

Implementation of a Material-Driven Design Approach on Sandwich Sacks for the Development of Ealsmor Brand Bags

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Keywords	Abstract
genius loci; heritage conservation; placemaking; Old City of Surabaya; cultural identity; urban revitalization.	This study examines the role of genius loci in architectural planning and revitalization of the Old City of Surabaya (Kota Lama Surabaya), with particular attention to its symbolic elements, cultural identity, and historical meaning. As an intangible and non-physical dimension, the symbolic element of the area is strongly associated with Surabaya's identity as the "City of Heroes," rooted in significant historical events such as the Battle of Surabaya on 10 November 1945, especially around the Jembatan Merah area. The research analyzes the application of genius loci through three main aspects: placemaking, identity and sustainability, and conservation and revitalization. Placemaking strategies emphasize the creation of a strong sense of place through historical narratives, adaptive reuse of heritage buildings, and the reorganization of public spaces. The aspect of identity and sustainability highlights the importance of maintaining collective identity while integrating sustainable architecture, community involvement, and contextual design. Meanwhile, conservation and revitalization focus on reactivating heritage buildings through value-based restoration without freezing their development. The study also identifies challenges in preserving genius loci, including development pressure, degradation of authenticity, and limited community participation, alongside opportunities such as sustainable heritage tourism, adaptive reuse, bottom-up conservation approaches, and multi-stakeholder collaboration. The findings suggest that integrating genius loci into planning and design can strengthen cultural continuity, enhance social sustainability, and ensure meaningful revitalization of Kota Lama Surabaya

INTRODUCTION

Bandung is a city with a number of industrial estates ranging from small to large scale (Sukirman, 2015). However, on the other hand, this condition has also triggered the spread of fast fashion in Bandung, leading to a significant increase in textile and packaging waste (Shinta, 2018). These conditions indicate that the impact of industrial progress has also resulted in serious environmental issues, where pollution is one of the main problems often faced by communities, especially in urban areas (Rahmadi, Sari, & Indriyani, 2022). Based on research conducted by Pamungkas and Febrina (2014, as cited in Purwaningrum, 2016), the most dominant type of plastic in Indonesia is polypropylene (PP), accounting for 30.19% of total plastic waste. Polypropylene has resistance to chemicals, boiling water, and heat, and is commonly used in food packaging, carpets, and automotive components. This material is widely utilized in food packaging and plastic bags. Furthermore, based on data from the

sipsn.menlhk.go.id website (2022), 13.2% of the total waste generated in Bandung consists of paper waste. Paper waste is the third most common type of waste in Bandung after food and plastic waste. In general, paper waste originates from packaging, magazines, newspapers, and books. These data indicate that paper- and plastic-based waste continues to increase alongside the growth of fast fashion (Bartol, 2023; Sultany, 2025; Tanner, 2023; Wagaw & Babu, 2023).

Based on these conditions, economic activities should be accompanied by efforts to minimize the use of resources that contribute to pollution and environmental degradation (Ali & Rahman, 2024; Awewomom et al., 2024; Huo & Peng, 2023; Wang et al., 2023; M. Yang et al., 2023; Z. Yang & Solangi, 2024). This is also in line with the principles of sustainable development outlined in the Sustainable Development Goals (SDGs), particularly Goal 12 concerning Responsible Consumption and Production, which emphasizes the importance of cooperation among business actors, consumers, governments, researchers and scientists, the media, and development institutions. In addition, consumers must also be involved through education and clear information, for example through environmentally friendly product labels and policies that encourage the purchase of sustainable products (United Nations, 2018). These efforts are also legally supported through Law Number 18 of 2008, Article 20, Paragraph (3), which emphasizes that business actors are obliged to use production materials that generate as little waste as possible and that can be reused, recycled, and/or easily decomposed through natural processes. However, in reality, there has not yet been a strong movement supporting the plastic recycling industry. As a result, domestic demand for recycled products remains low (Septiana & Ismawati, 2022).

In this regard, according to Arumsari and Nursari (2024), the rapid development of the fashion industry in Indonesia requires environmentally friendly material-processing practices and product design approaches. Consequently, creative actors within the local sector have begun utilizing plastic waste as an alternative material source. One example is the Noblen Sack, also known as a sandwich sack or woven laminated kraft paper sack. This material is a combination of woven sacks and paper sacks, where the inner layer is made of woven polypropylene (PP) and the outer layer uses kraft paper bonded through a 30-micron-thick polyethylene (PE) laminate. Noblen Sacks are commonly used for packaging chemicals, agricultural products, food and beverages, and construction materials (Kraftindo, 2021).

One of the actors attempting to highlight the potential of this material through recycling is Ealsmor, a local brand from Bandung. Over time, along with increasing public awareness of environmental issues, the brand has become increasingly recognized for its collection of recycled bags. The bags are produced in the form of tote bags measuring 38 cm × 40 cm to support daily activities. However, the use of these unconventional materials also presents new challenges for Ealsmor. Noblen Sacks possess surface weaknesses such as stains, wrinkles, creases, and thinning, causing consumers to hesitate despite appreciating the sustainability and aesthetic value of the material. This condition does not align with users' demands for durability and ease of maintenance. Without in-depth material processing, efforts to elevate this material as a sustainable alternative will remain at a semi-developed stage. Therefore, it is important to conduct a comprehensive analysis to define the relationship among the material's characteristics, function, and design meaning so that the resulting products can effectively communicate sustainability values both visually and functionally.

In the context of design, according to Ashby and Johnson (2003), the success of a product is not determined solely by technical aspects, but also by the way materials shape the product's character. The combination of these elements forms the character of the product, where design can evoke emotional responses. These emotional responses arise from the product's shape, color, texture, tactile sensation, and the combination of meanings conveyed by the material and design.

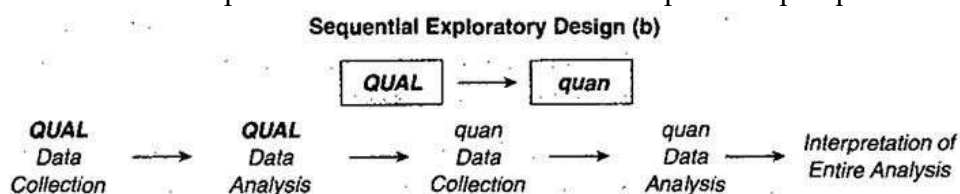
Based on the explanation above, efforts that can be undertaken include applying various sustainable material- and product-processing methods in accordance with the concept of sustainable fashion (Arumsari & Nursari, 2024). A relevant approach that can be used to test, understand, and further explore the material's potential in terms of physical properties, aesthetic value, and user experience is Material-Driven Design (MDD), in which the material serves as the central focus or starting point of product development (Karana et al., 2015). Thus, this research aims to address the problems faced by Ealsmor through experimentation as a basis for developing design strategies with functional, visual, and meaningful value. Furthermore, this research is expected to contribute to waste-reduction efforts and sustainability initiatives.

The objective of this research is to apply the Material-Driven Design (MDD) approach in processing Noblen Sacks into sustainable bags for the Ealsmor brand, thereby addressing consumer hesitation regarding durability and maintenance. The benefits of this research include: (1) providing a replicable framework for processing unconventional packaging materials into sustainable fashion products; (2) offering empirically validated design recommendations for Ealsmor's product development; (3) contributing to waste-reduction efforts in Bandung; and (4) supporting SDG Goal 12 on Responsible Consumption and Production.

METHOD

The research method was a scientific approach used to obtain data in a structured manner and according to specific objectives (Sugiyono, 2013). In this study, the method applied was a mixed-methods approach using the Sequential Exploratory Design strategy to process the data. This method emphasized qualitative approaches, such as analyzing phenomena through literature studies, observations, interviews, and experiments, which were then supported by simple quantitative methods at the stage of evaluating the experimental results (Creswell, 2009). The Sequential Exploratory Design strategy was also selected because it aligned with the Material-Driven Design process, which not only focused on material technicalities but also involved material experiences through sensory interpretation (Karana et al., 2015). Therefore, this study required a combined analysis to examine the characteristics and meanings of the Noblen Sack material.

In this study, the Sequential Exploratory Design method was used to process qualitative data as the basis for experimentation and as the initial step for simple quantitative testing.



Kemudian tahap penelitian ini dirancang dengan pendekatan Desain Berbasis Material (MDD) yang diperlukan untuk eksperimen agar berjalan dengan sistematis.

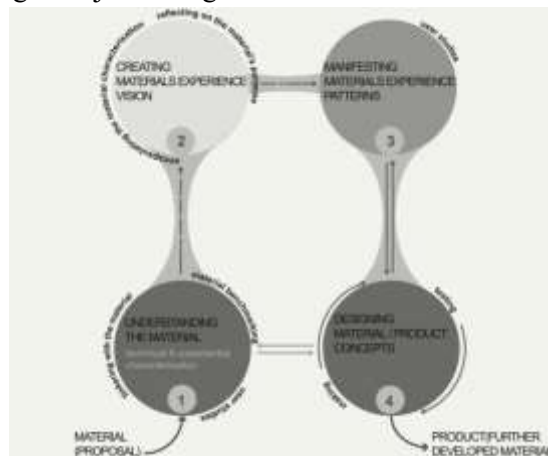


Figure 1 Material-Driven Design

Source: Karana et al., (2015)

The design method applied in this study implemented the Material-Driven Design (MDD) approach to explore the potential of Noblen Sack materials. This process included material development to understand the material's advantages, technical characteristics, and user experience, as well as how the material could be transformed into products (Karana et al., 2015). The design process was carried out through four stages.

The population of this study included fashion brands that produce bags, the materials used in bag design, and consumers who use these products. Sampling was conducted using a purposive sampling method based on criteria relevant to the research objectives. The samples included sustainable bag products from the Ealsmor brand as the main object of the study, Ealsmor owners as interview participants with in-depth knowledge of the design process and material-selection strategies, and Ealsmor consumers who had been customers for more than one year (Sugiyono, 2013).

The focus of this research was the sustainable bag design developed by Ealsmor using the Material-Driven Design (MDD) approach. The study emphasized experimentation with unconventional materials and examined how materials could influence the design of bags not only functionally, but also aesthetically and emotionally. Therefore, the research focused on both the final bag product and the relationship between material experimentation and Ealsmor's design strategy.

This research was conducted in Bandung from February 2024 to January 2025. Bandung was selected because of its rapid growth as a center of creativity and the fashion industry, the presence of the Ealsmor brand in the city, and its accessibility to the majority of Ealsmor consumers involved in the study. In addition, observations and material experiments could be conducted more effectively through direct interaction with MSME actors and consumers.

Data collection methods referred to Sugiyono (2013), who emphasized the importance of research instruments and data-collection procedures in determining data quality. Data were obtained from both primary and secondary sources through several techniques. Literature studies were used to gather theories, concepts, and previous studies related to sustainable design, Material-Driven Design (MDD), and the characteristics of Noblen Sack materials.

Semi-structured interviews were conducted with Ealsmor owners and consumers to explore perceptions of sustainability and user experiences related to the materials and products. Material experiments were also conducted using various treatments, including cutting, coating, burning, staining, and splicing techniques, to observe changes in the materials' physical, aesthetic, and sensory properties. Observation and documentation supported the visual and sensory analysis, while a simple voting method through WhatsApp was used to collect consumer assessments of the material experiments using a bipolar scale. The results were then analyzed as quantitative support for the qualitative findings.

RESULT AND DISCUSSION

Brand Brief Profile

Ealsmor, is a local brand from Bandung that focuses on making bags with the concept of Urban and the principle of sustainability. The name "Ealsmor" stands for Easy Simple More, describing a product that is functional, simple, and in accordance with the lifestyle of today's urban people. The owner of the brand is Shiva Tasya Virgana who started this business at the end of 2023, until now the brand is still growing. Ealsmor products fall into two categories: bags made from ordinary materials such as PVC, and bags made from recycled materials such as noblen sacks. The brand has a target market for ages between 13 and 35, with a unisex type designed for people in cities who are dynamic, care about the environment, and appreciate local products. Currently, all operational activities are managed directly by the owner, including the production process assisted by freelance tailors around Banceuy and Babakan Ciamis. Ealsmor sells its products through social media and marketplaces such as Tokopedia and Instagram. Then this brand has participated in national exhibitions such as INACRAFT and collaborated with Kerabat Store Dago which is supported by Dekranasda Bandung. Legally, this business is already in the form of a CV and registered with the Ministry of Law and Human Rights.

Ealsmor Products



Figure 2 Ealsmor products made from noblen sack (left) and PVC (right)

Ealsmor products are divided into two categories, namely bags made from standard materials such as PVC, and eco-friendly bags made from noblen sacks. Product design focuses on usability with a minimalist touch that harmonizes with the urban lifestyle. By raising the concept of "*Easy Simple More*", this brand hopes that each product is not only designed to be

useful, but also aims to tell the story of sustainability and bring local businesses to support MSMEs in Bandung.

Based on the achievements obtained so far among the two bag categories offered by Ealsmor, the most popular product category was the recycled bag made from Noblen Sacks. The following are the details of the recycled bags made from Noblen Sacks:



Figure 3 Product details of Ealsmor recycled bags made from noblen sack material

The implementation of the Material Driven Design (MDD) approach in this study began with the selection of Noblen Sack (sandwich sack) as the main material because it is included in the category of semi-developed materials that are commonly used in the industrial sector, but have the potential to be developed in the context of sustainable lifestyle and fashion products. At the material understanding stage, Noblen Sacks are analyzed based on their shape, dimensions, and physical properties characteristics consisting of kraft paper lamination and polypropylene (PP) plastic weave. This material structure shows high mechanical strength, tear resistance, and organic and natural visual effects, thus opening up opportunities to explore the meaning of materials from industrial packaging into fashion products with emotional value. Based on the initial analysis, material experiments are then divided into two broad categories, namely experiments in material processes (physical, mechanical, and chemical) and aesthetic and meaning experiments, so that the potential and limitations of materials can be understood systematically and controlled.

The results of material process experiments show that Noblen Sacks have excellent structural resistance. Physical tests in the form of up to 200 frictions and repeated folds did not cause tears or cracks, although they produced visual changes in the form of thinning of the paper layer and permanent wrinkles. Water resistance experiments show that the material is quite stable to splashes and light sprays, but undergoes dimensional changes in the form of winding after long immersion. In mechanical tests, the material was proven to withstand tensile loads without breaking or tearing, and had strong seam performance, although the pinhole had the potential to be a water entry point. Meanwhile, chemical experiments revealed the material's limitations to oil stains, heat exposure, and the use of chemical adhesives, so that the mechanical splicing method was considered more reliable than gluing.

The next stage focuses on experimenting with aesthetics and meaning through acrylic, patchwork, and woven paint techniques. The application of acrylic paint is able to change the

character of the surface of the material to be smoother, waterproof, and have expressive color visuals, thus shifting the image of the Noblen Sack from industrial packaging to an art medium with personal value. The patchwork technique reinforces the upcycling identity through texture variations and pattern irregularities that create an impression of exclusivity and evoke a sense of user pride. Meanwhile, weaving techniques provide the most significant physical changes by presenting three-dimensional textures, craft impressions, and artistic value that increase emotional appeal. The results of testing to consumers show that the three techniques have their own advantages and records, but in general the material is considered attractive, unique, and meaningful when the original character is maintained.

Based on the overall findings of experimentation and testing, the design of Ealsmor's product concept is directed at a balance between functionality, material authenticity, and the emotional experience of the user. The market segmentation is aimed at creative urban consumers with a high awareness of sustainability, covering various age groups with a life value that values material honesty, authenticity, and emotional meaning. The design concept is then strengthened through storytelling that emphasizes the transformation of leftover materials into meaningful products, collaboration with local artisans, and the message that sustainability is not always synonymous with perfection, but with honesty, limitations, and values that are able to survive and tell stories back to the user.

Design Themes and Concepts

The design theme raised is "Meaningful", which departs from the idea of transformation as the process of rediscovering the value and potential of simple and forgotten materials. Through the use of Noblen sacks, Ealsmor conveys the issue of sustainability honestly and as it is, emphasizing that aesthetic value can be born from awareness, openness, and the process of experimentation. This theme reflects the view that sustainability is not about perfection, but rather about how limitations can remain, have a story, and be meaningful.

The design concept translates the theme into an experiment in materials and bag shapes that balance function, aesthetics, and emotional value. Techniques such as weaving, patchwork, and acrylic paints are used to explore the texture, flexibility, and visual appearance of materials, while highlighting the value of handcrafted and the beauty of imperfections. Visually and functionally, the concept is realized through the use of experimental textures, large and multifunctional tote bag shapes, neutral colors with earthy nuances, and simple handmade details. Thus, Ealsmor bags not only function as everyday products, but also as a medium of expression of sustainability values and awareness of the process of creation.

MoodBoard



Figure 4 “Meaningful” design concept moodboard for Ealsmor bag development

Design Design

The initial process in this stage begins with sketching. Based on the implementation of experimental techniques, consideration of consumer testing results, market segmentation and suitability with meaningful concepts, the following are the results of the sketches of design recommendations that have been made.



Figure 5 Alternative sketch of Ealsmor bag design resulting from material experimentation

Based on the sketches and design experiments that have been carried out, the manufacture of bags is focused on shapes and types that suit the needs of urban lifestyle users. Tote

bags/backpacks are designed to be used in everyday activities such as work or college, with a basic shape that remains ideal but highlights the visual results of the experiment. Compact/crossbody sling bags are aimed at young users who are active and frequent travelers, while lunch bags/utility pouches are designed for those who prioritize a practical lifestyle and have a reduction in waste awareness. The next stage is validation by the Owner to determine the design that best represents the character of Ealsmor. The validation results showed that the No. 8 and No. 14 designs were chosen as the final recommendation because they look simple, are suitable for daily activities, represent the identity of Ealsmor (Easy Life and Simple More), and have a unisex style that suits the target market. In addition, these two designs have the potential to be developed into sustainable products. Furthermore, the design was further developed and poured into the techpack, which contained all technical details ranging from dimensions, openings, to the application of acrylic paint techniques, so that aesthetic and functional aspects were maintained. The series of designs No. 8 and No. 14 is the final result that not only represents the research stages from material experimentation to consumer perception testing, but also proves that Noblen Sack materials have great potential to be processed into sustainable urban lifestyle products.

CONCLUSION

The identification and processing of Noblen Sacks through the Material-Driven Design (MDD) approach demonstrated that the material possesses strong mechanical properties due to its woven polypropylene (PP) structure, while also presenting weaknesses in its kraft paper surface, such as susceptibility to water, stains, and creases. Through the four stages of MDD, the study found that sewing techniques were more effective than adhesive methods for product construction, and that acrylic paint applications using block print, brush, and thin wash techniques not only enhanced aesthetics but also improved water resistance and reduced creasing. These experiments successfully transformed the perception of Noblen Sacks from industrial waste into aesthetically valuable and emotionally meaningful materials while maintaining their sustainable character. Based on these findings, Ealsmor's design strategy emphasized minimalist forms, strong construction, and the concept of "Meaningful Transformation" to communicate sustainability through material storytelling rather than concealing material imperfections. The resulting design recommendations can serve as a reference for future Ealsmor product development. Future research is recommended to explore long-term durability testing, broader consumer acceptance, and the application of the MDD approach to other recycled or unconventional materials in sustainable fashion products.

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