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Assessing the Feasibility of the “*Tirta Dwimatra*” Transformational Gown as Stage Wear Inspired by *Nusantara* Aesthetics

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Abstract

This study evaluates the feasibility of the *Tirta Dwimatra* transformational gown as an innovative form of culturally inspired stage wear. The study employed a research and development approach adapted from the ADDIE model. This article focuses specifically on the development phase, particularly the expert-based product feasibility assessment. The *Tirta Dwimatra* gown combines transformational clothing construction, pleated tulle techniques, and visual elements derived from Indonesian cultural heritage, represented through batik motifs. Data were collected using a product feasibility assessment instrument completed by three expert validators. The instrument comprised 30 items covering three dimensions: aesthetic design, technical construction, and creativity and innovation. The data were analysed using quantitative descriptive analysis by comparing the total score obtained with the maximum possible score and converting it into a percentage. The gown received a total score of 320 out of 360, corresponding to a feasibility percentage of 88.89% and placing it in the highly feasible category. These findings indicate that the *Tirta Dwimatra* gown demonstrates strong aesthetic, technical, and innovative qualities as culturally inspired stage wear. The study also highlights the potential of expert-based feasibility assessment as a systematic approach to developing transformational fashion products that integrate cultural representation, functional construction, and design innovation in fashion education.

Keywords: *cultural aesthetics, feasibility test, stage performance clothing, transformational gown*

INTRODUCTION

The current development of the fashion industry shows increasingly dynamic changes in terms of aesthetics, function, technology, and cultural values presented in a garment. These dynamics indicate that fashion design is not only related to the creation of clothing, but also to a creative process involving inspiration, innovation, material exploration, technology, and response to social and cultural developments (Yuan, 2023; Mustafa et al., 2025). Clothing is no longer understood merely as body protection or a social status marker, but also as a medium of expression, visual communication, cultural identity, and creative experimentation. In the context of fashion education, the creation of fashion products needs to be directed toward the ability to produce works that are not only visually beautiful, but also possess functionality, novelty, technical value, and relevance to contemporary times.

Murzyn-Kupisz & Hołuj, (2021) emphasize that fashion design education needs to balance artistic skills, technical skills, and an understanding of sustainability so that prospective designers are able to respond to the challenges of the modern fashion industry. Therefore, the fashion design process requires an integration of design creativity, material selection, pattern construction, finishing techniques, and the ability to present character and meaning in fashion products. This is in line with (Omwami et al., 2020) who show that idea development in fashion design is a gradual process involving visual exploration, inspiration processing, and design decision making. One of the developing concepts in contemporary fashion design is transformable apparel or transformation

clothing. This concept refers to clothing that can change shape, function, silhouette, or appearance through a specific construction system, such as folds, ties, drawstrings, detachable modules, zippers, magnets, or fabric manipulation. Transformable apparel is considered to have potential in expanding product functionality because a single garment can present more than one look. (Rahman & Gong, 2016) explain that transformable fashion design can be part of sustainable design practices because it can increase flexibility, variation of use, and the lifespan of clothing. In line with this, (Lang & Wei, 2019) state that transformable apparel allows a single product to be used in multiple looks, thereby providing broader functional value to users.

The development of transformable apparel is also related to sustainability issues in the fashion industry. The modern fashion industry faces criticism due to fast consumption cycles, short product lifespans, and increasing textile waste. (Niinimäki et al., 2020) emphasize that the fashion industry imposes significant environmental impacts, including through water consumption, carbon emissions, chemical usage, and textile waste. In this context, fashion design capable of extending product utility becomes increasingly important. (Bocken et al., 2016) emphasize that design strategies in the circular economy need to be directed toward efforts to slow, narrow, and close resource use cycles. (Hur & Cassidy, 2019) also show that sustainable design practices in fashion must consider implementation challenges, ranging from material selection and production processes to user acceptance.

However, most studies on transformable apparel are still largely directed toward daily wear, modular design, and sustainability strategies. Studies such as (Kozłowski et al., 2018) and (Kozłowski et al., 2019) discuss more about tools, strategies, and sustainable design frameworks within the general context of fashion. Meanwhile, discussions regarding transformable apparel as stage wear remain relatively limited. In fact, stage wear has different demands from daily wear. Stage wear must be able to deliver strong visual effects, support user movement, be comfortable, safe, stable, and reinforce the character of the performance.

Stage wear with a transformation system possesses higher technical complexity because the shape change must occur clearly, quickly, and without compromising user comfort. A failure in the transformation mechanism can affect visual appearance, stage performance, and even user safety. (Telfer, 2026) emphasizes that the use of technology, lighting, and kinetic elements in performance costumes can enhance visual appeal but also requires thorough technical considerations. Thus, the development of transformable apparel for stage requirements is not sufficient merely by highlighting design beauty, but also needs to consider structural strength, material character, mechanical systems, finishing, and ease of wearing.

In the Indonesian context, fashion innovation has great opportunities to be integrated with rich local culture. Batik as a cultural heritage holds strong aesthetic, symbolic, and identity values. (Syed Shaharuddin et al., 2021) explain that Indonesian and Malaysian batik continues to evolve through production innovation, design, and adaptation to contemporary needs. (Rismantojo et al., 2024) also show that batik can be transformed through contemporary design approaches, including the use of pleating techniques, thereby retaining cultural values while presenting a modern look. Therefore, culture-based fashion development does not have to stop at preserving traditional forms but can be directed toward exploring new designs that connect local values with contemporary aesthetics.

The *Tirta Dwimatra* gown is a stage wear product that combines the concept of transformable apparel, inspiration from Archipelago culture, and modern fabric manipulation techniques. This product carries the theme *Meta Nusantara* by blending visual elements of batik and pleated tulle as part of the transformation construction. Conceptually, the word "*Tirta*" represents water that is dynamic, flexible, and graceful, while "*Dwimatra*" illustrates two looks or two visual dimensions that emerge through the garment transformation process. With this concept, the gown serves not only as aesthetic stage wear, but also as an innovative work that presents visual changes before an audience. Data in the student draft indicate that this gown was developed as a transformation wardrobe product based on the *Meta Nusantara* theme and evaluated for its feasibility by three expert validators using a 30-item evaluation instrument.

Despite having strong visual and conceptual value, a culture-based transformation gown still requires a systematic feasibility evaluation. Feasibility evaluation is crucial to ensure that the product is not only aesthetically attractive but also meets technical and functional criteria. In fashion products, feasibility can be observed through aspects of design harmony, proportion, silhouette, visual balance, size appropriateness, stitching neatness, edge finishing, shape stability, comfort, and the functionality of the transformation mechanism. Evaluation by experts is essential because stage wear products require assessments from parties who understand design, construction, materials, and the quality of

the final result. Based on this review, there is a gap between the growing practice of transformable fashion innovation and the limited empirical studies evaluating the feasibility of transformable stage wear products, particularly those based on Archipelago cultural inspiration. Previous studies have mostly placed transformable apparel within the frameworks of sustainability, modularity, and daily wear flexibility, whereas evaluations of transformable stage wear that combine cultural elements, technical functions, and visual effects have not been widely conducted. This gap forms the rationale for the importance of this study.

Accordingly, this study aims to evaluate the feasibility of the *Tirta Dwimatra* transformation gown as a culture-based stage wear innovation. The feasibility evaluation focuses on three main aspects: design aesthetics, technical construction, and creativity and innovation. The results of this study are expected to contribute to the development of stage wear products in fashion design education, particularly in designing garments that integrate cultural values, transformation functionality, and technical quality. In addition, this study can serve as an initial reference for designers or fashion design students in developing transformable fashion products that are not only visually beautiful, but also structurally and functionally feasible.

METHOD

This study used a Research and Development (R&D) approach by adapting the ADDIE model, which consists of five phases: analysis, design, development, implementation, and evaluation. However, the scope of this article is limited to the development phase, specifically the product feasibility testing stage. This limitation was imposed because the primary focus of this study was to evaluate the feasibility of the *Tirta Dwimatra* transformational gown before the product is more broadly utilized as stage wear. This study employed a quantitative descriptive design supported by expert evaluations. The quantitative descriptive design was used to describe the product's feasibility level based on scores provided by expert validators. Meanwhile, qualitative feedback from the validators served as supporting data to explain aspects of the product that were already well-developed and those that still required improvement.

The object of this study is the *Tirta Dwimatra* transformational gown, a stage wear piece that integrates the concept of transformable apparel, pleated tulle fabric manipulation, and visual elements of Archipelago culture through batik motifs. This gown was developed under the theme *Meta Nusantara* and designed to showcase two visual looks within a single garment. The scope of this research is focused on product feasibility evaluation. This study does not address live-performance wearability tests, long-term comfort tests, or audience acceptance. The assessment was limited to product feasibility based on expert perspectives regarding design aesthetics, technical construction, as well as creativity and innovation. The focus of this study is the product feasibility of the *Tirta Dwimatra* transformational gown. Product feasibility in this study is defined as the degree of alignment between the product and established criteria for design, construction, and innovation as culture-based stage wear. The focus of this assessment is detailed in Table 1.

Table 1. Product Feasibility Evaluation Focus

Attachment Aspect	Operational Definition	Evaluation Indicators
Design aesthetics	The visual quality of the gown relating to the appropriateness of the theme, shape, color, silhouette, proportion, and visual appeal.	Color harmony, design lines, silhouette, proportion, focal point, texture, visual balance, and overall impression.
Technical construction	The technical quality of the garment relating to size, pattern, stitching, finishing, comfort, shape stability, and transformation function.	Size appropriateness, pattern balance, stitching neatness, seam finishing, shape stability, ease of wearing, and transformation mechanism.
Creativity and innovation	The novelty of ideas and product uniqueness as culture-based transformational stage wear.	Creative ideas, detail uniqueness, material exploration, color and texture combinations, cultural identity, and design distinctiveness

The subjects of this study consisted of three expert validators: Novita Dwi Parastuti, Sudarna Suwarsa, and Desi Eka Wulandari. These three validators were selected based on their relevant competence and expertise in fashion design, garment construction, and creative fashion product evaluation. The primary instrument used in this study was a product feasibility assessment sheet structured as a closed ended questionnaire. The instrument comprised 30 evaluation items covering three main aspects: design aesthetics, technical construction, and creativity and innovation. Each item was assessed using a 1 to 4 Likert scale, defined as: 1 = poor, 2 = fair, 3 = good, and 4 = excellent.

Data were collected through an expert validation technique. Each validator observed the *Tirta Dwimatra* transformational gown and subsequently completed the assessment using the provided instrument. The validators assigned scores to each item based on the observed condition of the product. In addition to quantitative scores, the validators provided critiques and suggestions regarding the product. This feedback was utilized to strengthen the analysis results and served as a basis for formulating necessary improvements, particularly regarding material selection, stitching neatness, finishing quality, wearing comfort, and the transformation mechanism. Data were analyzed using quantitative descriptive techniques. The cumulative scores obtained from all validators were summed and compared against the ideal maximum score. The percentage of product feasibility was calculated using the following formula:

$$P = (\Sigma X / \Sigma X_i) \times 100\%$$

Explanation:

P = Feasibility percentage (%)

ΣX = Total empirical score

ΣX_i = Ideal maximum score

The ideal maximum score in this study was 360. This total score was calculated from 30 assessment items, evaluated by 3 validators, with a maximum score of 4 for each item. The resulting percentage was then converted into feasibility categories as presented in Table 2.

Table 2. Product Feasibility Criteria

Percentage Interval	Feasibility Category
81%–100%	Highly Feasible
61%–80%	Feasible
41%–60%	Moderately Feasible
21%–40%	Less Feasible
0%–20%	Unfeasible

Qualitative data in the form of comments and suggestions from the validators were analyzed descriptively. This analysis was used to elaborate on the quantitative evaluation results and identify the strengths and weaknesses of the product. Consequently, the analysis results not only reflect the product feasibility level in percentage terms but also provide actionable direction for revising the *Tirta Dwimatra* transformational gown.

RESULTS AND DISCUSSION

The product developed in this study is the *Tirta Dwimatra* transformational gown, a stage wear garment designed with the concept of a transformation wardrobe. This gown carries the theme *Meta Nusantara* by combining visual elements of Archipelago culture with modern garment construction. Cultural elements are presented through the use of batik motifs, while the transformational aspect is realized through pleated tulle manipulation and a structural shape shifting mechanism.



Figure 1. The *Tirta Dwimatra* Gown Before and After Transformation

Conceptually, the name "*Tirta*" represents the dynamic, flexible, and graceful character of water, while "*Dwimatra*" illustrates two visual looks that can be presented in a single garment. This concept demonstrates that the gown serves not only as aesthetic stage wear, but also as a medium of visual expression that delivers a dramatic effect through shape shifting. In the context of stage wear, this shape shifting mechanism becomes an essential element because it enhances performance appeal and offers a distinct visual experience for the audience. The *Tirta Dwimatra* gown was developed as a stage wear product that integrates aesthetic value, transformation functionality, and cultural inspiration. Therefore, product feasibility was evaluated not only from the perspective of visual beauty, but also from construction quality, comfort, shape stability, transformation mechanism, and design creativity. The feasibility assessment was conducted by three expert validators using an instrument consisting of 30 assessment items.

The product feasibility assessment was conducted by three expert validators: Novita Dwi Parastuti, Sudarna Suwarsa, and Desi Eka Wulandari. Each validator assigned scores across 30 assessment items using a 1 to 4 scale. The maximum score per validator was 120, yielding an ideal maximum total score of 360 across all three validators. A summary of the validator evaluation results is presented in Table 3.

Table 3. Summary of Validator Assessment Results

Validator	Obtained Score	Maximum Score	Percentage	Category
Validator 1	120	120	100,00%	Highly Feasible
Validator 2	89	120	74,17%	Feasible
Validator 3	111	120	92,50%	Highly Feasible
Total	320	360	88,89%	Highly Feasible

Based on Table 3, the total score obtained by the *Tirta Dwimatra* gown was 320 out of an ideal maximum score of 360. The product feasibility percentage was calculated as follows:

$$P = (320 / 360) \times 100\% = 88,89\%$$

This result falls within the 81%–100% interval, categorizing the *Tirta Dwimatra* gown as highly feasible. This finding indicates that, overall, the *Tirta Dwimatra* gown meets the feasibility criteria as a culture-based stage wear innovation. Nevertheless, the score variance among validators suggests that the product still requires refinement in several technical aspects, particularly regarding materials, finishing, and the transformation mechanism.

The expert evaluation results indicate that the *Tirta Dwimatra* transformational gown achieved a total score of 320 out of an ideal maximum score of 360, yielding a feasibility percentage of 88.89%. This percentage falls into the highly feasible category. This finding demonstrates that the developed product meets the feasibility criteria for culture-based stage wear across all dimensions: design aesthetics, technical construction, as well as creativity and innovation. The evaluation was obtained from three expert validators using a 30-item evaluation instrument on a 1 to 4 likert scale. The highly feasible category indicates that the *Tirta Dwimatra* gown possesses not only visual value but also meets most of the technical indicators required for apparel products. In the context of fashion product development research, expert feasibility assessment represents a critical phase because fashion products cannot be evaluated solely on design concepts; they must also be tested for proportion,

construction, materials, finishing, functionality, and alignment with their intended purpose. Accordingly, the feasibility result of 88.89% shows that this gown has a solid foundation for use as an innovative stage wear product, despite requiring minor revisions.

The design aesthetics aspect is one of the main strengths of the *Tirta Dwimatra* gown. Based on the assessment results, indicators related to color harmony, design lines, silhouette, proportion, focal point, texture, visual balance, and visual appeal achieved good to excellent scores. This indicates that the gown successfully delivers a visual impression aligned with the *Meta Nusantara* concept. Aesthetically, the use of batik motifs provides a strong cultural identity, while the pleated tulle delivers a modern, lightweight, and dynamic impression. This combination reinforces the gown's character as contemporary stage wear that remains rooted in Archipelago culture. In this context, batik functions not merely as decorative ornament, but as a carrier of cultural meaning and national identity. This aligns with (Yulianingrum et al., 2022), who explain that batik can be acculturated with contemporary fashion trends to strengthen national identity. (Syed Shaharuddin et al., 2021) also emphasize that Indonesian and Malaysian batik continues to evolve through design innovation, production techniques, and adaptation to contemporary needs, allowing batik to serve as a source of inspiration in modern fashion products.

The interplay between batik and pleating techniques is relevant to the study by (Rismantojo et al., 2024), who developed *Batik Tiga Negeri* using pleating techniques to represent the batik heritage of Indonesia, Malaysia, and Thailand. Their study demonstrates that cultural elements can be transformed into new visual forms without losing their inherent identity. In the context of the *Tirta Dwimatra* gown, the application of pleated tulle and batik motifs reflects a similar endeavor: transforming traditional elements into a more contemporary, dynamic stage wear appearance while retaining cultural roots. Although the aesthetic aspect achieved a highly feasible rating, the validation results revealed notes regarding material selection, particularly the use of glittered batik fabric. Glitter that sheds easily can deteriorate visual quality and compromise the professional appearance of the garment. This highlights that apparel aesthetics are determined not only by color, pattern, and silhouette, but also by material stability during wear. In stage wear, materials must maintain visual integrity during movement, wear, and transformation.

Technical construction is the most critical aspect of a transformational gown because product success relies not only on design beauty, but also on the garment's ability to shift shapes safely, comfortably, and stably. Assessment results show that the technical construction of the *Tirta Dwimatra* gown falls into the highly feasible category; however, this aspect also received the highest number of revision notes. Technical construction indicators encompass size appropriateness, pattern balance, stitching neatness, seam finishing, shape stability, ease of wearing, and transformation mechanism functionality. In the evaluation records, several indicators receiving relatively lower scores related to material harmony, freedom from technical defects, and ease of putting on and taking off without altering the overall shape. This indicates that while the product is generally feasible, technical reinforcement is still required to ensure the garment is fully stage-ready.

These findings align with the concept of transformable apparel, which emphasizes a single garment's capacity to deliver two or more functional or aesthetic looks through manipulative methods such as tying, folding, rolling, pulling, or gathering specific sections. (Lang & Wei, 2019) explain that transformable apparel offers two or more alternative looks through manipulative techniques, meaning the product requires not only design creativity, but also construction that enables effective shape-shifting. In the case of the *Tirta Dwimatra* gown, the transformation mechanism using pleated tulle must operate smoothly without distorting the primary structure of the garment. Therefore, pattern construction, seam strength, zipper placement, pull points, and interior finishing need to be engineered with greater precision. If the transformation system is overly heavy, rigid, or poorly finished, the shape shifting function may be compromised. In stage wear, minor construction failures can have significant visual impacts since transformations occur live before an audience.

Studies on performance costumes further emphasize the importance of integrating design, technology, movement, and visuals. (Telfer, 2026) notes that incorporating technological, lighting, and kinetic elements into performance costumes can enhance performance quality and audience engagement, but its success depends on thorough technical design. Consequently, the validators' feedback regarding stitching neatness, joint reinforcement, and transformation system optimization is highly relevant, as this gown is not merely a display piece, but a garment with performative functionality. Creativity and innovation emerged as the most prominent strength of the *Tirta Dwimatra* gown. The product was evaluated as possessing creative design ideas, unique details,

material exploration, harmonious color and texture combinations, and a distinct aesthetic identity. Its innovative value is evident in the bold integration of three key elements: Archipelago cultural motifs, stage wear construction, and a transformation mechanism.

Creativity in this product resides not only in its final appearance, but also in the concept of a single gown delivering two distinct visual looks. The "*Dwimatra*" concept serves as a strong creative foundation by linking design meaning with transformation functionality. Within stage performance contexts, this shape-shifting feature creates a dramatic effect that enhances stage appeal. This distinguishes the *Tirta Dwimatra* gown from conventional attire, as the garment is not merely worn, but "performed" through a visual transformation process.

These findings align with (Rahman & Gong, 2016), who view transformable fashion design as an approach that offers shape and functional flexibility in fashion products. (Lang & Wei, 2019) also note that transformable apparel adds value by allowing wearers to achieve different looks from a single item. In this study, transformation value is directed not toward daily wear efficiency, but toward the artistic and performative effects of stage wear. Thus, the *Tirta Dwimatra* gown expands the application of transformable apparel concepts from consumer utility and sustainability into stage performance and cultural expression.

Innovation is also reflected in the adoption of the *Meta Nusantara* theme. This theme demonstrates an effort to connect cultural heritage with modern design imagination. In sustainable design literature, fashion innovation is understood not merely as structural novelty, but as a product's ability to convey new values, functions, and experiences to users and audiences. (Kozłowski et al., 2018) emphasize that sustainable fashion design requires a holistic approach that focuses not only on product form, but also on value, function, context, and impact. The *Tirta Dwimatra* gown makes an important contribution to the development of culture-based stage wear. The application of batik motifs and the *Meta Nusantara* theme demonstrate that local culture can serve as a rich source of inspiration for contemporary fashion. Here, culture is positioned not as a static element, but as a dynamic ideational resource that can be reinterpreted into new forms through design exploration.

Cultural integration in fashion products fulfills two primary functions. First, culture serves as a visual identifier that sets the product apart from other works. Second, culture provides a source of meaning that strengthens the design narrative. In the *Tirta Dwimatra* gown, the name "*Tirta*" (representing water) and "*Dwimatra*" (representing two visual looks) form an integral part of this design narrative, reinforcing the connection between concept, form, and transformation function.

Research on contemporary batik indicates that cultural preservation does not require adhering strictly to traditional forms but can be achieved through creative reinterpretation. Syed (Syed Shaharuddin et al., 2021) explain that batik innovation is necessary to keep cultural products relevant to industry developments and modern consumer demands. This approach is evident in the *Tirta Dwimatra* gown, where batik is used not merely as a surface motif, but integrated with pleated tulle structures and stage transformation concepts. Accordingly, the *Tirta Dwimatra* gown represents a cultural reinterpretation in fashion design. The product demonstrates that cultural inspiration can be developed into experimental, performative works that remain relevant to contemporary fashion. In fashion education contexts, this approach is vital, as students learn not only how to construct garments, but also how to translate cultural values into innovative, functional creative products.

CONCLUSION

Based on the research findings, the *Tirta Dwimatra* transformational gown is declared highly feasible as Archipelago aesthetics-based stage wear. Validation results by three experts yielded a total score of 320 out of an ideal maximum score of 360, representing a feasibility percentage of 88.89%, which falls into the highly feasible category. These results demonstrate that the *Tirta Dwimatra* gown meets the feasibility criteria across design aesthetics, technical construction, as well as creativity and innovation aspects. Aesthetically, the gown successfully integrates batik motifs and pleated tulle as a representation of Archipelago culture within a contemporary stage wear aesthetic. Technically, the gown demonstrates functional transformation feasibility, despite requiring minor refinements in material selection, stitching neatness, finishing, and the shape shifting mechanism. Consequently, the *Tirta Dwimatra* gown serves as an exemplar of innovative stage wear development that integrates cultural values, technical functionality, and design creativity within fashion education. For future development, it is recommended that material selection pay greater attention to fabric characteristics that are lightweight, fluid, flexible, and colorfast. Furthermore, the transformation mechanism should

be tested directly on models or performers to comprehensively evaluate comfort, movement safety, shape-shifting speed, and visual effectiveness on stage. For future researchers, subsequent studies could be expanded to include evaluations from audiences or end-users, ensuring that product feasibility is assessed not only through expert perspectives, but also through visual reception and user experience dimensions.

DECLARATION OF GENERATIVE AI

The authors declare that no generative AI or AI-assisted technologies were used in the writing process of this manuscript.

CONFLICTING INTEREST STATEMENT

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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REFERENCES

- Bocken, N. M. P., de Pauw, I., Bakker, C., & van der Grinten, B. (2016). Product design and business model strategies for a circular economy. *Journal of Industrial and Production Engineering*, 33(5), 308–320. <https://doi.org/10.1080/21681015.2016.1172124>
- Hur, E., & Cassidy, T. (2019). Perceptions and attitudes towards sustainable fashion design: Challenges and opportunities for implementing sustainability in fashion. *International Journal of Fashion Design, Technology and Education*, 12(2), 208–217. <https://doi.org/10.1080/17543266.2019.1572789>
- Kozłowski, A., Bardecki, M., & Searcy, C. (2019). Tools for sustainable fashion design: An analysis of their fitness for purpose. *Sustainability*, 11(13), Article 3581.
- Kozłowski, A., Searcy, C., & Bardecki, M. (2018). The reDesign canvas: Fashion design as a tool for sustainability. *Journal of Cleaner Production*, 183, 194–207. <https://doi.org/10.1016/j.jclepro.2018.02.014>
- Lang, C., & Wei, B. (2019). Convert one outfit to more looks: Factors influencing young female college consumers' intention to purchase transformable apparel. *Fashion and Textiles*, 6, Article 26. <https://doi.org/10.1186/s40691-019-0182-4>
- Murzyn-Kupisz, M., & Hołuj, D. (2021). Fashion design education and sustainability: Towards an equilibrium between craftsmanship and artistic and business skills? *Education Sciences*, 11(9), Article 531. DOI: 10.3390/educsci11090531
- Mustafa, M. K., Saleh, N., Farahanies, D. I., Rafee, M. R. M., Ramli, I., & Rosman, M. R. (2025). The fundamental research inspiration in fashion design. *Journal of Fashion & Textile Design Unesa*, 6, 259–265.
- Niinimäki, K., Peters, G., Dahlbo, H., Perry, P., Rissanen, T., & Gwilt, A. (2020). The environmental price of fast fashion. *Nature Reviews Earth & Environment*, 1, 189–200. <https://doi.org/10.1038/s43017-020-0039-9>
- Omwami, A., Lahti, H., & Seitamaa-Hakkarainen, P. (2020). The variation of the idea development process in apparel design: A multiple case study. *International Journal of Fashion Design, Technology and Education*, 13(3), 341–351. DOI: 10.1080/17543266.2020.1817573
- Rahman, O., & Gong, M. (2016). Sustainable practices and transformable fashion design: Chinese professional and consumer perspectives. *International Journal of Fashion Design, Technology and Education*, 9(3), 233–247. <https://doi.org/10.1080/17543266.2016.1167256>
- Rismantojo, S., Sirivesmas, V., Joneurairatana, E., & Natalia, W. A. (2024). Transforming the Batik Tiga Negeri (Three-Countries Batik) in pleats to represent Indonesia, Malaysia, and Thailand's batik heritage by applying the ATUMICS method. *Archives of Design Research*, 37(4), 65–96.
- Syed Shaharuddin, S. I., Shamsuddin, M. S., Drahman, M. H., Hasan, Z., Mohd Asri, N. A., Nordin, A. A., & Mohd Shaffiar, N. (2021). A review on the Malaysian and Indonesian batik production, challenges, and innovations in the 21st century. *SAGE Open*, 11(3), 1–19. <https://doi.org/10.1177/21582440211040128>

- Telfer, J. (2026). Light, technology, and kinetics in costume design. *Athens Journal of Humanities & Arts*. Advance online publication. <https://www.athensjournals.gr/humanities/2025-6571-AJHA-ART-Telfer-02.pdf>
- Yuan, H. (2023). The innovation process in fashion design. In Y. Chen et al. (Eds.), *Proceedings of the 2023 2nd International Conference on Public Culture and Social Services* (pp. 276–281). Atlantis Press. DOI: 10.2991/978-2-38476-130-2_34
- Yulianingrum, V., Ranita, S., Basuki, L. S. K., Wijaya, A. L., & Pandin, M. G. R. (2022). Batik fashion trends and national identity. *Philosophica: Jurnal Bahasa, Sastra, dan Budaya*, 5(2). <https://doi.org/10.35473/po.v5i2.1454>