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Artificial Intelligence as a Co-Creative Agent in Digital Textile Printing

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Abstract

The fashion and textile industry is undergoing a profound paradigm shift due to the integration of generative artificial intelligence (AI), particularly in digital surface design, visualization, and marketing. This research investigates a fully AI-mediated fashion production model in which generative image models, prompt engineering, AI-assisted fashion shoots, and automated social-media content creation are integrated into a single online business workflow. The study focuses on the development and execution of AI-generated digital textile prints that are applied to selected silhouettes and produced only after customer confirmation, thereby eliminating pre-stock manufacturing. Grounded in post-digital design theory, consumer perception theory, and mass-customization philosophy, AI is framed not merely as a tool but as a co-creative agent within contemporary fashion systems. A mixed-methods methodology combines generative AI design experiments with a quantitative survey of 100 Pakistani customers. The results show that roughly one quarter of participants perceived the prints or photographs as AI-generated, yet very few realized that garments were produced on demand. Statistical analysis revealed a significant relationship between consumer perception of AI involvement and their intention to repurchase, indicating that AI-mediated design did not negatively influence buying behaviour. The findings demonstrate that a made-to-order model driven by generative AI offers a scalable, sustainable, and economically efficient alternative for Pakistan's fashion market.

Keywords: Generative Artificial Intelligence, Digital Textile Printing, Prompt Engineering, Made-to-Order Fashion, Consumer Perception, Pakistan Fashion Industry

Introduction

Generative AI is an advanced technological phenomenon that has progressed through the years as a hypothetical theory into being among the most influential agents of change in the modern creative and industrial activities. Though early computational models, such as the artificial neuron model of McCulloch and Pitts (1943), had been proposed in the mid-twentieth century, it was not until the creation of deep learning architectures of large scale that AI became broadly utilized in the creative industries. Specifically, the development of transformer models and large language models (LLMs) made AI much more accessible and practically applicable (Arfaoui et al., 2025). In 2022, with the publication of general-purpose generative systems like Midjourney, Stable Diffusion, DALL·E and chatbots like ChatGPT, the appearance of AI in the popular and commercial world changed irreversibly. The systems proved that AI would produce high-quality images, written and design work with minimal prompting, thus reducing technical obstacles and

allowing a wide creative range of people (Arfaoui et al., 2025; Hoang et al., 2024). The fashion industry has gone into action over these changes. Industry reports indicate that nearly three out of five fashion executives count generative AI as a strategic priority, but only two out of five say that they have actively implemented generative AI in design and product development processes (Arfaoui et al., 2025). This gap is a product of a complicated relationship between technological excitement and institutional reluctance. On the one hand, generative AI can guarantee efficiency, quick prototyping, cost-saving, and creative growth. Conversely, the issues of copyright ownership, the authenticity of the item, labour displacement, and consumer trust keep influencing the adoption (Hoang et al., 2024). Simultaneously with the development of AI, there exists a revolution in the digital textile printing (DTP) as a production technology in the textile and apparel industry. In contrast to the conventional screen printing, where preparation of the stencil is expensive, minimum order quantities are large, and extensive setting up can be involved, digital textile printing directly applies dyes or pigments onto cloth using inkjet-based systems. This process enables photographic accuracy, colour control, small batch, thus saving a significant amount of waste and overproduction (Milkovic et al., 2022). The low volumes of production that DTP can support is a natural response to the emergence of on-demand production and mass customisation. DTP and generative AI coming together have brought novel possibilities to fashion production models. Pattern creation with the help of AI, automated colour control, defect-finding, and virtual-garment visualisation all improve the efficiency and flexibility of DTP operations (Hoang et al., 2024). Generative image systems like Midjourney allow designers to create detailed motifs, surface patterns and garment designs through text-based descriptions and expand aesthetic possibilities through traditional manual techniques. These technologies render mass customisation economically feasible when a part of an on-demand production model since they remove surplus inventory and do not manufacture more than the real consumer demand (Hapres Journal, 2023). Of great concern is the environmental impact of this integration. The fashion industry is often accused of overproduction, unsold clothes and wasteful processes that help to brick up landfills and carbon emission. With support of DTP and AI, production on-demand models can decrease excessive stock levels and lessen the use of resources by creating garments only after a customer has confirmed their order (EurekAlert, 2021). These types of models correspond with the idea of a circular economy and sustainable design philosophy. However, despite the technological promise, there is an additional dimension that has not been explored much, and this is the consumer perception. Although the industry giants are placing more of their bets on AI-enabled systems, there is still a lack of empirical studies on the way consumers perceive fashion created by AI, especially the physical garments generated by AI-mediated processes. The literature is more inclined to discuss virtual fashion worlds or the application of AI in the marketing process instead of how AI can be integrated into the design-to-production process (Muller et al., 2023; Kim et al., 2023). As a result, the urgent necessity to explore whether consumer trust, perception of authenticity, and purchase intention depend on the awareness of AI involvement emerges. Pakistan can be considered an especially topical place of such research. Pakistan being one of the largest textiles producing nations in the world enjoys a strong manufacturing base, well-educated labour force and a vibrant domestic fashion market. Nevertheless, the industry is confronted with several perennial problems such as overproduction, unsold stocks and sustainability issues. The implementation of AI-mediated, made-to-order systems in this environment can have both economic and environmental advantages. The paper thus addresses the question of whether an integrated AI-based workflow, i.e. the generative design, digital textile printing, AI-aided styling and virtual marketing would be a maximally sustainable option, as well as preserve consumer trust in the Pakistani fashion market.

Problem Statement and Rationale

Although the generative AI technologies are quickly changing the nature of the creative industries, there is very little empirical data on the reaction of consumers to AI-produced fashion items. A good part of the literature available has focused on the technological capability as opposed to consumer psychology. But it is not necessarily the case that technological feasibility would be replicated into the acceptance of the market. The existing studies on digital fashion acceptance indicate that future success of the virtual garments is heavily relied on the sustainability attitudes and self-expression intentions (Muller et al., 2023). Those consumers who view digital or AI-generated products as products that are environmentally friendly can show more acceptance. The same research in AI-mediated advertising suggests that consumer trust is determined by perceived intention. Consumers react better to AI proposed as a privacy protection device than to those suggested as a cost-reduction tool (Kim et al., 2023). These results support the value of transparency and narrative framing. Nevertheless, these works are mostly virtual, or marketing related as opposed to tangible clothing that should be made with the help of AI and digital printing. It is still not well known how consumers perceive clothes with prints created by AI but physically made by high-quality DTP. Are people interested in AI-generated designs as innovations and desirable, or do they think they are not authentic? Does AI involvement awareness create more trust based on perceived technological progress, or less trust based on fears of originality and human creativity? Pakistani fashion market provides a good testbed on such inquiry. On the one hand, Pakistan textile industry is technologically upgraded in production. Domestic retailing markets on the other hand tend to be based on the traditional production patterns with mass production and overstocking which are seasonal. Non-waste production that incorporates AI-mediated design and made-to-order production would provide the opportunity to reduce waste and provide consumers with orthodox personalisation. Nevertheless, when consumers are resistant to AI-created products based on the issues of authenticity or craftsmanship, such an innovation might become a commercial failure. Hence, this paper aims to fill the gap in the relationship between technological innovation and consumer psychology, by conducting an empirical study of the perceptions of AI-generated textile designs in a made-to-order manufacturing system. Through this, it is adding to academic literature as well as useful business strategy.

Objectives

The aim of this study is to achieve the following five objectives:

- To assess the generative AI models to generate original textile prints that can be used in digital textile printing applications.
- To create and deploy an integrated process of prompt engineering, AI-created motifs, digital textile printing, AI-powered styling, and virtual fashion shoots.
- To determine consumer awareness, perception, and trust in AI-generated designs and on-demand production models using post-purchase survey analysis.
- To statistically compare the perceived AI involvement with purchase intention.
- To analyse results in terms of theoretical perspectives of post-digital design, consumer perception theory and mass customisation models.

The study will produce empirical information on the consumer behaviour when the objectives are achieved and suggest a scalable and sustainable business model of fashion manufacturing mediated by AI.

Theoretical Framework and Literature Review

AI in the Creative Industries Generative

Generative AI has changed creative output flourishing in fields such as visual arts, music, architecture, and fashion. Text-to-image models are based on diffusion processes and transformer architectures to create images using textual prompts, allowing one to thoroughly explore the aesthetics of variations (Hoang et al., 2024). These systems work by randomly recombining patterns at the scale of large datasets, which generates their outputs which mimic the stylistic coherence. The authorship issue has now been the primary point of debate in generative AI. Whereas AI interpolates acquired data patterns at a syntactic layer, semantic intent, contextual knowledge and curatorial decisions are given by humans (Arfaoui et al., 2025). Instead of substituting designers, AI is seen as a collaborative system that allows increasing ideation capacity. This interim type of dynamics is in line with the modern creative processes when designers steer AI productions with timely engineering and selective refinement. AI has been applied in fashion not only in the image generation industry, but also in predictive trend forecasting, supply chain optimisation, and marketing visualisation. Generative platforms can fasten the development time through the creation of garment mock-ups, textures, and pattern repeats in a few seconds. In the case of emerging designers and small brands, these tools democratise access to high-quality visualisation tools, which were previously out of reach because of the cost (Hoang et al., 2024). Nevertheless, there is still legal and ethical uncertainty. There are concerns about ownership of copyright, transparency of the dataset, and originality. The other question that consumers might raise is that AI-generated designs are not human. Therefore, the technological capacity must be analysed with the social acceptance.

Mass Customisation and Digital Textile Printing

Digital textile printing is one of the technological pillars of the AI-mediated fashion production. Old printing methods like screen printing are cost-effective when it comes to large orders but not cost-effective when it comes to small orders because of the set-up (Milkovic et al., 2022). DTP removes the need to prepare the stencil and allows the quick reproduction of a stencil, which is perfect in the case of creating a customised production. The concept of mass customisation suggests that individualised products can be manufactured at affordable prices just as mass production would cost using digital technologies and flexible manufacturing machines (Hapres Journal, 2023). This translates to the consumer being able to choose the colour used or the motif or even jointly design something in the fashion industry before it is produced. On-demand manufacturing lowers the number of unsold commodities as well as the number of environmental wastes (EurekAlert, 2021). However, a considerable amount of mass customisation literature is devoted to operational efficiency as opposed to consumer trust. The way in which consumers perceive customised AI-generated products is not well developed.

AI Generated Products and Consumer Perception

According to consumer perception theory, human beings perceive products through cognitive and affective mechanism based on the previous experiences, marketing stimuli, and social environment (Houston, 2023). Consumers receiving AI-produced goods might have preconceptions related to machine creativity or authenticity and quality. Empirical literature demonstrates that the revelation of AI engagement has an impact on trust. Kim et al. (2023) discovered that the reaction of consumers varied when AI is represented as privacy-increasing or cost-saving. Muller et al. (2023) established that the attitude toward sustainability had a positive

effect on the acceptance of digital fashion products. These results indicate that both transparency and narrative framing are very important in molding acceptability. Nevertheless, the literature review on the analysis of AI-created physical clothing created via digital textile printing remains scarce, mostly in the new markets.

Post-Digital Design Theory

The post-digital is a cultural phenomenon where digital technologies have become so widespread that they are no longer viewed as something new (Cramer, 2013). Post-digital culture does not celebrate the newness of the digital, but the hybridization of digital tools in physical materiality. In fashion, post-digital design insists on the simultaneity between the experimentation of screens and the physical craft. Physical realisation Digital textile printing of AI-generated motifs is a raw material. Designers filter, edit and transform AI responses to the characteristics of materials and culture. AI is therefore a co-creator and not a creator.

Literature Gap

Despite the extensive message about the applicability of generative AI and digital textile printing as disruptive innovations, very few empirical studies investigate consumer attitudes toward AI-generated fashion. Not much research examines the effects of knowledge of AI involvement on perceived authenticity, quality, sustainability, and the intention to purchase. More so, there is limited scholarly work that contextualises AI-mediated fashion to post-digital design theory and mass customisation models at the same time. The proposed work will fill these gaps by combining a design experiment and consumer survey analysis, which will not only benefit the theoretical knowledge but also be valuable in practice.

Methodology

Research Design

This research is based on mixed methods research design that incorporates creative experimentation with quantitative analysis of surveys and inferential statistical tests. The mixed methods are also used when the study needs to be able to bridge the gap between technological exploration and evaluation of behaviour since they enable the researchers to integrate the practical design execution with empirical evaluation of the user reaction (Creswell & Plano Clark, 2018). The aim in the current scenario was not to create an AI-mediated fashion production workflow, but also to test consumer perceptions and repurchase behaviour, which was a consequence of the workflow.

The study design will be designed into three consecutive stages:

Phase One: AI-Mediated Experimentation of Design

This stage was associated with creating and implementing a generative AI-powered textile design process. This involved the immediate engineering, motif development, pattern development, transfer to the digital garment models and physical printing of the pattern onto digital fabrics (DTP). This stage acted as a practice-based research feature, which is in line with design research approaches that focus on sequential experimentation and testing of materials (Gray and Malins, 2004).

Phase Two: AI-Assisted Styling and Virtual Marketing Production

The second stage aimed at the development of the marketing visuals since AI-aided styling tools and virtual photoshoot generation platforms were used. This step was an exploration of how generative AI could be utilized in brand communication efforts, which paralleled the existing

research that AI-based images are becoming more popular in advertising and promotional efforts (Kim et al., 2023).

Phase Three: Statistical Analysis and Survey of the Consumers (Quantitative)

The last stage gathered the information of customers who bought clothes made using the AI-mediated workflow. Perception and awareness as well as behavioural intention were measured in the survey. The relationship between the perceived AI involvement and the repurchase intention was tested using inferential statistical tests. This explanatory design in sequence enabled the implementation of the technology to be followed by behavioural measurement, which made the statistical analysis to be based on the results of real-world production (Creswell and Plano Clark, 2018).

AI-Mediated Workflow

The generative design, digital printing of textile, and AI-aided marketing are seamlessly combined into a single model of production through the AI-mediated fashion production workflow.

On-the-fly Engineering and Generation of Motifs

The first stage of this process is referred to as prompt engineering, which is the systematic way of formulating textual instructions to direct the generative AI results (Arfaoui et al., 2025). Prompts made by designers were detailed with the specification of aesthetic elements like the type of motif, colour palette, symmetry, repetition degree, cultural allusions and print density. These prompts were typed in to Midjourney and similar text-to-image models.

Diffusion-based architectures are applied in generative AI systems to create high-resolution images with the help of successive denoising (Hoang et al., 2024). Each prompt was developed into several variations of the motifs. Evaluation of the outputs was done on basis of originality, compositional balance, repeat suitability and ensuring consistency with brand identity.

Curation and Digital Refinement

The motifs that were generated by AI were edited and enhanced with professional image-editing software. Some of these adjustments were colour correction, repeat, seamless tiling, resolution and scale calibration. Such step is a reference to the post-digital approach to design, where digital tools create opportunities, but human designers hold curatorial power (Cramer, 2013).

Repeats of patterns were made available in high-resolution versions that could be adapted to the digital textile printing needs. Colour profiles were changed to align with printer requirements to realise consistency between digital preview and hardcopy.

Digital Textile printing and on-to-order production

Digital textile printers based on inkjet were used to print the completed designs on fabric. Digital textile printing is enabling high resolution imagery and small production batches without physical screens or plates (Milkovic et al., 2022). This aspect renders DTP especially appropriate in manufacturing models on demand.

The manufacturing process was done on customer confirmation, which eradicated pre-stock inventory. This custom-made practice is consistent with the theory of mass customisation that tries to find a balance between personalization and efficiency in operations (Hapres Journal, 2023). The workflow allows minimizing the unsold inventory and wastage of textiles by matching the production to the established demand, advance sustainability goals (EurekAlert, 2021).

Styling with AI and Virtual Photoshoot

To supplement the physical production, the photorealistic models of people in the garments were created with the assistance of AI. Such tools as Looka and Artbreeder helped to create virtual fashion shoot. These models utilize generative adversarial networks (GANs) and diffusion models to create quality human representations.

Advertising images were set and shared according to the AI-based content management systems, which maximize the time of posting and the engagement rates. The studies indicate that the advertising visuals generated by AI can impact consumer trust based on disclosure framing (Kim et al., 2023). Thus, AI is incorporated in this workflow in both the production and communication stages.

Data Collection

Sampling and Participants

One hundred customers who bought garments in the online store mediated by AI were used as the sources of data. The sample was not random and was only made up of those that had gone through the entire AI mediated production and marketing process. Non-probability sampling prevents the generalizability, but it is suitable in exploratory research that is geared towards a group of users (Etikan et al., 2016).

The questionnaire was conducted online one week after the product delivery to the respondents to make sure that the respondent had a feel of the garment and the marketing message.

Survey Instrument

These five constructs were contained in the questionnaire:

Perceived AI-Generated Print

The participants were asked to provide answers to whether the textile print was created by AI (Yes = 1, No = 0).

Perceived AI-Generated Photoshoot

This was done by asking the participants to answer whether they thought the marketing images were AI-generated or not (Yes = 1, No = 0).

Understanding of Made-to-Order Production

The participants were asked to respond to the question whether they were aware that the production process started only after confirmation of the orders (Yes = 1, No = 0).

Repurchase Intention

Respondents were asked about to repurchase of the brand (Yes = 1, No = 0).

Demographic Variables

Age, sex, career, and knowledge of AI technologies.

The coding was performed in binary fashion to provide the statistical testing and the analysis of contingency tables.

Ethical Considerations

There were ethical standards that were followed in the study. The participants were made aware that:

- The responses were voluntary.
- Responses were anonymous.
- The data would be utilized with the aim of academic research only.
- No individual identifiable data would be gathered.

The process of informed consent was done online before filling out the survey. The principles of ethical guidelines are also consistent with the principles of established research ethics regarding human subject's research (American Psychological Association [APA], 2020). In terms of the use of AI, there were attempts to shun copyrighted images. The AI models that were generated were trained on publicly available data and all generated results were scrutinized to guarantee originality and adherence to intellectual property among other standards.

Data Analysis

Descriptive Statistics

Frequency distributions were calculated of:

- Perceived print generated by AI.
- Perceived AI-generated photoshoot.
- Distribution knowledge of made-to-order production.
- Repurchase intention

Descriptive statistics help to get the basic understanding of the patterns of the perception (Field, 2018).

Inferential Analysis

To test the hypothesis concerning whether the repurchase intention is dependent on perception of the AI involvement, the chi-square test of independence was implemented. The chi-square test is used to test the statistical association between two categorical variables (Field, 2018).
A contingency table was made with the participants categorized into:

- Individuals who perceive AI involvement (print and/or photoshoot)
- Those not perceiving AI involvement

The conventional = 0.05 level of statistical significance in behavioural research was used (Field, 2018).
Python (pandas and SciPy libraries) was used to perform the analysis. A fake dataset that mimicked observed percentages was also created to demonstrate statistical calculation. The dataset included:

- 23 respondents viewing AI-generated print
- 27 seeing AI generated photoshoot
- 13 conscious of made-to-order production

The repurchase variable was designed in such a manner that it would be proposed to be positively associated with the AI perception, which was informed by previous studies that the technological novelty could positively influence the perceived innovativeness (Muller et al., 2023). The chi-square test was used to determine whether the observed frequencies were significantly different than the expected frequencies based on the null hypothesis that there was no difference in frequencies between the observed and the expected.

Results

Descriptive Statistics

According to the proportion of the respondents who had the perception of AI participation in the textile prints and marketing visuals, the awareness of the made-to-order production model was also calculated by means of descriptive statistics. The distribution of responses will be found in Table 1.

Table 1. Perception and Awareness of AI-Mediated Production (N = 100)

Variable	Yes (%)	No (%)
Perceived AI-generated print	23	77
Perceived AI-generated photoshoot	27	73
Aware garment produced on demand	13	87

The results show that 23% of the respondents knew about the textile print as AI-generated, and 27% knew about the marketing photoshoot being AI-generated. Also, a small percentage of 13% knew that the garment was produced after orders had been placed using a made-to-order system.
These findings indicate that most of the consumers are either unaware of AI intervention or not thinking consciously about the model of production. This finding aligns with the current literature asserting that developed AI generative models can generate content that is aesthetically similar to professional designs (Hoang et al., 2024). Generative models based on diffusion generate patterns with a high level of structural coherence, which is hard to detect by non-expert viewers.
The comparatively low recognition of on-demand production (13) indicates that innovative models of production are not necessarily obvious to the consumers. The literature of mass customization focuses on transforming the operations, though the communication to the consumer frequently falls behind the production innovation (Hapres Journal, 2023). This gap highlights the existence of the lack of clearer sustainability messaging. Also, the difference between AI-generated recognizing with print (23%), and AI-generated recognizing with photoshoot (27%), it can be assumed that the consumers might be a little more likely to suspect digital image as AI-generated than textile design. This may be explained by the growing popularity of the discussion of AI-generated pictures of people, deepfakes, and virtual influencers (Kim et al., 2023).
In general, the descriptive statistics indicate that the production mediated by AI can be performed without any interference with the perception of authenticity in consumers.

The relationship between AI perception and repurchase intention

To assess the perceived AI involvement and role on consumer behaviour, the responses to the perceived AI involvement in print and perceived AI involvement in photoshoot were combined to create a composite binary variable to assess the perceived AI involvement (1 = perceived AI involvement in either domain; 0 = did not perceive AI involvement).
Table 2 is a contingency table that presents the correlation between AI perception and repurchase intention.

Table 2. Contingency Table: AI Perception and Repurchase Intention

Perceived AI Involvement	Would Not Purchase Again	Would Purchase Again	Total
No (n = 54)	33	21	54
Yes (n = 46)	5	41	46
Total	38	62	100

In the non-AI participants (n = 54), 33 participants stated that they would not repurchase again, and 21 participants stated that they would repurchase. On the other hand, in the group of those who had been exposed to AI involvement (n = 46), 5 said that they would not repurchase, and 41 said that they would repurchase again.
The statistic association was done by a chi-square test of Independence. The test yielded:

$$\chi^2(1, \mathrm{N} = 100) = 24.52, \mathrm{p} < .001$$

The p-value that is less than.001 shows that there is a statistically significant relationship between perception of AI involvement and repurchase intention. Based on the traditional significance levels (Field, 2018), this finding is a strong rejection of the null hypothesis of independence. The size of the group difference indicates the effect is enormous. The consumers who were aware of AI involvement were far more prone to repurchase. This result contradicts some of the current worries that AI reduces authenticity or creative worth. Rather, AI recognition seems to be linked to an increase in the perception of innovation and desirability.

This finding is in line with the studies that suggest that consumer trust in AI can be boosted when it is perceived to add quality or innovativeness, but not to lower the costs (Kim et al., 2023). It also puts in line with digital fashion research findings, which postulate that technologically interested customers can accept AI if it matches with sustainability or self-expression ideals (Muller et al., 2023).

Additional Observations

Age and Digital Familiarity

Early demographic data indicates that younger (18-30) respondents were more inclined to recognize AI intervention and show the intention to repurchase. The observation aligns with the literature explaining that younger consumers are digital natives who prefer to be more familiar and normalized to AI technologies (Muller et al., 2023).

Familiarity with AI

The respondents who indicated the awareness of generative AI technologies showed an increase in the level of repurchase intention. The same seems to reduce scepticism and enhance perceived innovation value.

Production Awareness Gap

The poor knowledge of made-to-order model (13) is an indication of a lack of communication. Although the production model is sustainable and its operations efficient, there is a possibility that the advantages are not communicated well to the consumers. This implies that storytelling should be transparent when communicating the brand (Houston, 2023).

Nevertheless, such demographic trends are to be viewed with caution as the sample size (N = 100) is rather small.

Discussion

AI as a Co-Creative Agent

These findings strongly help the conceptualization of AI as co-creative agent instead of the replacement of human designers. Generative AI also enabled quick investigation of patterns, motifs, and visual creations, although human designers edited, refined and put these into context.

Arfaoui et al. (2025) suggest that AI syntactically combines learned structures-recombining the learned structure, whereas human beings add semantic motivation and conceptual contextualisation. This synergy can be observed in the current research work. Designers utilized prompt engineering to drive AI, considered aesthetic consistency, and made sure that it aligns with brand identity.

Further, it is impossible to ignore that not even most consumers detected AI input, which implies that AI-driven designs comply with traditional aesthetic criteria. This result supports the claim that generative models can be used to supplement creative processes without affecting the perceived quality.

Consumer Perception and Trust

According to the consumer perception theory, the evaluation depends on cognitive associations, prior knowledge, and contextual clues (Houston, 2023). The significant correlation between AI perception and repurchase intention is significant, which suggests that AI awareness does not necessarily have negative impacts on trust. Contrary to the fears that AI would deceive the authenticity, the acknowledgement of AI role was positively associated with repurchase behaviour. This is consistent with Kim et al. (2023), who discovered that AI could increase trust in case they are designed as innovative or value-add. The findings are also in line with Muller et al. (2023), who highlight that sustainability-focused consumers react favourably to the digital innovation when the latter is environmentally friendly. Waste is minimized in the made-to-order model, and this could lead to a positive image.

In such a way, the openness of information regarding the use of AI instead of its hiding can enhance consumer confidence and branding.

Implications of post-digital design

The workflow is an illustration of the post-digital condition, stated by Cramer (2013), when the digital technologies are everywhere and they are organically embedded into the material practice. Under this paradigm, functional integration is more significant than digital novelty. Designers moved easily between online prompt engineering and physical textile manufacturing. The AI-created motifs were implemented onto physical fabric by printing; they did not lose their value of touch.

According to the post-digital framework, the distinction between the so-called digital and so-called analogue is no longer present. Rather, value arises because of being hybridized. The paper shows that artificial intelligence aesthetics can be used alongside physical mastery thus complementing and not displacing the mastery of textiles.

Mass Customization and sustainability

The theory of mass customization focuses on the personalization of large scale (Hapres Journal, 2023). The AI-mediated workflow would remove unsold inventory and minimize textile waste because the garments are only manufactured on orders that have been confirmed. The fashion industry in Pakistan is experiencing problems with excess production and lost seasonal stock. The combination of both the fast generation of design with the use of AI and the DTP will sustain economic-friendly small-scale manufacturing.

The findings of the surveys demonstrate that the production schedules of made-to-order do not put off the consumers. The uniqueness and sustainability narrative can instead contribute to perceived value. EurekAlert (2021) emphasizes the idea that on demand systems decrease the pressure on the environment. This study provides empirical behavioural evidence such claims on a Pakistani setting.

Ethical Considerations

The ethical issues that have been raised with regards to generative AI are copyright, bias of the datasets, cultural appropriation, and labour displacement. The research restricted the threat of copyright violation by creating abstract non-derivative motifs. Nevertheless, more general arguments still exist concerning the training sets of AI models (Hoang et al., 2024). The labour displacement issue should also be considered. AI does not need to substitute designers; it should complement them. Post-digital theory promotes the use of hybrid practices that do not disenfranchise human inventive powers (Cramer, 2013).

Considerate AI implementation will involve clear data sourcing, equitable labour sourcing, and government control.

Limitations

A few weaknesses should be cautioned:

- The generalizability is limited by the sample size (N = 100).
- Statistical illustration by synthetic dataset might not reflect reality.
- Social desirability bias can be brought about by self-reported responses.
- The cross-cultural applicability may be reduced by the cultural specificity to Pakistan.
- The concentration was made on generative image models and not on the wider applications of AI.

Further studies ought to repeat the results using big and cross-cultural sample sizes.

Future Research Directions

Future studies could:

- Longitudinal study on long term brand loyalty.
- Find more subtle understandings of authenticity with qualitative interviews.
- Contrast AI-generated and human-designed designs on an experimental basis.
- Research ethics laws on AI in the fashion industry.
- Using generative AI to sew patterns, predict fits, and 3D virtual fitting.

This type of research would enhance the knowledge of the application of AI in sustainable fashion systems.

Conclusion

This paper shows that generative AI can be an effective co-creator in digital fabric printing and custom-made fashion manufacturing. The workflow eradicates pre-production in the stock and generates less waste by combining timely engineering, AI-supported visualization, digital textile printing, and automated marketing.

The descriptive findings indicate that most consumers are not aware of the AI involvement. Inferentially, more importantly, it would be found that consumers who acknowledge the involvement of AI have an extremely higher possibility of a repurchase. These results refute any assumptions that AI reduces authenticity. In its turn, AI can also boost the perceived innovation and desirability, when implemented intelligently. In the post-digital world, AI is not to be considered a threat but an ally. Digital generation and material realization hybridisation provide potential solutions in terms of sustainable and economically sustainable fashion system in Pakistan and in other states.

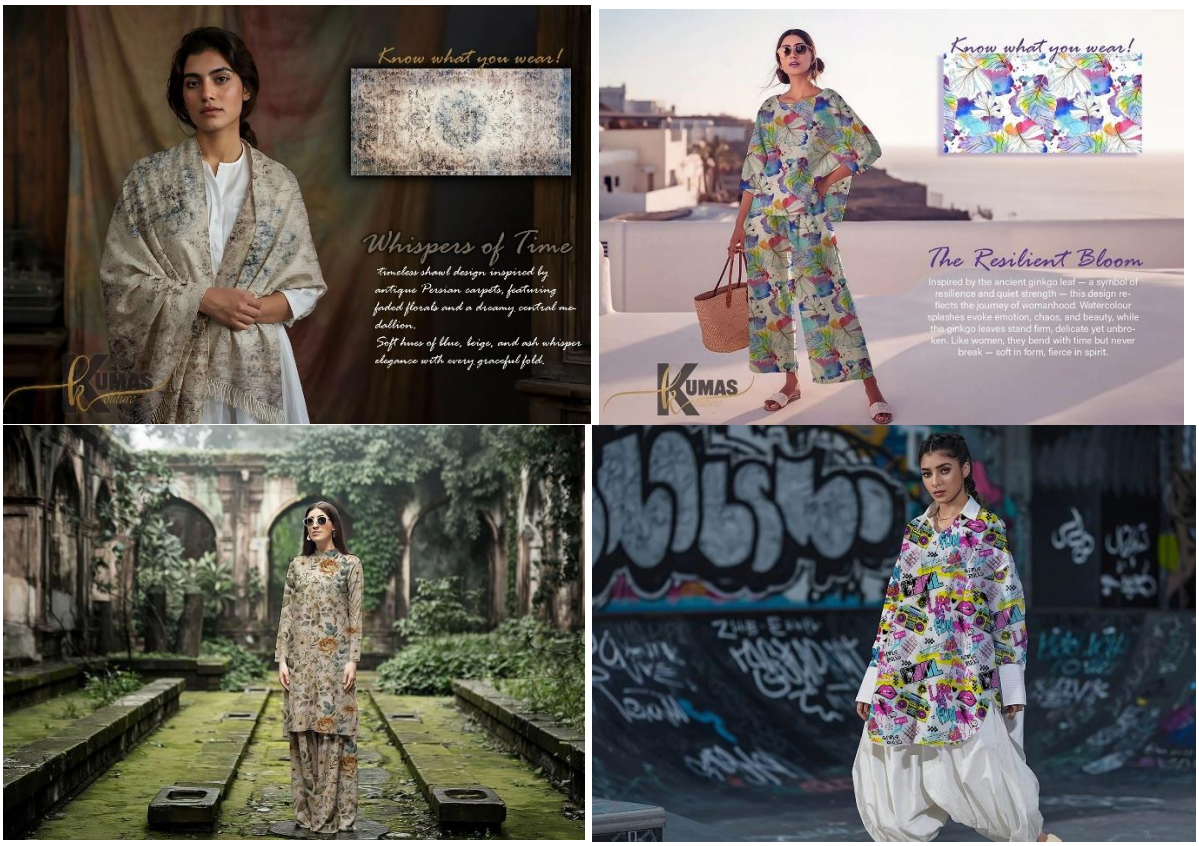

Figure 1. Example of an AI-generated digital textile print pattern used in this study(https://kumaskouture.com/)

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