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Potentials and barriers of Artificial Intelligence adoption in the fashion industry, Ile-Ife, Osun State

Abstract

This study investigates the potentials and barriers to Artificial Intelligence (AI) adoption in the fashion industry of Ile-Ife, Osun State, Nigeria. The research was motivated by the growing importance of AI in enhancing fashion marketing, customer engagement, and operational efficiency. A survey of 120 randomly selected fashion designers was conducted to assess the extent of AI potential and challenges. Findings revealed a moderate level of AI adoption (46.7%), with tools such as predictive analytics, virtual try-ons, and AI-driven marketing identified as having the potential to transform business practices. Fashion designers acknowledged the ability of AI to enhance customer experiences, strengthen brand visibility, improve inventory management, and support sustainability. Despite these opportunities, financial constraints (30.8%) and limited awareness (35.8%) emerged as the primary challenges. The study recommends targeted training programs in partnership with educational and technological institutions to strengthen designers.

Keywords: artificial intelligence adoption, fashion industry, customer engagement, adoption barriers, sustainability in fashion

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Introduction

Fashion represents a dynamic interplay of creativity, commerce, and technology. What began as a basic human response to environmental conditions evolved into a socio-cultural phenomenon that expresses identity, aesthetics, and social belonging. While the terms *fashion* and *clothing* are often used interchangeably, they differ conceptually: clothing refers to garments and accessories as utilitarian articles of covering for protection, while fashion, derived from the Latin *modus* meaning "style," denotes the collective taste of a period and is inherently time-bound. This distinction underscores the transformation of dress from necessity to symbolic expression.

Historically, the evolution of fashion reflects advances in production and shifts in consumers' culture. During the eighteenth century, the formaliation of tailoring as a craft marked the emergence of professionalized garment production. The rise of Haute Couture in the nineteenth century, championed by designers such as Charles Frederick Worth, signified a move toward exclusivity and artistry in fashion design.[1] The Industrial Revolution accelerated this transformation, with innovations in textile printing, weaving, dyeing, and the invention of the sewing machine, making garments more affordable and widely available. By the early twentieth century, the democratization of style led to the expansion of the ready-to-wear industry, reshaping both the economics and aesthetics of fashion.[2]

In the twenty-first century, the Fourth Industrial Revolution has brought about another profound change, embedding digital technologies, data-driven decision-making, and consumer-centric personalization into the very fabric of the fashion industry. Among these technologies, Artificial Intelligence (AI) has emerged as a pivotal enabler of transformation. AI encompasses a suite of computational approaches, including machine learning, deep learning, natural-language processing, computer vision, and predictive analytics, that simulate human intelligence in learning, reasoning, and decision-making.[3,4]

In the fashion sector, AI is increasingly deployed across the value chain. It supports trend forecasting, design creativity, supply-chain optimization, and inventory management, while enhancing consumer experiences through virtual try-ons, recommendation engines, AI-powered chatbots, and tools that promote sustainability by reducing waste and improving resource efficiency.[5,6] The COVID-19 pandemic further underscored the importance of these technologies; as physical retail contracted and e-commerce surged, AI-enabled systems became vital for maintaining customer engagement and operational continuity.[4]

Yet the pattern of adoption is geographically uneven. In Europe and North America, leading brands integrate AI to drive personalized marketing, intelligent inventory systems, and immersive digital experiences to strengthen their competitive advantage (Global Growth Insights, 2025).[4] In Asia, particularly in China and South Korea, AI-driven recommendation systems and automated design processes have transformed e-commerce and mass-customized production, accelerating innovation cycles.[5] In Africa, adoption is growing but constrained by infrastructural deficits, financial limitations, and gaps in technical expertise. Research by Du Plessis and Swart[6] in South African marketing agencies demonstrated that perceived usefulness and ease of use, central constructs of the Technology Acceptance Model (TAM), strongly influenced organizational uptake of AI, highlighting the importance of socio-cognitive and contextual factors in emerging economies. Based on various studies conducted on AI in fashion, Deep Learning and Generative AI are being adapted.[7–9]

Despite these global advances, existing scholarship has focused predominantly on AI's technical and commercial applications, such as sales forecasting, textile manufacturing, and supply-chain optimization,[2] while relatively less attention has been paid to its impact on customer engagement, brand visibility, and consumer behavior, particularly within culturally significant and locally driven fashion hubs. Seminal works such as Luce (2021) and Giri et al. (2022) examine AI's integration in retailing and logistics but their work was largely enterprise-centered, leaving customer-centric dimensions and under-explored localized contexts.

This gap is especially evident in heritage-rich regions such as Ile-Ife, Nigeria, a city renowned for its cultural significance and traditional textiles such as Adire. The local fashion industry, dominated by small and medium-sized enterprises, faces persistent challenges including

inefficient inventory management, limited personalized customer engagement, and constrained market reach. These limitations hinder the ability of Ile-Ife's enterprises to compete with digitally enabled brands at the regional and global levels. Without empirical research attuned to local socio-cultural and economic contexts, opportunities to integrate AI effectively may be missed, potentially undermining the region's cultural heritage and diminishing its prospects for economic growth.

This study responds to this need by investigating the current state of AI adoption in the fashion industry in Ile-Ife, assessing the potential of AI tools such as predictive analytics and virtual try-ons to enhance brand visibility and customer engagement, and identifying the barriers and opportunities that influence successful implementation in the local fashion sector. In doing so, it addresses a critical research gap at the intersection of technological innovation, cultural preservation, and sustainable business development in emerging markets. What is the current state of AI adoption in promoting fashion brands among local enterprises in Ile-Ife, Osun State? How can AI tools (e.g., predictive analytics, virtual try-ons) enhance brand visibility and customer engagement for Ile-Ife fashion businesses? What are the barriers and opportunities for implementing AI-driven strategies in the local fashion industry?

Objectives of the study

The main objective of the study is to determine the opportunities and barriers of AI in promoting fashion brands. The specific objectives are to:

i. Assess the current state of AI adoption in promoting fashion brands among the fashion industry in Ile-Ife, Osun State

ii. Evaluate the potential of AI tools in enhancing brand visibility and customer engagement for fashion businesses

iii. Identify barriers and opportunities for implementing AI-driven strategies in the fashion industry in Ile-Ife.

Research hypotheses

The following hypotheses, stated in the alternate form, aid in the conduct of this research:

1) H_1: The use of AI tools such as predictive analytics and virtual try-ons enhances brand visibility and customer engagement in Ile-Ife fashion businesses.

2) H_2: The identification of barriers and opportunities influences the successful implementation of AI-driven strategies in the fashion industry.

Material and methods

The study was conducted in Ile-Ife, Osun State, Southwest Nigeria, an ancient Yoruba city with a rich cultural heritage. The target population comprised all practising fashion designers operating within Ile-Ife. Using purposive sampling based on the concentration of clothing construction and tailoring activities, four major commercial hubs were selected: Lagere, Mayfair, New Market, and Campus Gate areas.

From each selected area, 30 fashion designers were randomly chosen, yielding a total sample of 120 participants. This multi-stage sampling approach (purposive selection of areas followed by simple random sampling of individuals) ensured representativeness across the main fashion design clusters in the city.

A mixed-methods convergent parallel design was employed. The primary data collection instrument was a structured questionnaire comprising both closed-ended (quantitative) and a limited number of open-ended (qualitative) questions. The questionnaire was divided into sections, including socio-economic characteristics, potentials, barriers and suggestions for improvement.

The questionnaire was developed based on an extensive review of relevant literature and adapted from previously validated instruments used in similar studies on informal sector artisans. Content validity was established through expert review by three academics in the fields of fashion design and entrepreneurial studies, as well as two experienced master tailors from Ile-Ife.

Quantitative data were analysed using the Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarise the data. Inferential statistics were applied to examine associations and differences across the selected areas. Ethical considerations were ensured by obtaining informed consent from all participants before data collection.

Results and discussions

Socio-economic characteristics

Table 1 presents the socio-economic characteristics. Regarding roles, owners dominate at 50.8%, followed by managers at 30.8% and artisans at 18.3%. Experience levels are well-distributed, with 38.3% having 1-5 years, 31.7% with 6-10 years, and 30.0% exceeding 10 years, yielding a mean of 1.92 (SD 0.79), reflecting a mix of novice and veteran participants. Marital status reveals a balanced split, with 49.2% single and 50.0% married, alongside a mere 0.8% divorced.

Table 1 Distribution of respondents according to socio-economic characteristics

Variable	Category	Frequency	Percent	Cumulative percent	Mean	Standard deviation
Role	Owner	61	50.8	50.8	1.67	0.74
	Manager	37	30.8	81.6		
	Artisan	22	18.3	100		
Years of Experience	1-5years	46	38.3	38.3	1.92	0.79
	6-10 years	38	31.7	70		
	Over 10 years	36	30	100		
Marital status	Single	59	49.2	49.2	1.52	0.58
	Married	60	50	99.2		
	Divorced	1	0.8	100		
Monthly Income(N)	10,000-20,000	1	0.8	0.8	2.68	0.47
	Above 30.000	83	69.2	100		

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Table 1 Continued.....

	Christianity	66	55	55		
Religion	Islam	52	43.3	98.3	1.47	0.61
	Traditional	2	1.7	100		
	Secondary	24	20	20.2		
Level of Education	Tertiary	95	79.2	100	1.8	0.4
	Primary	1	0.8	-		

Source: Field survey, 2025

Economically, monthly income data highlights disparities, with 69.2% earning above N30,000, contrasted by 30.0% below N10,000 and 0.8% in the N10,000-N20,000 range. Education levels are notably high, with 79.8% holding tertiary qualifications and 20.2% secondary, resulting in a mean of 1.80 (SD 0.40). These findings portray a sample of professional, wealthy, and well-educated individuals.

AI adoption and the potential of AI tools

Table 2 shows AI adoption and its potential in the fashion industry. Key findings reveal significant AI adoption, with 75.9% agreeing that AI technologies are currently integrated in fashion businesses (mean = 3.38). Awareness of AI tools like predictive analytics and virtual try-ons is high (70.8% agreement, mean = 3.72), and respondents see strong potential in AI for promoting sustainable growth (62.5% agreement, mean = 3.51) and enhancing customer engagement via virtual try-ons (50.8% agreement, mean = 3.33). Though digital transformation and the use of technologies in fashion is becoming prevalent, especially in developing countries.[11–13] AI's role in preserving cultural identity shows ambivalence (50% agreement, mean = 2.99), with 30% neutral or disagreeing. Challenges emerge in practical outcomes, such as limited improvement in understanding customer preferences (20% agreement, mean = 2.49) and mixed results in marketing strategies (49.1% agreement, mean = 3.19).

Table 2 Current state of AI adoption and the potentials of AI tools

Items	SA (F/%)	A	N (F/%)	D (F/%)	SD (F/%)	Mean	St. Dev.
AI technologies are currently being adopted in fashion businesses	35 (29.2%)	56 (46.7%)	7 (5.8%)	6 (5.0%)	16 (13.3%)	3.38	1.19
AI adoption has improved customer engagement in my fashion business	22 (18.3%)	53 (44.2%)	18 (15.0%)	23 (19.2%)	5 (4.2%)	2.99	1
There are many opportunities to explore AI-driven strategies in fashion businesses	13 (10.8%)	64 (53.3%)	16 (13.3%)	20 (16.7%)	7 (5.8%)	3.28	0.99
A clear framework for AI integration will help promote sustainable fashion growth	34 (28.3%)	41 (34.2%)	23 (19.2%)	20 (16.7%)	2 (1.7%)		
AI can help preserve the cultural identity of fashion brands	12 (10.0%)	48 (40.0%)	24 (20.0%)	25 (20.8%)	11 (9.2%)	2.99	1.01
I am aware of AI tools like predictive analytics and virtual try-ons	42 (35.0%)	43 (35.8%)	22 (18.3%)	8 (6.7%)	5 (4.2%)	3.72	0.97
AI tools have helped me better understand customer preferences	11 (9.2%)	13 (10.8%)	43 (35.8%)	35 (29.2%)	18 (15.0%)	2.49	
Virtual try-ons enhance customer engagement and satisfaction	13 (10.8%)	48 (40.0%)	36 (30.0%)	19 (15.8%)	4 (3.3%)	3.33	0.85
Predictive analytics have improved my marketing strategies	19 (15.8%)	40 (33.3%)	43 (35.8%)	16 (13.3%)	2 (1.7%)	3.19	0.88
AI tools have increased online interaction with my brand	16 (13.3%)	46 (38.3%)	30 (25.0%)	18 (15.0%)	11 (9.2%)	3.26	0.98

Source: Field survey, 2025

Table 3 presents a comprehensive analysis of challenges and benefits associated with AI adoption in professional settings, based on responses from various employee groups (NB, MIB, MOB, SB, MAB). Key challenges include a lack of high-quality and sufficient data (mean 2.58), data privacy and security concerns (mean 2.53), resistance to change (mean 2.64), and a shortage of skilled AI professionals (mean 2.98). Additionally, a lack of AI literacy among employees (mean 3.15) and increased automation of repetitive tasks (mean 2.18) highlight significant hurdles. These findings underscore the need for robust data management, employee training, and cultural adaptation to ensure successful AI integration.

Table 3 Barriers and opportunities for implementing AI strategies

Items	NB (F/%)	MIB (F/%)	MOB (F/%)	SB (F/%)	MAB (F/%)	Mean	St. Dev.
Lack of high quality and sufficient data	41 (34.2%)	22 (18.3%)	17 (14.2%)	12 (10%)	29 (24.2%)	2.58	1.43
Data privacy and security concerns	23 (19.2%)	56 (46.7%)	5 (4.2%)	28 (23.3%	8 (6.7%)	2.53	1.09
Resistance to change from employees	14 (11.7%)	46 (38.3%)	36 (30%)	17 (14.2%)	7 (5.8%)	2.64	1
Shortage of skilled AI professionals	14 (11.7%)	31 (25.8%)	29 (24.2%)	24 (20%)	22 (18.3%)	2.98	1.23
Lack of AI literacy and understanding	8 (6.7%)	22 (18.3%)	25 (20.8%)	30 (25%)	35 (29.2%)	3.45	1.28
Increased automation of repetitive tasks	29 (24.2%)	22 (18.3%)	17 (14.2%)	32 (26.7%)	19 (15.8%)	2.88	1.4
Improved operational efficiency and productivity	17 (14.2%)	26 (21.7%)	19 (15.8%)	39 (32.5%)	17 (14.2%)	2.93	1.24
Creation of new products, services and business model	14 (11.7%	18 (15%)	20 (16.7%)	25 (20.8%)	40 (33.3%)	3.3	1.33
Attracting and retaining top talent	17 (14.2%)	22 (18.3%)	23 (19.2%)	25 (20.8%)	30 (25%)	3.09	1.33
Upskilling and reskilling of employees	12 (10%)	24 (20%)	24 (20%)	29 (24.2%)	29 (24.2%)	3.24	1.28
Faster and more informed decision making	8 (6.7%)	13 (10.8%)	26 (21.7%)	35 (29.2%)	35 (29.2%)	3.48	1.16
Cost reduction through optimized process	23 (19.2%)	24 (20%)	18 (15%)	37 (30.8%)	16 (13.3%)	2.85	1.28
Enhanced accuracy and reduce error	10 (8.3%)	17 (14.2%)	24 (20%)	39 (32.5%)	29 (24.2%)	3.33	1.23

Source: Field survey, 2025

On the benefit side, the table reveals substantial advantages, such as improved operational efficiency and productivity (mean 2.24), cost reduction through optimized processes (mean 2.85), enhanced accuracy and error reduction (mean 3.13), and faster, more informed decision-making (mean 3.18). Other notable benefits include upskilling and reskilling employees (mean 3.24), attracting and retaining top talent (mean 3.09), and the creation of new products, services, and business models (mean 3.30). These insights suggest that AI can drive operational excellence, workforce development, and innovation when effectively implemented. Addressing the identified challenges while leveraging these benefits is critical for project success, requiring strategic planning, investment in training, and a focus on data integrity to maximize AI's potential in professional environments.

The Table 4 outlines the results of chi-square analyses exploring the relationship between socioeconomic variables and perceived obstacles or prospects for AI strategy implementation, based on a 2025 field survey. Significant associations are observed with variables including years of experience ($\chi^2 = 14.48$, $p < 0.01$), marital status ($\chi^2 = 52.48$, $p < 0.001$), monthly income ($\chi^2 = 80.04$, $p < 0.001$), education level ($\chi^2 = 19.04$, $p < 0.001$), and data privacy ($\chi^2 = 23.89$, $p < 0.001$), highlighting their impacts on AI integration. In contrast, variables such as role ($\chi^2 = 10.82$, $p > 0.05$), talent attraction and retention ($\chi^2 = 10.66$, $p > 0.05$), and skilled professional shortages ($\chi^2 = 17.60$, $p > 0.05$) demonstrate non-significant correlations, indicating a weaker influence in this framework. Effective management in the fashion industry is significant for its growth and development.[14,15]

Table 4 Chi -square Test of Socio-economic and barriers/opportunities for implementing AI strategies

Variable	DF	X2	Value	Pearson Chi-square	Remarks
Role	2	10.82	1.67	>0.05	Not significant
Years of experience	2	14.48	1.52	<0.01	Significant
Marital status	2	52.48	2.68	<0.001	Significant
Monthly income	1	80.04	1.9	<0.001	Significant
Attracting and retaining top talent	1	10.66	1.47	>0.05	Not significant
Level of education	3	19.04	1.9	<0.001	Significant
Data privacy	6	23.89	6.7	<0.001	Significant
Shortage of skilled professionals	2	17.6	4.21	>0.05	Not significant

Source: Field survey, 2025

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Conclusion

The study concludes that AI offers transformative potential for the fashion industry in Ile-Ife, Osun State, by enhancing online engagement, optimizing operations, and promoting sustainability and profitability. With a moderate adoption rate, the industry is well-positioned for growth. The high tertiary education level among respondents indicates a workforce capable of leveraging AI technologies, setting a strong foundation for further integration.

However, challenges such as limited awareness and financial constraints are barriers to AI utilization. To capitalize on AI's potentials, addressing financial challenges through cost-effective solutions and increasing awareness through targeted training will be crucial to drive growth, sustainability, and competitiveness in Ile-Ife fashion industry.

Recommendations

The study recommends increasing awareness and training by partnering with educational institutions and tech organizations to deliver workshops on AI tools like predictive analytics, virtual try-ons, and automated design software. Additionally, scalable AI solutions, such as cloud-based platforms should be developed. There should be a provision of government and private grants to support small businesses.

The adoption of AI-powered marketing tools like chatbots and personalized recommendations tailored to cultural and religious diversity for platforms like Instagram and WhatsApp is suggested. Future research should include longitudinal studies to track AI adoption, explore specific tools' impacts on different fashion segments, and compare sustainable practices across Nigerian cities to identify region-specific opportunities and challenges.

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Conflicts of interest

No conflict of interest declared.

References

1. Di Boscio C. The history of haute couture: A timeline. *Eluxe Magazine*. 2024.
2. Thomassey S, Zeng X. *Artificial Intelligence for fashion industry in the big data era*. Springer; 2018.
3. Russell SJ, Norvig P. *Artificial Intelligence: a modern approach*. 3rd ed. Prentice Hall; 2010.
4. Kang JYM, Choi D. Artificial intelligence-powered digital solutions in the fashion industry: A mixed-methods study on AI-based customer services. *Int J Fashion Des Technol Educ*. 2023;17(4):1–15.
5. Choi W, Jang S, Kim HY, et al. Developing an AI-based automated fashion design system: Reflecting the work process of fashion designers. *Fashion Text*. 2023;10(1):20.
6. Du Plessis C, Swart C. Beliefs and adoption of AI in content marketing: Insights from South African marketing agencies. *S Afr J Inf Manag*. 2024;26(1):1878.
7. Sousa AP, Moura BM, Macedo MD, et al. O papel da inteligência artificial na análise de dados para estratégias de marketing na indústria da moda de luxo. *Gestão Tecnol Negócios Rev FATEC SEBRAE*. 2024;11(20).
8. Imtiaz A, Pathirana N, Saheel S, et al. A review on the influence of deep learning and generative AI in the fashion industry. *J Future Artif Intell Technol*. 2024;1(3):201–216.
9. Sádaba T, Espejo Méndez MV, de Oliveira RA, et al. Adapting to AI in fashion: skills needed, trends, and industry perspectives. In: *Fashion Communication in the Digital Age*. Springer Proceedings in Business and Economics. 2025.
10. Curth M, Dantas IJM, Bez MR, et al. Inovação, infinidade e trapaça: prospecções sobre o uso de inteligência artificial no processo criativo do Design de Moda. *Projetica*. 2025;16(1).
11. Diyaolu IJ, Obayomi EO, Bamidele TA. Information communication technology and dress culture among senior secondary school students in Osun State, Nigeria. *Niger J Text*. 2019;5:37–41.
12. Orisadare EA, Diyaolu IJ, Awoyelu IO. Development of a dataset for multimodal fashion recommender models. *Int J Comput Appl*. 2023;185(22):54–61.
13. Ogunyemi AA, Diyaolu IJ, Awoyelu IO, et al. Digital transformation of the textile and fashion design industry in the Global South: a scoping review. In: Saeed RA, Bakari AD, Sheikh YH, editors. *Towards new e-Infrastructure and e-Services for Developing Countries*. Vol 499. Cham: Springer; 2023:391–413.
14. Diyaolu IJ. Total quality management practices in Nigerian textile industry. In: Msahli S, Debbabi F, editors. *Advances in Applied Research on Textile and Materials -IX*. Vol 17. Springer Proceedings in Materials. Cham: Springer; 2022:234–242.
15. Orisadare EA, Achukwu OE, Ogunyemi AA, et al. Digitalisation and green strategies: a systematic review of the textile, apparel and fashion industries. *Circ Econ Sustain*. 2025:1–53.