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The Utilization of the Scratch Application in the Development of Ready to Wear Deluxe Wedani Woven Dresses

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Abstract: The contemporary fashion design paradigm demands the integration of cultural heritage with technological efficiency. The process of adapting traditional textiles, such as Wedani woven fabric, into the contemporary ready-to-wear deluxe segment faces significant challenges, primarily the high costs and time involved in the prototyping cycle. This research investigates the utilization of the Scratch application, a visual programming platform, as an innovative solution for rapid, model-based, and cost-free fashion design prototyping. Through a qualitative approach, this study involved in-depth interviews with three key participant groups: industry experts, design practitioners, and academics. Thematic analysis of the qualitative data identifies an urgent need for accessible visualization tools. The result of this research is a functional prototype within Scratch that enables designers to explore combinations of woven motifs on fashion silhouettes in a modular and interactive manner. This system is proven to accelerate the ideation process, minimize financial risks, and reduce material waste from physical sampling. This study affirms that Scratch offers a pragmatic method for bridging the preservation of cultural essence with the demands for efficiency and innovation in the global fashion market.

Keywords: rapid prototyping, fashion design, traditional textiles, human-computer interaction, visual programing

1. Introduction

The paradigm of contemporary fashion design is at a crossroads, driven by a wave of sustainability, personalization, and technological integration (Adiyanti, 2024). Today's consumers seek more than just clothing; they desire products that tell a story, embrace ethical production, and adapt to modern lifestyles (Rahmayanti, 2024). In Indonesia, the deluxe ready-to-wear fashion trend is on the rise, indicating a shift towards premium, easy-to-wear products (Krismajayanti et al., 2025). However, translating the rich heritage of traditional textiles, such as Wedani woven fabric, into this market segment poses significant challenges (Mtenguzi, 2025). These challenges are not only aesthetic but also technical and economic. The typically stiff nature of woven fabrics, combined with non-repetitive, handcrafted motifs, demands high precision in pattern making and cutting to avoid wasting valuable material (Chavan et al., 2026). Designers need to find innovative ways to maintain cultural essence while accelerating the design cycle and reducing high prototype costs, which are often the biggest financial barriers to creative exploration (Susanto et al., 2025).

Current research identifies a gap in the academic literature regarding the use of accessible and intuitive design software for the development of fashion based on traditional textiles (Jakaria et al., 2024). While scientific discourse in developed countries like France (focusing on the digitalization of haute couture), the United States (with innovations in wearable technology), Turkey (through the industrialization of textiles with CAD/CAM), Germany (in parametric design and additive manufacturing), and Russia (with material simulation and 3D visualization) continues to advance, the application of technology that is friendly to non-technical designers or artisan communities in developing countries

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remains limited. The dominant scholarly debate tends to center on professional software such as CLO 3D or Browzwear, which, despite their sophistication, have steep learning curves and high (Firdaus et al., 2026).

This condition creates a digital disjuncture that hinders innovation at the level of independent designers and Micro, Small, and Medium Enterprises (MSMEs), which are the backbone of the heritage-based creative industry. This article aims to fill this gap by exploring the potential of the Scratch application as a digital fashion design tool. Although Scratch is known as a platform for developing educational games and simple animations, its capabilities in interactive visualization and block-based object manipulation open up unexpected opportunities in the realm of fashion design (Puteri et al., 2024). We seek to examine how this visual-coding platform can facilitate the integration of tradition and technology in fashion production, particularly in the development of a deluxe ready-to-wear Wedani woven dress. With its pedagogical origins, Scratch offers an intuitive interface, allowing designers to adopt a computational thinking framework without requiring deep programming expertise.

This approach empowers them to systematically arrange design elements such as silhouettes, sleeve cuts, and motif placements, much like assembling blocks of code. The proposed methodology offers a practical guide that empowers young designers and artisans to leverage Scratch for design innovation (Guerra, 2025). This approach seeks to democratize design tools and accelerate the adaptation of Indonesian cultural heritage within the dynamic global fashion landscape. Employing Scratch, designers can rapidly visualize concepts, experiment with combinations of color and woven motifs, and generate virtual prototypes of the Wedani woven dress (Spieler et al., 2020). Furthermore, Scratch's potential for rudimentary simulations of movement and interaction with a virtual avatar a process analogous to game character development offers a preliminary environment for testing ergonomics and fabric drape (Burman, 2022). This digital testing phase precedes the costly stage of physical production. Ultimately, this research posits that low-fidelity prototyping tools such as Scratch function as a crucial bridge, connecting the esteemed values of craftsmanship with the contemporary demands for efficiency, innovation, and sustainability in the digital age (Petrak, S. et al., 2025). This article delineates three primary, interconnected objectives that investigate the innovative application of Scratch within fashion design (Sembiring, et al., 2022).

First, the study explores the potential of Scratch as a novel digital fashion design tool (Fauchiyah et al., 2025). Transcending its conventional role as an educational platform for programming, this research examines how Scratch's visual-coding features facilitate the conceptualization, visualization, and rudimentary simulation of contemporary Wedani woven dress designs. It demonstrates the adaptation of Scratch from a pedagogical environment into an intuitive design-assistance tool, enabling designers to visualize concepts and digitally experiment with fashion elements.

Second, this research critically examines the integration of tradition and technology in fashion production, analyzing Scratch's role as a technological intermediary (Ferdiansyah, et al., 2021). The study investigates how this digital application bridges the cultural heritage of Wedani weaving with the demands of the modern deluxe ready-to-wear industry. This objective assesses how such an innovative approach can preserve local traditions while concurrently increasing design process efficiency, reducing prototype costs, and opening new pathways for creating globally relevant and innovative products.

Third, the article provides a practical, foundational guide for young designers and artisans to utilize Scratch in their design process. It presents a conceptual framework outlining an initial methodology for individuals interested in the digitalization of design. The framework demonstrates Scratch's utility as an accessible tool for visualizing woven motifs, exploring dress silhouettes, and simulating simple fabric drape. This work aims to inspire further exploration and spark innovation among design and artisan communities, empowering them with relevant digital skills.

2. Methodology

This research adopts the ADDIE (Analysis, Design, Development, Implementation, Evaluation) methodological framework, adapted for the context of technology-based fashion design innovation. This approach systematically guides the process from needs identification to the evaluation of the proposed solution.

2.1 Phase of Analysis

The analysis phase identifies the needs and challenges inherent in developing ready-to-wear deluxe Wedani woven dresses and evaluates the potential for integrating Scratch into this process. The study collected primary data through in-depth interviews with key participants. The research developed an interview protocol to explore comprehensive perspectives on current design practices, operational obstacles, and attitudes toward digital technology adoption.

The interview protocol probed several key domains. Initial questions prompted participants to delineate their current design workflow and to identify the primary challenges they encounter in prototyping and visualizing Wedani woven designs. Subsequent inquiries explored their perspectives on how digital technology can support or hinder the creative process in traditional fashion design. The protocol then specifically investigated the perceived relevance of the Scratch application, asking participants how a tool known for game development might apply to the context of fashion, particularly for woven textiles. Further questions aimed to establish expectations by asking participants to define success criteria for a digital design tool for Wedani woven products. Finally, the interview solicited concrete examples of how technology integration could enhance the value and competitiveness of woven products in the global market.

2.2 Phase of Design

Based on the analysis result, the design phase establishes a conceptual framework, as illustrated in Figure 1, for integrating Scratch into the fashion design workflow. Within this phase, the research formulates a visualization model that enables designers to leverage Scratch's features for representing Wedani woven motifs, colors, textures, and silhouettes. This stage also involves developing specific usage scenarios for Scratch that align with the operational needs of the ready-to-wear deluxe fashion industry. Presented a functional prototype of "Ready-to-Wear Deluxe Wedani Woven Dresses".

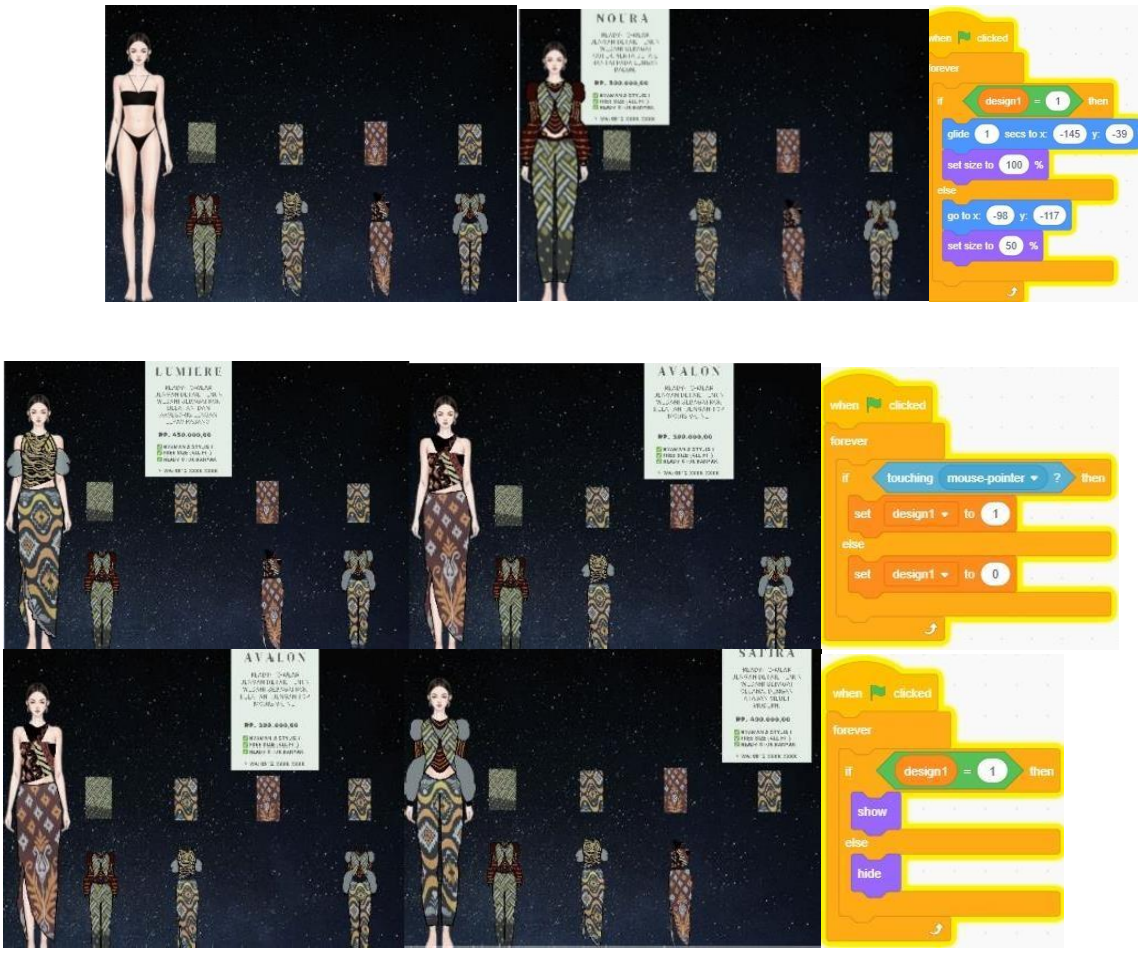


Figure 1. Prototype Design

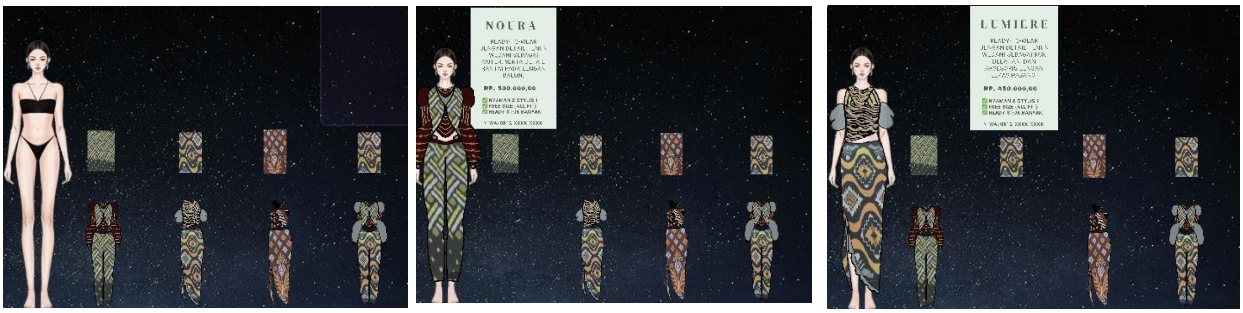
2.3 Phase of Development

The development phase entails the construction of a digital prototype, or a sample Scratch application, which demonstrates the previously formulated concepts as illustrated in Figure 2. This process involved creating key digital assets, such as woven motif sprites and fashion model backdrops, and engineering Scratch scripts to facilitate interactive design manipulation. The researchers prioritized an intuitive interface to ensure effective utilization by designers without programming expertise.

The prototype was developed iteratively through a series of design, testing, and refinement cycles. During this stage, the functionality of each interactive feature was evaluated to ensure that users could easily modify garment elements, experiment with motif placements, and visualize different design combinations in real time. Continuous revisions were conducted based on feedback from fashion practitioners and design experts, enabling the improvement of navigation flow, visual consistency, and overall user experience.

Special attention was also given to the representation of Wedani woven motifs within the digital environment. Traditional patterns were carefully digitized and integrated into the Scratch platform while preserving their distinctive visual characteristics. This approach allowed users to explore various motif applications on deluxe ready-to-wear dress designs without compromising the cultural identity of the original woven textiles. As a result, the prototype served not only as a design tool but also as a medium for promoting local textile heritage.

To ensure the practicality of the application, usability considerations were incorporated throughout the development process. Features such as drag-and-drop controls, simple navigation buttons, and immediate visual feedback were included to reduce the learning curve for users. By leveraging the accessibility and flexibility of the Scratch platform, the prototype demonstrated how digital technologies can support creative fashion design processes, particularly for designers seeking innovative ways to adapt traditional woven fabrics into contemporary ready-to-wear products.

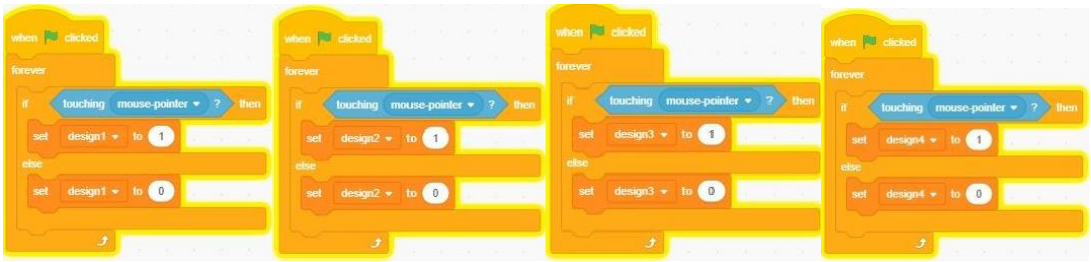


(a) **(b)** **(c)**

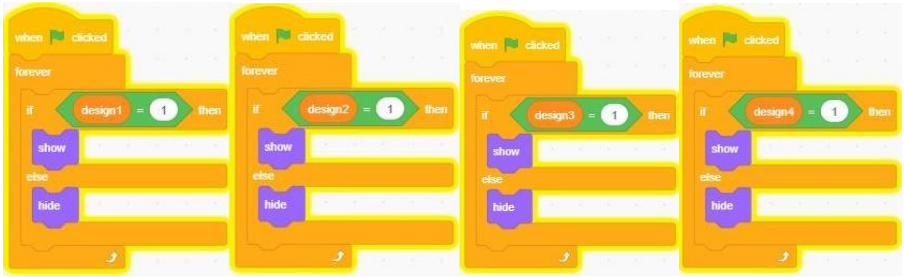
(d) **(e)**

Figure 2. (a) Main menu; (b) the 'noura' prototype; (c) the 'lumiere' prototype; (d) the 'avalon' prototype; (e) the 'safira' prototype

(a) **(b)** **(c)** **(d)**



(e) **(f)** **(g)** **(h)**



(i) **(j)** **(k)** **(l)**

Figure 3 (a) Coding for 'noura' dress according to the model; (b) coding for 'lumiere' dress according to de model; (c) coding for 'avalon' dress according to de model; (d) coding for 'safira' dress according to de model; (e) coding for 'noura' wedani woven motif; (f) coding for 'lumiere' wedani woven motif; (g) coding for 'avalon' wedani woven motif; (h) coding for 'safira' wedani woven motif; (i) coding for 'noura' dress price; (j) coding for 'lumiere' dress price; (k) coding for 'avalon' dress price; (l) coding for 'safira' dress price.

In the development stage, the entire conceptual design is realized into a real product. Researchers technically translated the design results into a functional " Ready-to-Wear Deluxe Wedani Woven Dresses " e-catalogue prototype as shown in Figure 2. The whole process of coding as shown in figure 3 and building this prototype was done using the Scratch visual programming application.

2.4 Phase of Implementation

The implementation phase involved testing a Scratch prototype. Utilizing the Scratch application developed to design and visualize the Wedani woven dress. This phase aimed to gather direct feedback on the tool's usability, ease of use, and relevance to established design practices. The tool provided a modular framework where users could interactively design a Wedani woven dress. Based on the application's underlying code, users could select discrete design elements and instantly visualize their combination on a virtual model. The primary task for participants was to use this system to construct one or more complete dress concepts, mirroring the final prototypes such as the 'Noura', 'Lumiere', or 'Avalon' models.

2.5 Phase of Evaluation

This research adopts the ADDIE (Analysis, Design, Development, Implementation, Evaluation) (Rusdi et al., 2022). The evaluation phase continuously measures the effectiveness and efficiency of the proposed approach. Drawing from the feedback gathered during implementation, the researchers analyze the extent to which Scratch integration achieves the stated research objectives (Fagerlund, 2021). Efficiency is measured by examining the Scratch-based workflow in comparison to traditional design methods. Based on these findings, the Design phase establishes a conceptual framework and visualization model, defining how Scratch's features and event-driven scripts can represent modular design components like motifs and silhouettes. The Development phase, during which researcher construct a functional digital prototype in Scratch, creating visual assets and engineering the interactive scripts. Once developed, the prototype advances to the Implementation phase, efficiency of the Scratch-based approach and validate its contribution to the fashion design process.

The analysis investigates whether the application accelerates the ideation-to-visualization cycle, thereby reducing the time and material costs associated with creating initial physical samples. Designers need to find innovative ways to maintain cultural essence. The ability of the tool to generate a virtual catalog of distinct, priced, ready-to-wear concepts serves as a key indicator of its potential to improve commercial efficiency. Furthermore, the evaluation critically examines the tool's accessibility, gauging its ease of use for designers who may not possess advanced programming skills.

3. Finding

This research yielded several key findings derived from a thematic analysis of in-depth interviews with industry experts, design practitioners, and academics, as well as from the development of a functional prototype using the Scratch application.

First, significant challenges were identified in the conventional design process for Wedani woven dresses in the deluxe ready-to-wear segment. Participants consistently highlighted three main constraints: (1) the high financial and material costs of creating physical prototypes, (2) a slow design cycle due to reliance on fabric samples, and (3) difficulty in accurately visualizing and communicating design ideas before the production stage. This confirms an urgent need for process innovation to enhance efficiency.

Second, there is a positive yet critical perception regarding the adoption of digital technology in traditional fashion design. Participants from all three groups acknowledged the potential of technology to accelerate processes and reach a wider market. However, significant concerns emerged about the risk of losing the "soul" or cultural essence of the woven fabric if the digitalization process is not handled carefully. This finding underscores the importance of digital tools that are not only technically efficient but also culturally sensitive.

Third, the Scratch application proved its feasibility as an accessible visual prototyping tool. The prototype developed in this study demonstrated Scratch's capability to facilitate a modular design process. Designers could interactively combine various fashion elements (such as bodices, skirts, and sleeves) with diverse woven motifs that had been converted into digital assets (sprites). Participants from practitioner and academic circles specifically highlighted Scratch's intuitive interface as a key advantage, as it allows for design exploration without requiring deep programming expertise.

Fourth, the success criteria for utilizing a digital tool in this context are measured not only by efficiency but also by its ability to enhance product value and competitiveness. According to industry experts, the primary measures of success are the reduction in time-to-market and the decrease in material waste. Furthermore, technology integration is seen as a pathway to strengthen the narrative and transparency of woven products in the global market, which increasingly values ethical and authentic production.

Adapting Game Development Principles for Fashion Prototyping**.** To fully understand the potential of Scratch in fashion design innovation, an analysis of its original domain educational game development is essential. The fundamental principles that make Scratch an effective pedagogical tool in game design present a strong functional analogy to the needs of the contemporary fashion prototyping process. Game development in Scratch centers on the concept of modularity, where each visual element functions as an independent object called a Sprite. This framework can be directly translated to the fashion design process; each component, such as a bodice, sleeve, skirt, and woven motif detail, is treated as an individual Sprite. This modular approach empowers designers to dynamically deconstruct and reconstruct designs, much like a game developer combines existing assets to efficiently create new variations.

Furthermore, the primary appeal of a game lies in its interactivity, which gives the player agency to experiment within a low-risk environment. Scratch translates this principle into the fashion design workflow. By using event-based code blocks like *when this sprite clicked*, designers transform a static digital canvas into an interactive design "playground." They can "play" their prototypes, trying out limitless combinations in real-time to find the most harmonious visual composition. This experimental environment fundamentally addresses a key challenge in using Wedani woven fabric: the high cost of physical prototypes and the significant risk of fabric waste. Before a single thread is cut, a designer can perform dozens of virtual iterations to validate a concept.

Finally, game development relies heavily on a rapid iteration cycle to test mechanics and gameplay flow, an area where Scratch excels by providing instant visual feedback. In the context of designing a woven dress, this capability is invaluable. A designer does not need to wait for days to see the visual result of an idea. Changes to the scale, position, or combination of motifs can be evaluated in seconds, effectively accelerating the otherwise slow design cycle. The utilization of Scratch, therefore, transcends the mere use of a digital drawing tool; it is a paradigm shift towards the gamification of the creative process. By adopting the principles of modularity, interactivity, and rapid iteration from the world of game development as validated through interviews with industry experts, practitioners, and academics designers can overcome traditional barriers and strengthen the competitiveness of cultural heritage on the global fashion stage.

This approach reframes Scratch not as an overly simplistic tool, but as a strategic low-fidelity prototyping platform. Its value lies not in its ability to produce photorealistic 3D renders, but in its function as a conceptual "sandbox" that facilitates quick and inexpensive decision-making at the ideation stage. In doing so, it directly lowers the financial threshold for experimentation, encourages greater creative risk-taking, and ultimately, opens up more space for innovation in the adaptation of traditional textiles. Analyzed the qualitative data from interviews and

observations using thematic analysis. This process involved data familiarization, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and writing the thematic report. This approach allowed to identify key patterns, concepts, and perspectives emerging from the participant data, providing a deep understanding of the utilization of Scratch in the context of developing a deluxe ready-to-wear Wedani woven dress.

To ensure a comprehensive analysis, nine respondents from three key stakeholder groups were interviewed. These groups comprised fashion industry experts, fashion design practitioners, and academics in the field of design and technology. Their backgrounds are summarized in the following table:

Tabel 1. Respondent Backgrounds

No.	Respondent's initials	Professional Positions & Affiliations	Relevant Work Experience	Participant Category
1.	RK	Creative Director, Luxury Fashion Brand	20 years in premium product development based on traditional textiles (wastra).	Fashion Industry Expert
2.	AD	Designer & Founder, Independent Brand	8 years designing and producing deluxe RTW collections with woven fabrics.	Fashion Design Practitioner
3.	NW	Associate Professor & Researcher, Fashion Design & Technology	12 years researching and teaching computational design, smart textiles, and digitalization.	Academic
4.	FM	Production Manager, Garment Export Company	15 years in supply chain management and quality control for the mass production of premium ethnic garments.	Fashion Industry Expert
5.	LS	Junior Designer, Fashion House	4 years in concept development and digital illustration for woven textile-based collections.	Fashion Design Practitioner
6.	BP	Professor, Informatics & Human-Computer Interaction (HCI)	18 years researching human-computer interaction (HCI) for the preservation and transformation of cultural crafts.	Academic
7.	ST	Retail Consultant & Merchandiser, High-End Boutique	25 years analyzing market trends and the commercial viability of ethnic fashion products.	Fashion Industry Expert
8.	DI	Pattern Maker & Prototype Specialist	10 years translating designer sketches into precision patterns for woven fabrics.	Fashion Design Practitioner
9.	ME	Senior Lecturer, Cultural & Fashion Studies	15 years researching fashion semiotics and cultural sustainability.	Academic

3.1 Thematic Analysis of Interview Results

Qualitative data from the interviews was analyzed using a thematic analysis approach to identify key patterns and concepts. This process yielded several key themes directly linked to the challenges and opportunities in the development of the deluxe ready-to-wear Wedani woven dress. The first theme concerned the preservation of cultural authenticity within a contemporary fashion context. Participants emphasized the importance of maintaining the distinctive visual identity, traditional weaving techniques, and symbolic meanings embedded in Wedani woven textiles. At the same time, they acknowledged the necessity of adapting traditional motifs and garment silhouettes to meet the preferences of modern consumers. This finding highlights the delicate balance between cultural preservation and product innovation, which is essential for ensuring both heritage sustainability and market relevance.

The second theme focused on product design and market competitiveness. Interviewees identified several factors influencing consumer acceptance, including garment comfort, functionality, aesthetic appeal, and perceived exclusivity. The transformation of traditional woven fabric into a deluxe ready-to-wear dress was viewed as a promising strategy to expand market reach beyond conventional users of woven textiles. Furthermore, participants noted that contemporary styling, high-quality finishing, and attention to current fashion trends could enhance the

product's value proposition and strengthen its competitive position in the premium fashion segment.

The third theme related to production challenges and business opportunities. Participants highlighted constraints such as limited production capacity, the time-intensive weaving process, and the need for skilled artisans to maintain product quality. Despite these challenges, the growing consumer interest in sustainable fashion, locally produced goods, and culturally inspired designs was identified as a significant opportunity. The findings suggest that strategic collaboration among designers, weavers, and fashion entrepreneurs can support the commercialization of Wedani woven products while simultaneously contributing to the economic empowerment of local weaving communities and the preservation of traditional textile heritage.

Tabel 2. Thematic Analysis of Interview Results

Interview Questions	Respondents' Answers	Emerging Themes (Analysis Codes)
1. How would you describe the current design process for Wedani woven dresses for the deluxe ready-to-wear segment?	RK (Expert): "The process is long and expensive." AD (Practitioner): "It's very dependent on the 'feel' of the fabric. I have to hold the fabric first before I can sketch." DI (Practitioner): "The challenge lies in placing the pattern onto the woven motifs, which are not always symmetrical."	Linear & Expensive Design Process: Reliance on physical samples, slow design cycles. Tactile Dependency: The importance of the physical touch of the fabric. Materiality Challenges: Difficulty in pattern placement.
2. What are the main challenges you face in efficiently prototyping and visualizing Wedani woven designs?	FM (Expert): "The cost of a single dress prototype can be very high. A small mistake means a huge loss." LS (Practitioner): "It's difficult to communicate a 3D visualization of how the stiff woven fabric drapes to superiors or buyers with just a 2D sketch. They can't imagine it." NW (Academic): "An accurate digital representation of the texture, sheen, and stiffness of the woven fabric is a technical challenge. Existing fashion design software is often generic."	High Prototyping Costs: Financial risks in creating physical samples. Visualization Gap: Difficulty in translating 2D designs into 3D understanding. Low Digital Fidelity: Software limitations in replicating the unique characteristics of traditional textiles.
3. In your opinion, how can digital technology support or hinder the creative process in traditional fashion design?	BP (Academic): "Technology can be a tremendous accelerator if used as an exploration tool, not merely a documentation tool. However, it can become a hindrance if designers get too fixated on digital templates." ME (Academic): "The support lies in the democratization of design. The hindrance is the risk of commodification and the loss of 'soul' if the process is oversimplified." RK (Expert): "It supports efficiency and presentation to the global market."	Acceleration vs. Intuition: The potential to accelerate design exploration versus the risk of losing intuitive touch. Democratization vs. Commodification: Opening up design access versus the risk of losing cultural value and narrative. Efficiency vs. Alienation: Increased speed versus the potential for disconnection from artisans.
4. How might the potential of the Scratch application, known for its use in game development, be relevant in the context of fashion design, particularly for woven textiles?	NW (Academic): "The drag-and-drop logic in Scratch has great potential for quickly mixing-and-matching motifs and silhouettes. It's a form of rapid visual prototyping without the need for complex coding skills." LS (Practitioner): "I can imagine using it to create simple simulations of design and motif placement on a model." BP (Academic): "Scratch teaches computational thinking. In fashion, this can be translated into systematic thinking in combining design elements (code blocks as fashion elements), which is highly relevant for ready-to- wear	Rapid Visual Prototyping: Ease of simulation and visual exploration. Accessibility & Ease of Use: Does not require high technical skills, making it suitable for designers. Systematic Thinking: Encourages a modular and logical approach to collection development.

	collections."	

Interview Questions	Respondents' Answer	Emerging Themes (Analysis Codes)
5. What success criteria would you expect from the utilization of a digital design tool for Wedani woven products?	ST (Expert): "Success is measured by market response. Can the digital visualization convince buyers and generate sales? Does it shorten the time from idea to market?" AD (Practitioner): "If the tool can reduce fabric waste by just 20% because of better cutting simulations, that's already a huge success for me." ME (Academic): "Success is when the technology doesn't just imitate, but assists, while still authentically telling its cultural story."	Market Validation & Time Efficiency: Increased sales and a reduction in time-to-market. Sustainability & Design Efficiency: Reduction of material waste and an increased volume of design exploration. Innovation & Cultural Authenticity: Fostering new creativity while maintaining the integrity of cultural heritage.
6. Could you provide a concrete example of how technology integration can enhance the value and competitiveness of woven products in the global market?	RK (Expert): "Imagine a virtual try-on where a customer in Europe can see how a Wedani woven dress drapes on their avatar." BP (Academic): "Through blockchain, we could track the origin of every thread, the artisan's name, and the story behind the motif." FM (Expert): "On-demand manufacturing. The customer chooses a combination of motifs and silhouettes digitally, then the data is sent to a precision laser cutter and sewn. It fulfills the desire for personalization."	Personalization & Immersive Experiences: Technologies like virtual try-on and AR. Transparency & Traceability: The use of blockchain to guarantee authenticity. Mass Customization & Smart Manufacturing: Efficient on-demand production.

Overall, the thematic analysis of these interviews, when placed in dialogue with high-impact academic literature, indicates that the utilization of an application like Scratch is not about replacing the designer's expertise, but rather empowering it. It offers an accessible platform to address the challenges of efficiency and visualization, while paving the way for deeper technological integration to enhance the value, competitiveness, and sustainability of Wedani woven products in the global market.

4. Conclusion

This research concludes that the Scratch application is a valid and effective tool for addressing the fundamental challenges in the prototyping stage of developing deluxe ready-to-wear Wedani woven dresses. The utilization of this platform as a visual prototyping tool directly addresses the industry's problems related to high costs and slow design cycles. By providing an accessible medium for designers to experiment with design compositions virtually, Scratch significantly accelerates the creative exploration phase and mitigates material waste. Furthermore, this method enhances the fidelity of communicating the design vision between designers, production teams, and other stakeholders before a significant investment is made in physical samples.This integration of accessible technology does not diminish the esteemed value of the woven fabric but rather strengthens its relevance by providing an efficient pathway for innovation. Therefore, the adoption of digital tools like Scratch in professional design practices and educational curricula can boost the competitiveness of cultural heritage products in the contemporary fashion landscape.

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Conflict of Interest

The authors declare no conflicts of interest.

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