AI-Aided Gown Making: Humanizing Technology in Fashion Design and Production

Selnamie U. Asoque

Cebu Technological University – Main Campus

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ABSTRACT

The growing integration of Artificial Intelligence (AI) into fashion design and production presents opportunities for greater efficiency, personalization, and innovation; however, limited research has examined how AI can be applied to formal gown making while preserving human creativity, cultural sensitivity, and artisanal craftsmanship, particularly in local fashion contexts. This study aimed to examine the integration of AI-assisted technologies in the design and production of formal gowns and assess their potential to support human-centered fashion practices. A quantitative research approach was employed, with data collected from fashion designers and related stakeholders in Palompon, Leyte, and analyzed using appropriate statistical techniques. Findings indicated that AI-assisted technologies can support design ideation, fabric simulation, fit prediction, personalization, material efficiency, and production processes. Participants also identified concerns related to cultural sensitivity, design authenticity, creative ownership, and the possible reduction of artisanal value. The results suggest that the perceived usefulness and ease of using AI-assisted technologies influence stakeholders' willingness to incorporate these tools into gown-making practices. The study concludes that AI is most valuable when used as a co-creative tool that complements rather than replaces human expertise. The study contributes a context-specific perspective on human–AI collaboration in fashion and provides practical insights for the responsible adoption of AI in gown making and fashion education, with potential benefits for creative innovation, sustainable production, and the preservation of human-centered craftsmanship.

Keywords: Artificial Intelligence, Gown Making, Human–AI Collaboration, Fashion Technology, Sustainable Fashion

INTRODUCTION

The fashion industry is undergoing a significant technological transformation as artificial intelligence (AI), machine learning, generative design, digital simulation, and other intelligent technologies become increasingly integrated into fashion design, product development, manufacturing, and consumer engagement. Globally, AI is moving beyond conventional automation toward applications that directly support creative and design processes, including design ideation, garment generation, personalization, and other stages of fashion development. AI technologies can analyze patterns, generate design alternatives, and support decision-making, demonstrating their growing potential within creative industries (Goodfellow et al., 2016; Russell & Norvig, 2021). In fashion specifically, AI has increasingly been explored as a tool for design and innovation, creating opportunities for designers to expand creative possibilities and experiment with alternative design concepts (Park & Kim, 2020). However, this transformation also presents challenges concerning authorship, creativity, human judgment, and the appropriate role of technology in creative practice. Fashion design remains a creative and iterative process in which designers continuously explore, evaluate, and refine ideas (Schenk & Holman, 2000). Consequently, the global challenge is not simply the adoption of AI but its appropriate integration in ways that improve efficiency and innovation while preserving human creativity and design judgment.

In the Philippines, these global developments are particularly relevant because fashion and other creative activities contribute to the country's broader creative economy and provide opportunities for employment and livelihood. The increasing availability of digital and AI technologies can potentially help Filipino fashion practitioners improve productivity, expand design possibilities, and respond to increasingly individualized

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consumer requirements. Nevertheless, the adoption of such technologies must consider the diverse technological capabilities, resources, and working environments of Filipino designers, particularly those operating outside major urban fashion centers. In this context, technology should be sufficiently useful and easy to operate to encourage actual adoption. Davis (1989) emphasized that perceived usefulness and perceived ease of use are important determinants of technology acceptance, while Venkatesh et al. (2003) further established that users' perceptions of performance, effort, and social conditions influence their intention to adopt technology. Thus, the introduction of AI into Philippine fashion requires not only technological innovation but also consideration of users' needs, capabilities, and acceptance.

At the local level, this concern is particularly relevant to custom and formal gown making in Palompon, Leyte, where gown development is a highly personalized process involving body measurements, proportions, aesthetic preferences, fabric characteristics, fitting, and repeated design modifications. Such activities depend substantially on the knowledge, experience, and creativity of designers and dressmakers. Bye (2010) emphasized the importance of understanding clothing and textile design within its actual practice and user context, while Schenk and Holman (2000) described fashion design as a creative process involving exploration and development of ideas. Although this human-centered process is essential to craftsmanship, it may also require considerable time, repeated adjustments, and material experimentation. Local designers may likewise have limited access to advanced digital design technologies, specialized software, and technical training. Therefore, there is a need to explore an AI-assisted approach that is responsive to the actual requirements and technological conditions of local gown-making practice rather than simply adopting technologies developed for large-scale or highly advanced fashion environments.

The need to conduct the study arises from the limited empirical evidence on the application of AI specifically to customized gown making within a local Philippine setting. Although AI demonstrates potential for design generation and personalization, its effectiveness cannot be established solely through its technical capabilities. The technology must also be evaluated according to whether it performs its intended functions, operates efficiently, is compatible with users' technological environments, is understandable and easy to use, and can be implemented across appropriate settings. These considerations are consistent with the selected software quality characteristics of ISO/IEC 25010:2011, particularly functional suitability, performance efficiency, compatibility, usability, and portability (International Organization for Standardization [ISO], 2011). Usability is likewise important because systems intended for users with varying levels of technical expertise must be understandable, manageable, and responsive to human needs (Nielsen, 1994; Norman, 2013). Accordingly, the present study developed and evaluated an AI-Aided Gown Making Technology designed to assist gown designers through automated design generation, fabric recommendation, and measurement-based customization. The technology was conceived not as a replacement for designers but as a decision-support and co-creative tool that can organize design possibilities, reduce repetitive trial-and-error, and support design decisions while retaining human judgment and creative control.

The output and impact of the study extend beyond the development of a technological prototype. The primary output is an evaluated AI-Aided Gown Making Technology supported by empirical evidence regarding its software quality and user acceptance. The findings can provide a basis for refining the system and identifying functions with potential for further development and technology diffusion, particularly design generation, fabric recommendation, and measurement-based customization. The study can also support training initiatives that develop AI and digital-fashion competencies among local designers and dressmakers and contribute to fashion education by demonstrating how AI can complement rather than replace human creativity and craftsmanship. Furthermore, the findings may provide educational institutions, local government units, industry organizations, and technology developers with evidence for future partnerships, capacity-building programs, and responsible technology adoption. Ultimately, the study seeks to demonstrate that AI can be adapted to strengthen local gown-making practices while preserving human creativity, craftsmanship, and design judgment, thereby contributing to a more efficient, user-centered, and technology-responsive fashion design environment.

Research Objectives

This study aimed to assess the developed AI-Aided Gown Making Technology in assisting gown designers in

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the Municipality of Palompon, Leyte through automated design generation, fabric recommendation, and measurement-based customization. Specifically, it sought to:

1. describe the profile of the respondents in terms of:

1.1. age and gender;

1.2. trainings attended related to fashion or technology; and

1.3. number of years in the fashion industry;

2. describe the functional components and workflow of the developed AI-Aided Gown Making Technology;

3. evaluate the developed AI-Aided Gown Making Technology based on selected software quality assurance standards in terms of:

3.1. functional suitability;

3.2. performance efficiency;

3.3. compatibility;

3.4. usability; and

3.5. portability;

4. assess the level of acceptability of the developed AI-Aided Gown Making Technology based on the following dimensions:

4.1. performance expectancy;

4.2. effort expectancy;

4.3. social influence; and

4.4 behavioral intention;

5. determine whether there is a significant difference in the level of acceptability and efficiency of the developed AI-Aided Gown Making Technology among the identified respondent groups.

METHODS

Research Design

The study employed a developmental-descriptive research design with mixed-methods evaluation, guided by the Design–Develop–Evaluate (DDE) model. The design involved (1) conceptualizing the AI-Aided Gown Making based on relevant literature and existing fashion design workflows, (2) developing the system using web-based programming and algorithmic logic to generate measurement-based gown designs and fabric suggestions, and (3) evaluating its functionality, usability, perceived usefulness, acceptability, and compliance with quality assurance standards among selected designers and consumers. Quantitative data were gathered through a structured questionnaire anchored on the Unified Theory of Acceptance and Use of Technology (UTAUT) framework, while qualitative feedback was used to provide contextual insights into users' experiences and perceptions. The study was conducted at the Palompon Institute of Technology (PIT), Palompon, Leyte, which provided an appropriate academic and technical environment for system development and testing. The overall process followed an Input–Process–Output framework, integrating respondent profiles, system components, quality assurance criteria, and acceptability measures as inputs; system development, data

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collection, evaluation, and statistical analysis as processes; and the validated AI-Aided Gown Making, findings, conclusions, and recommendations as outputs.

Respondents

The study involved forty-eight (48) purposively selected respondents who were actual or potential users and institutional stakeholders relevant to the AI-Aided Gown Making within Palompon, Leyte. The respondents consisted of 10 gown designers (20.83%), including local couturiers, dressmakers, and tailoring shop owners; 30 consumers/clients (62.50%) with experience commissioning gowns for formal occasions; 5 IT and AI professionals (10.42%) with expertise in software systems, artificial intelligence, and application deployment; and 3 faculty/institutional evaluators (6.25%) involved in research, innovation, extension, or technology transfer at the Palompon Institute of Technology. These respondents were selected based on their practical experience, professional involvement, or institutional responsibilities related to gown design, technology evaluation, system development, or technology adoption. No students were included as respondents, in accordance with the panel's recommendation. Their participation provided complementary perspectives on the system's design relevance, usability, technical functionality, aesthetic quality, acceptability, and potential for real-world and institutional application.

Research Instrument

The study utilized a researcher-made structured questionnaire, supplemented by an observation checklist, semi-structured interview guide, system documentation, and automated system log reports, to gather quantitative and qualitative data for evaluating the AI-Aided Gown Making System. The questionnaire was anchored on the Unified Theory of Acceptance and Use of Technology (UTAUT) of Venkatesh et al. (2003) and the ISO/IEC 25010:2011 software quality model, with researcher-developed items addressing the system's functionality, software quality, user acceptability, AI-generated gown outputs, and technology transfer potential. It consisted of five parts covering the respondents' profile, system functionality and workflow, software quality, technology acceptance, and evaluation of AI-generated gown designs. Parts II to V employed a five-point Likert scale, ranging from 5 (Strongly Agree) to 1 (Strongly Disagree), with weighted means interpreted according to predetermined ranges. Content validity was established through expert evaluation by specialists in fashion design, information technology, artificial intelligence, and research methodology, while reliability was assessed through pilot testing and Cronbach's Alpha. The observation checklist documented system performance and user interaction, including design generation time, regenerations, manual adjustments, responsiveness, and fabric recommendation accuracy. The semi-structured interview guide gathered deeper qualitative insights regarding user experiences, perceived creative value, system limitations, and recommendations, while automated system logs recorded design generation time, gown and fabric recommendations, and user interactions to provide objective evidence of system efficiency and usage.

Data Collection

The data gathering procedure was conducted systematically through five phases: preparation, system development, implementation and data collection, data consolidation and analysis, and interpretation and reporting. The preparation phase involved securing research approval and ethical clearance, obtaining permission from relevant stakeholders, and orienting participants regarding the study objectives, procedures, and ethical considerations. The system development phase focused on designing, integrating, and testing the functional components and workflow of the AI-Aided Gown Making System prior to evaluation. During implementation, respondents used the system in a controlled setting, with designers assessing its functional and creative capabilities and clients evaluating the generated gown designs in terms of appropriateness and visual appeal. The researcher documented user interactions and system performance through an observation checklist, after which respondents completed the validated questionnaire, while selected participants underwent semi-structured interviews to obtain qualitative feedback. Quantitative data were encoded and analyzed using SPSS through descriptive and appropriate inferential statistics, while interview data were thematically analyzed using NVivo. Automated system logs were also examined to assess processing time, design generation, user interactions, and fabric recommendations. Finally, quantitative and qualitative findings were integrated, interpreted, validated through expert feedback, and used to formulate conclusions, recommendations, and

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necessary system refinements.

Data Analysis

The quantitative data were analyzed using descriptive and inferential statistics to determine the usability, usefulness, system performance, and overall acceptability of the AI-Aided Gown Making System. Frequency and percentage were used to summarize the respondents' demographic characteristics, while weighted mean and standard deviation were employed to determine the level and consistency of respondents' evaluations based on the five-point Likert scale. The mean scores were interpreted using the established ranges from 1.00–1.80 (Strongly Disagree/Very Low) to 4.21–5.00 (Strongly Agree/Very High). The Chi-square test (χ^2) was used to determine significant associations between categorical variables, such as respondent group and system acceptance, at the 0.05 level of significance. For the qualitative component, responses from semi-structured interviews and open-ended questions were transcribed and subjected to thematic analysis to identify recurring themes concerning usability, creativity, satisfaction, challenges, and perceived benefits of AI-assisted gown design. The quantitative and qualitative findings were subsequently integrated to provide a comprehensive interpretation of the system's performance, acceptability, and potential for application in fashion design and production.

Ethical Considerations

The study adhered to established ethical principles throughout the research process to protect the rights, privacy, safety, and welfare of all participants. Prior to data collection, the research proposal was subjected to institutional review and ethical clearance was secured from the appropriate Research Ethics Committee. Permission was also obtained from the Palompon Institute of Technology and other relevant stakeholders before the conduct of the study. All respondents were provided with clear information regarding the study's purpose, procedures, potential risks and benefits, and their expected participation, after which written informed consent was obtained. Participation was strictly voluntary, and respondents were informed of their right to decline participation or withdraw from the study at any time without penalty. No students were included in accordance with the approved research protocol. Confidentiality and anonymity were maintained by excluding personally identifying information from the research database and reporting results only in aggregated form. Survey responses, interview transcripts, observation records, and system-generated data were securely stored and accessed only by authorized members of the research team. Audio recording of interviews was conducted only with participants' consent, and recordings were transcribed for analysis and handled confidentially. The study also observed applicable data privacy requirements in the collection, processing, storage, and disposal of research data. Since the study involved the evaluation of an AI-based system, participants were informed that their responses and system interactions would be used solely for research and system evaluation purposes. All collected data were managed responsibly and retained only for the period required by institutional research policies before secure disposal.

RESULTS

The results present the findings from the 48 respondents regarding the functionality, usability, performance efficiency, compatibility, portability, and overall acceptability of the AI-Aided Gown Making System based on ISO/IEC 25010 and UTAUT constructs. The findings are presented using frequency, percentage, weighted mean, standard deviation, and appropriate inferential statistics to objectively summarize respondents' evaluations and determine the system's performance and acceptance.

Profile of the Respondents

The profile of the respondents was examined in terms of age, gender, training related to fashion or technology, professional role, years of experience, and frequency of AI-tool use. The respondents were predominantly female, while the age distribution was concentrated among the younger groups, particularly those aged 18–25 and 26–35 years. In terms of professional role, clients comprised the largest respondent group, followed by gown designers, IT and AI professionals, and faculty/institutional evaluators. Most respondents had participated in at least one training related to fashion design, digital design, artificial intelligence, or information and

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communication technology, with Fashion Design and Dressmaking being the most commonly reported training. The respondents also demonstrated varied levels of professional experience, ranging from less than one year to seven years or more, indicating representation from both relatively new and more experienced participants. In terms of AI-tool exposure, most respondents reported using AI tools at least occasionally, with a considerable proportion indicating frequent or regular use. Overall, the respondent profile reflects varied demographic characteristics, professional backgrounds, levels of experience, training exposure, and familiarity with AI technologies, providing a broad basis for evaluating the AI-Aided Gown Making System.

Table 1 Distribution of Respondents According to Age and Gender

Age Group	Male f	Male %	Female f	Female %	Total f	Total %
18–25	6	12.50	10	20.83	16	33.33
26–35	7	14.58	9	18.75	16	33.33
36–45	4	8.33	5	10.42	9	18.75
46 and above	3	6.25	4	8.33	7	14.58
Total	**20**	**41.67**	**28**	**58.33**	**48**	**100.00**

Table 2 Distribution of Respondents According to Trainings Attended Related to Fashion or Technology

Trainings Attended	Frequency (f)	Percentage (%)
Fashion Design and Dressmaking	14	29.17
Computer-Aided Design (CAD) / Digital Fashion Design	10	20.83
Artificial Intelligence (AI) Applications in Design	8	16.67
Fashion Technology and Innovation	7	14.58
Technology Awareness / ICT-related Training	5	10.42
No Relevant Training Attended	4	8.33
Total	**48**	**100.00**

Table 3 Distribution of Respondents According to Professional Role, Years of Experience, and AI-Tool Usage

Category	Frequency (f)	Percentage (%)
Professional Role		
Designer	10	20.83
Client	30	62.50
IT and AI Professional	5	10.42
Faculty / Institutional Evaluator	3	6.25
Total	48	100.00

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Years of Experience		
Less than 1 year	8	16.67
1–3 years	14	29.17
4–6 years	12	25.00
7 years and above	14	29.17
Total	48	100.00
AI-Tool Usage		
Never	2	4.17
Rarely	6	12.50
Occasionally	14	29.17
Often	16	33.33
Always	10	20.83
Total	**48**	**100.00**

Functional Components and Workflow of the Developed AI-aided Gown Making

The developed AI-Aided Gown Making System consists of an integrated workflow that supports the gown design process from user access to project archiving. The system includes nine functional stages: onboarding, project setup, design creation, fabric recommendation, review and feedback, revision, approval, delivery, and archiving. These stages provide users with functions for account management, project creation, sketch or reference-image uploading, design parameter selection, AI-generated gown visualization, fabric recommendation, client feedback, design regeneration, final approval, output export, and project record storage. The workflow establishes distinct roles for designers and clients, allowing designers to manage projects and develop designs while clients participate in reviewing, commenting, and approving outputs.

Table 4 Functional Components and Workflow of the Developed AI-aided Gown Making

Stage	**Functional Component**	**Main Function**	**User**	**Output**
1. Onboarding	Registration and Login	Provides secure account access and role-based dashboards	Designer/ Client	User account and dashboard
2. Project Setup	Project Creation	Creates projects and assigns clients	Designer	Project record
3. Design Creation	AI Design Generation	Generates gown designs from sketches, parameters, and prompts	Designer	AI-generated gown design
4. Fabric	Fabric	Suggests fabrics	Designer	Fabric

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Recommendation	Selection	appropriate to the design		recommendations
5. Review and Feedback	Client Review	Allows clients to view and comment on designs	Client	Feedback/revision request
6. Revision	Design Refinement	Modifies parameters and regenerates designs	Designer	Revised design
7. Approval	Client Approval	Enables approval of the final design	Client	Approved design
8. Delivery	Export and Download	Exports and delivers the completed design	Designer/ Client	Final design output
9. Archiving	Project Repository	Stores completed projects and design records	Designer/ Client	Archived project history

Evaluation of the AI-Aided Gown Making Technology Based on Selected Software Quality Assurance Standards

The developed AI-Aided Gown Making Technology was evaluated based on selected software quality assurance standards covering functional suitability, performance efficiency, compatibility, usability, and portability. The results show that all five quality dimensions were rated Very High, with usability receiving the highest assessment and compatibility receiving the lowest, although both remained within the same very high category. The overall assessment likewise indicates a very high extent of compliance with the selected software quality assurance standards.

Table 5 Evaluation of the AI-Aided Gown Making Technology Based on Selected Software Quality Assurance Standards

Software Quality Assurance Standard	**Mean**	**SD**	**Verbal Description**
Functional Suitability	4.56	0.60	Very High
Performance Efficiency	4.53	0.60	Very High
Compatibility	4.48	0.60	Very High
Usability	4.60	0.60	Very High
Portability	4.55	0.60	Very High
Overall	**4.54**	**0.60**	**Very High**

Level of Acceptability Based on the UTAUT Constructs

The level of acceptability of the developed AI-Aided Gown Making System was assessed using the four UTAUT constructs: Performance Expectancy, Effort Expectancy, Social Influence, and Behavioral Intention. As shown in Table 6, all four constructs obtained a Very High verbal description, indicating consistently favorable evaluations of the system. Among the constructs, Behavioral Intention obtained the highest rating, followed by Performance Expectancy, Effort Expectancy, and Social Influence. The overall assessment likewise indicated a Very High level of acceptability, while the relatively consistent standard deviations across the constructs suggest a generally similar pattern of responses among the participants.

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Table 6 Level of Acceptability Based on the UTAUT Constructs

UTAUT Construct	Mean	SD	Verbal Description
Performance Expectancy	4.60	0.58	Very High
Effort Expectancy	4.55	0.58	Very High
Social Influence	4.48	0.58	Very High
Behavioral Intention	4.65	0.58	Very High
Overall	4.57	0.58	Very High

Significant Differences in Acceptability and Efficiency of the AI-Aided Gown Making Technology Across Respondent Groups

The results showed a statistically significant difference in the level of acceptability and efficiency of the developed AI-Aided Gown Making Technology among the identified respondent groups, as indicated by the One-Way ANOVA. A significant difference was also found between the Designers and Clients based on the independent-samples t-test, with the effect size indicating a substantial practical difference between the two groups.

Table 7 Test of Significant Difference in the Evaluation of the AI-Aided Gown Making Technology

Test	**Test Statistic**	***p*-value**	**Interpretation**
One-Way ANOVA	$F = 7.472$	0.0004	Significant
Designers vs. Clients (*t*-test)	$t = 4.251$	0.0001	Significant
Cohen's *d*	1.552	—	Large effect

DISCUSSIONS

The findings are discussed in relation to the respondents' characteristics, the functional workflow of the developed technology, its compliance with selected software quality assurance standards, its level of technology acceptance, and the differences in evaluation across respondent groups.

The profile of the respondents shows a diverse group with varying levels of age, professional experience, training, and exposure to AI technologies, providing complementary perspectives for evaluating the AI-Aided Gown Making Technology. The substantial representation of respondents with fashion- or technology-related training and prior exposure to AI tools suggests that many participants possessed sufficient background to assess the system's functionality and applicability. At the same time, the inclusion of respondents with limited experience and less exposure to AI provides an important basis for examining the system's accessibility and usability among less technologically experienced users. This is particularly relevant because technology acceptance is influenced by users' perceptions of usefulness and ease of use (Davis, 1989), while usability principles emphasize designing systems that can be understood and operated effectively by users with different levels of experience (Nielsen, 1994; Norman, 2013). Thus, although the predominance of clients and younger respondents should be considered when interpreting the generalizability of the findings, the overall composition provided varied perspectives relevant to evaluating the developed technology.

Furthermore, the developed AI-Aided Gown Making Technology demonstrated a structured workflow that integrates AI-assisted design generation with conventional fashion design activities and client participation.

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The sequence from user access and project creation to design generation, fabric recommendation, client feedback, revision, approval, delivery, and archiving establishes an organized process that supports both technical and creative aspects of gown development. This approach is consistent with the view that fashion design involves iterative creative exploration and refinement rather than a single, linear production activity (Schenk & Holman, 2000). In addition, the integration of AI into fashion design can provide designers with additional opportunities for generating and exploring design alternatives while maintaining human judgment in the creative process (Park & Kim, 2020). Thus, the system's workflow does not replace designer-client interaction but instead provides a digital environment through which AI-generated outputs can be reviewed, modified, and refined according to user preferences.

Moreover, the system obtained a very high extent of compliance with the selected software quality assurance standards in terms of functional suitability, performance efficiency, compatibility, usability, and portability. These dimensions correspond to selected characteristics of the ISO/IEC 25010 quality model, which provides a framework for evaluating software systems based on characteristics relevant to their intended use (International Organization for Standardization [ISO], 2011). The strong assessment of functional suitability indicates that the system provides functions relevant to gown design, including design generation, customization, and fabric recommendation. Likewise, the high assessment of performance efficiency suggests that the system can support the intended workflow without imposing unnecessary delays or operational burden. These characteristics are particularly important in AI-assisted applications because the usefulness of an intelligent system depends not only on its ability to generate outputs but also on its capacity to deliver those outputs effectively within the user's task environment (Russell & Norvig, 2021; Goodfellow et al., 2016).

Similarly, the very high assessments for compatibility, usability, and portability indicate that the technology can be integrated into users' available technological environments and accessed with relative ease. Usability is especially important in a system intended for users with different levels of technical expertise because a technically capable system may have limited practical value if users find it difficult to understand or operate (Nielsen, 1994; Norman, 2013). The results therefore suggest that the developed technology has addressed both technical and human-centered aspects of software quality. This is also consistent with ISO/IEC 25010, which recognizes usability, compatibility, and portability as important characteristics of software quality (ISO, 2011). Consequently, the very high assessment across the selected dimensions provides evidence supporting the system's potential for practical application in fashion design and production.

In addition, the findings demonstrate a very high level of acceptability across the UTAUT dimensions of Performance Expectancy, Effort Expectancy, Social Influence, and Behavioral Intention. The strong assessment of Performance Expectancy indicates that respondents perceived the technology as capable of improving gown-design activities, while the high Effort Expectancy suggests that they considered the system manageable and relatively easy to use. These findings are consistent with Davis's (1989) Technology Acceptance Model, which emphasizes perceived usefulness and perceived ease of use as important determinants of user acceptance. More specifically, the UTAUT framework proposed by Venkatesh et al. (2003) identifies performance expectancy, effort expectancy, and social influence as important determinants associated with technology adoption and behavioral intention. Therefore, the overall pattern suggests that respondents' willingness to use the AI-Aided Gown Making Technology is supported by both its perceived usefulness and ease of operation, as well as by the perceived social environment surrounding its adoption.

Correspondingly, the high Behavioral Intention assessment indicates that respondents demonstrated strong willingness to use the technology, suggesting that positive perceptions of its usefulness and usability translated into an intention to adopt the system. The Social Influence finding further indicates that respondents perceived support or encouragement from relevant users and stakeholders regarding the use of the technology. This is particularly important in fashion design because adoption of AI does not occur solely at the individual level; it may also depend on how designers, clients, institutions, and other stakeholders perceive the role of technology in the creative process. In this regard, the UTAUT framework provides an appropriate basis for understanding acceptance because it incorporates both individual perceptions and social factors influencing technology use (Venkatesh et al., 2003).

However, despite the generally high evaluation of the system, the inferential results showed a significant

difference in the level of acceptability and efficiency among the identified respondent groups. The significant One-Way ANOVA indicates that the groups did not evaluate the technology in exactly the same manner. This difference is understandable because the respondents interacted with the system from different perspectives and had different expectations regarding its application. Designers are more directly concerned with technical and creative aspects of gown development, whereas clients are more likely to evaluate the resulting designs based on appearance, personalization, suitability, and satisfaction. Such differences are consistent with the human-centered nature of fashion design, where the needs and expectations of the designer and end user may not always be identical (Bye, 2010; Schenk & Holman, 2000).

Furthermore, the significant difference between Designers and Clients, accompanied by a large effect size, indicates that the difference is not merely statistical but also practically meaningful. Designers may evaluate the system according to its capacity to support professional design tasks, control design parameters, generate alternatives, and improve workflow, while clients may place greater emphasis on whether the generated designs reflect their preferences and intended aesthetic outcomes. Therefore, the difference does not necessarily indicate a weakness in the system; rather, it demonstrates that the technology serves users with distinct roles and expectations. This distinction is important in evaluating AI-assisted fashion technologies because AI should function as a supportive design tool while preserving human judgment, creativity, and client preference (Park & Kim, 2020).

The findings present a coherent picture of the developed AI-Aided Gown Making Technology as a technically compliant, highly acceptable, and potentially useful digital innovation, while also showing that user role influences how its acceptability and efficiency are perceived. The very high software quality assessments establish the technical foundation of the system, while the very high UTAUT assessments demonstrate favorable user perceptions and willingness to adopt it. At the same time, the significant differences among respondent groups emphasize the importance of continued user-centered refinement. Consistent with the principles of software quality, technology acceptance, and human-centered design (ISO, 2011; Venkatesh et al., 2003; Davis, 1989; Norman, 2013), the system's continued development should therefore preserve its technical functionality while allowing sufficient flexibility to address the different requirements of professional designers and clients. In this way, AI can serve not as a replacement for human creativity but as a technological support that enhances design exploration, efficiency, collaboration, and decision-making in gown design and production.

CONCLUSION

The developed AI-Aided Gown Making Technology represents a viable, human-centered application of artificial intelligence for advancing contemporary gown design and development. Its integrated workflow, encompassing AI-assisted design generation, fabric recommendation, client feedback, revision, approval, delivery, and archiving, supports both the creative and collaborative dimensions of gown making. The technology demonstrated a very high level of compliance with the selected software quality assurance standards and a very high level of user acceptability, confirming its potential as a functional, efficient, usable, and acceptable digital design solution. The significant differences among respondent groups, particularly between designers and clients, further indicate the importance of addressing role-specific needs in AI-assisted creative technologies. The study's novelty lies in integrating AI-assisted design generation, fabric recommendation, measurement-based customization, and designer–client interaction within a localized gown-making context, providing empirical evidence for technology refinement, training, and diffusion. However, the findings are context-specific and should not be generalized to all fashion practitioners or settings without further validation through larger samples, diverse garment categories, and longer-term implementation. More broadly, the findings demonstrate that AI can complement rather than replace human creativity and craftsmanship, offering wider potential for improving design efficiency, creative exploration, collaboration, and decision-making in fashion and other creative industries.

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