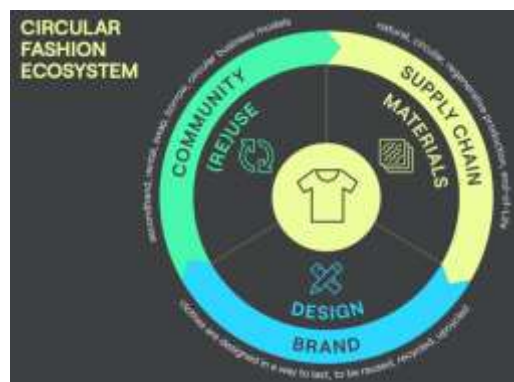

Figure 1. Circular Fashion Ecosystem by Lablaco (2020)

To conclude, the fundamental ideas behind the circular economy model for the fashion industry are consistent with Nancy M.P. Bocken et al.'s explanation of how to change the linear fashion system

into a circular one. These approaches include (a) narrowing - efficiency, (b) closing - recycling, and (c) slowing - reusing, slowing consumption, and remanufacturing. [10]

Systemic Design

The complex problems have caused paradigm shifts and numerous conversations concerning design concepts including fashion have also emerged. According to Herbert and Mani [25] the phrases strategic design and system-based design have become increasingly common in the design world in recent years. Monchaux (2023) even referred to the necessity to reconstruct the term "design" to be more pertinent to the complexity of challenges in today's society. [26]

Recognizing that current designers are now working on far more complicated issues and need more direction than the philosophy of placements, Jones and Van Patter [27] suggest four distinct design domains which embody different design processes. The four domains progress from easy to complex, requiring a sequence of learning and skill stages to navigate the complexity as it rises, as follows:

- Design 1.0: traditional design practice (artifacts and communications)
- Design 2.0: value creation (products/service design)
- Design 3.0: change-oriented (organizational transformation)
- Design 4.0: complex societal situations (social transformation)

Incorporating skills and subject-matter expertise from the social, organizational, and service levels, a systemic design method creates new artifacts (such as integrated products and services) that can adapt to the market (social) ecosystem and organization. [8]

Different combinations of systems practices and design approaches have been tested in design co-creation workshops. Developing systems thinking models to comprehend the contexts and relationships in current issues and using design thinking as a tool to generate formative or future possibilities are typical approaches. According to conventional approaches, a system is a complicated scenario that already exists and necessitates investigation in order to come to an understanding of patterns, behaviors, and potential intervention sites. Interventions are intended to be potential future alternatives for system transformation. [28]

There's a model introduced by Warfield's [29] , extended by Christakis & Bausch [30] and Chistakis & Dye [31] called the Domain of Science Model or DoSM. The methodology of dialogic design is used in this study to approach design co-creation. Jones (2018) then suggest a general paradigm for co-creation activities across context with the help of DoSM research for the two practice domains of dialogic design and systemic design. Jonas (2018) introduced four domains of design activity shown in Figure 2 in a systemic design context, as follows: (a) Lab – Academic and Experimental, (b) Studio – Design Led Exploration, (c) Arena – Stakeholder Focused, and (d) Agora – Open Innovation. [28]

Figure 2. Domains of Design Activity based on DoSM by Jones (2018)

The circular fashion ecosystem could be mapped within the framework of a collaborative program using the four areas of design activity. A comprehensive understanding of the ways in which various elements, stakeholders, and behaviors interact could be obtained by mapping the circular fashion ecosystem within these areas. It would be beneficial to comprehend the situations in which collaboration is most necessary and the areas in which different strategies, from dialogic design to systemic design.

METHODOLOGY

The research study used a systemic design methodology to address the complicated issues related to circular fashion, encourage sustainable collaborations, and circular fashion initialization. Stakeholder involvement, interdisciplinary cooperation, and systems thinking were all integrated into the process. Introduced by Ryan [32] based on the theory of systemic operational design, the systemic design methodology is comprised of six main activities, as follows: (a) Inquiring, (b) Framing, (c) Formulating, (d) Generating, (e) Facilitation, and (f) Reflecting.

The research began with the 'Inquiring' phase, which involved meticulously examining the problems of implementing circular fashion in Surabaya and obtaining insights from many sources such as literature, data, and 'reflection' insight from stakeholder interactions. This paved the way for the 'Framing' step, which defined the scope of the study and identified key players such as the Surabaya city government's Environmental Office, zero-waste communities, and Universitas Ciputra. After establishing a well-defined framework, the 'Formulating' process condensed the accumulated insights into specific issues and opportunities. This paved the way for 'Generating' creative circular fashion activities specific to Surabaya, such as community workshops. During the 'Facilitation' phase, these ideas were refined collaboratively through workshops including academics, government officials, and members of the zero-waste community. Finally, the investigation concluded with the 'Reflecting' phase, which critically evaluated the findings.

MODEL OF SYSTEMIC DESIGN FOR COLLABORATIVE INITIATIVE IN PROMOTING CIRCULAR FASHION

System Mapping and Analysis

The "inquiring" phase in the lab area involves academic and experimental research. Here, a fashion and sustainability lecturer from Universitas Ciputra works closely with students to do an in-depth study to comprehend the complexity of circular fashion. The lecturer along with the students delved

into literature, case studies, and experimentation to finally propose the solution concept in promoting circular fashion to the community. The "inquiring" phase of systemic design is aligned with the Lab domain, which serves as the knowledge foundation.

The emphasis switches to the Studio domain once the academic research has been completed (Lab). Design-led inquiry is part of the "framing" process. The lecturer and students frame the issue in the framework of circular fashion design using the knowledge they have learned. They outline the joint program's variables, objectives, and limitations This framing aligns with the Studio domain, where the limits of creativity are established using design skills.

However, while the ideas of circular fashion are important, there is a significant gap in their widespread comprehension at the grassroots level. The team is aware of the problem and, as a result, is actively seeking input from the stakeholders. A particular approach for discovering target communities' intrinsic potential is to share knowledge with them. [33] These interactions reveal a range of problems, from knowledge gaps to mismatched practices. Despite these limitations, there is a silver lining. The team discovers existing projects embedded in stakeholders' daily lives that unknowingly correlate with circular fashion ideas. It was a conscious choice to use plastic upcycling as the pilot project because it strongly complemented the zero-waste community's ongoing initiatives. These green-minded communities were already working to upcycle plastic into products like shopping bags. However, despite their admirable efforts, the Surabaya government's environmental office, which serves as the community's supervisor, experienced trouble in making the upcycled items attractive and appealing enough for widespread use which made it become another waste. This was a significant obstacle that was recognized and subject to discussion.

Figure 3. (a) The Inquiring Phase; (b) The Framing Phase

The "formulating" phase moves to the Arena domain after a clear framing in the Studio domain. Stakeholders from the academic institution (the lecturer and students of Universitas Ciputra) and the Surabaya government environmental office join together here. They develop plans, have stakeholder-focused conversations, and jointly develop solutions that support the objectives of circular fashion. This fits with how the Arena domain is collaborative and stakeholder-focused. It has been decided to execute the circular fashion promotion program over its duration of two days. There were transformative workshops on circular fashion and plastic upcycling. The workshop's objectives were to explain the idea of circular fashion, improve the environment, promote mindful consumption, and spark a movement of change among Surabaya's 40 Zero Waste Communities.

The Agora domain, which fosters open creativity, is included in the "generating" phase. Stakeholders interact with a larger community by utilizing information from the Arena. This involves a substantial session devoted to setting up and introducing the idea of circular fashion. Participants had the chance to interact with academics and gain knowledge on circular fashion. The discussion shed important light on the fashion industry's environmental effect and the significance of moving toward circular fashion. From the discussion with the community, the plan to conduct a plastic waste upcycling workshop together became more comprehensive. This phase produces creative ideas that are consistent with the Agora domain's emphasis on open cooperation and different inputs.
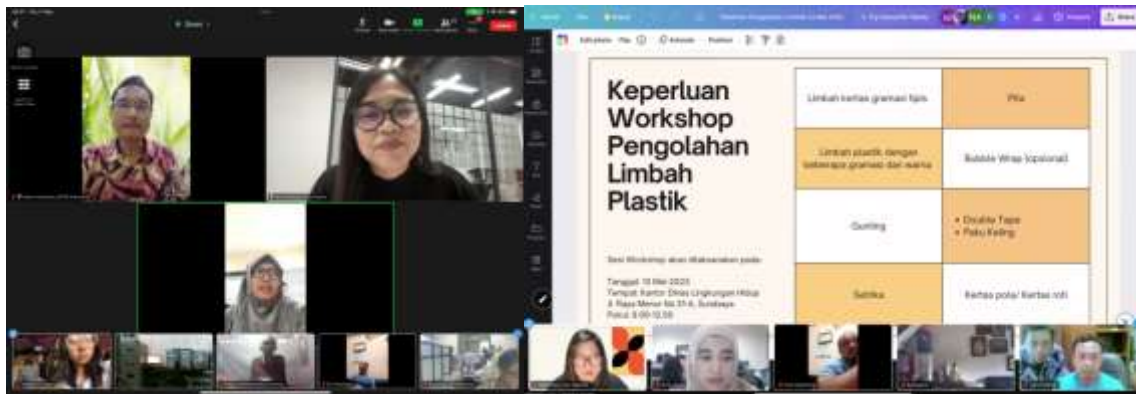
Figure 4. (a) The Formulating Phase; (b) The Generating Phase

The "facilitation" phase fits the Arena domain perfectly. Participants in this phase work together in workshops, discussions, and co-design sessions with representatives from academics, the government, and the community. To cooperatively design projects for circular fashion, the academic institution enables these interactions. The workshop's main emphasis was on the useful side of turning recycled plastic into stylish goods. The participants learned cutting-edge methods to turn plastic trash into fashionable and useful goods under the guidance of a team of committed facilitators who are Universitas Ciputra students enrolled in the Fashion and Sustainability course. The practical training not only sparked imagination but also demonstrated the possibilities of upcycling as a long-term response to the waste problem.

The "reflecting" phase encompasses all four domains and is multi-dimensional. Academic reflection in the lab involves assessing research techniques and knowledge gaps. Designers in the Studio domain consider the success of their design choices. Stakeholders in the Arena domain assess the results of group efforts. The community in the Agora domain considers the open innovation strategy. The reflections serve as a roadmap for the upcoming stages and provide systemic improvements.

Figure 5. (a) The Facilitation Phase; (b) The Reflecting Phase

The originality of this strategy is that it integrates systemic design phases with many design activity areas, resulting in a thorough and systematic procedure for cooperative circular fashion efforts. It effectively integrates academic research, design discovery, stakeholder involvement, and open collaboration, helping to introduce circular fashion in the local context.

The Implication of the System Mapping into the Circular Fashion Ecosystem

The systemic design process has produced a thorough potential impact for the circular fashion ecosystem, guided by the six phases of systemic design methodology and four domains of design activities. The Surabaya city government's Environmental Office, Universitas Ciputra, and the zero-waste community have collaborated to bring a pilot project as a case study to promote circular fashion adoption.

The academic realms of material and supply chain are fully investigated within the Lab domain, showing the complexities of sustainable materials and their environmental impacts. This fundamental understanding not only provides the path for actionable strategies but also serves as the foundation for comprehending Surabaya's cultural and material capital. Using this knowledge, techniques for incorporating sustainable materials into the city's fashion narrative were developed, lowering environmental footprints while paying homage to the city's cultural and existing material.

The emphasis moved to design exploration within the ecosystem in the Studio domain. This is possible to be developed for creating circular fashion items that blend sustainability and style. Design concepts that put repairability and recyclability first have developed within this field, and they perfectly complement the larger objectives of circular fashion. Through the use of these ideas, efforts were developed to produce fashion product that defines the circular economy, building a distinctive and ethical brand identity.

The research in the Arena area casts a broad net in the hopes of garnering viewpoints from a diverse set of stakeholders. This comprehensive investigation provides essential insights into the community's goals, political visions, and scholarly advances. This rich tapestry of perspectives guarantees that the conceptualization of circular fashion is both globally aware and locally attentive, with a special emphasis on cooperation with the zero-waste movement, which matches with Surabaya's community-driven sustainability aspirations.

Finally, the Agora domain promotes open innovation by enlisting the participation of stakeholders other than the proximate stakeholders. This inclusive approach broadens the solution range while also deepening cultural resonance. Strategies are developed here to utilize the collective expertise gained via open collaboration, create community ownership, and seamlessly weave circular fashion concepts into Surabaya's cultural fabric.

To conclude, based on Ryan's systemic design methodology [32] , adopting Jones's (2018) four design domains [28] , Lablaco's [5] circular fashion ecosystem, and the collaborative initiatives in Surabaya, a model of systemic design for circular fashion ecosystem was created in the context of promoting circular fashion through a collaborative program as shown in Figure 6 below:
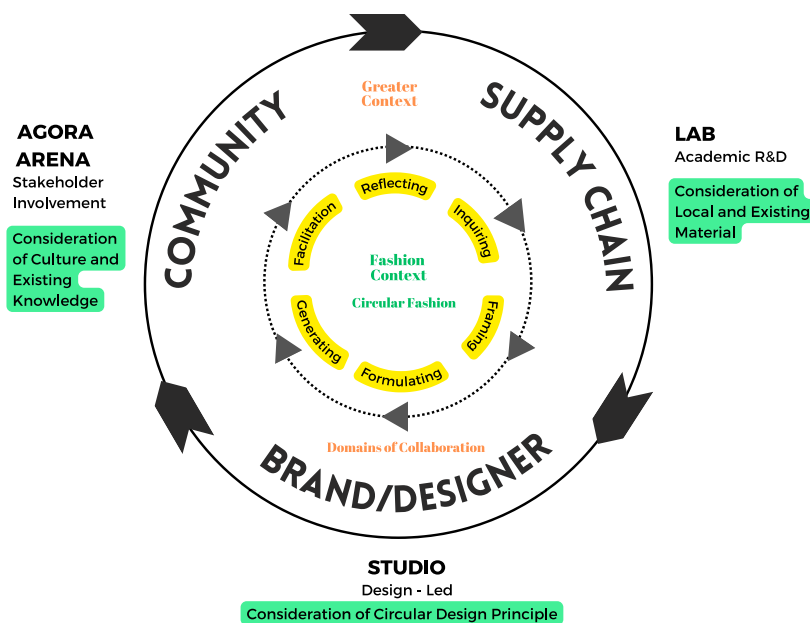

Figure 6. Model of Systemic Design for Collaborative Local Initiatives in Circular Fashion by Handayani (2023)

CONCLUSION

In conclusion, this article conveys the process of promoting circular fashion using a systemic design approach in conjunction with Universitas Ciputra, the Surabaya city government's Environmental Office, and the zero-waste community. A first step movement towards circular fashion has been made possible by this comprehensive approach, which is integrally linked to Jones's (2018) four design domains—Lab, Studio, Arena, and Agora.

Through the lens of systemic design, the exploration to introduce circular fashion in Surabaya has revealed the critical significance of context in tackling global sustainability concerns. This study, founded on the interaction of academic discipline and cultural sensitivity, demonstrates the transforming power of merging global ideals with local realities. Collaboration activities, particularly collaboration between institutions such as Universitas Ciputra, the local government, and community movements, highlight the need of multi-stakeholder participation. The extensive process, which includes everything from material research to open innovation, demonstrates the significance of

holistic methods. These findings emphasize that the journey toward circular fashion is about weaving sustainability into the cultural and social fabric of communities, not just material sustainability.

While the direct quantification of impact was not the primary goal of this research, the systemic design model for circular fashion ecosystems emerged as a critical basis for framing future projects and research activities. According to the findings, promoting circular fashion through collaborative initiative thrives best where research, design, community participation, and open innovation intersect, with the local context playing an important role in defining its progress. This project, which reflects an effort to promote circular fashion embedded in local subtleties, provides essential insights not just for global circular fashion projects, but also for contextualizing these concepts in varied cultural environments.

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