Journal of Science and Technology – Engineering and Technology for Sustainable Development
Volume 36, Issue 2, April 2026, 095–102

Revolutionizing Fashion Design: Optimizing Garments with OptiTex Software

Ha Tu Van, Ngo Thi Viet Ha, Luong Hoang Tuyet Van*
Faculty of Fashion, Ho Chi Minh City University of Industry, Ho Chi Minh City, Vietnam
**Corresponding author: luonghoangtuyetvan9126@gmail.com*

Abstract

In the context of digital transformation and sustainable development in the fashion industry, OptiTex software has emerged as a key solution for optimizing apparel design and production processes. This study aims to evaluate the practical effectiveness of OptiTex in Vietnam through a survey of 106 fashion professionals and real-world experiments conducted at Hai Ngoc Garment Co., Ltd. Survey results reveal that OptiTex helps reduce design time by 20%–60% and significantly lowers prototyping costs. Experimental findings further confirm a high simulation accuracy of 92% between the 3D virtual fit and the actual product. Furthermore, the automatic marker-making feature helps save approximately 12% of fabric on average. Despite these benefits, several challenges remain, including the high cost of licensing, the software's complex interface, and the need for user training. The study proposes improvements such as enhancing fabric simulation algorithms, simplifying the user interface, offering intensive training programs, and integrating advanced technologies like AI and blockchain. These findings highlight the considerable value of OptiTex in supporting the modernization and efficiency of Vietnam's fashion industry and provide practical insights for its broader implementation across enterprises and educational institutions in the digital era.

Keywords: CAD/CAM, digital simulation, fashion technology, OptiTex, 3D design.

1. Introduction

1.1. Background and Development of Fashion Design Technology

The modern fashion industry is witnessing a significant turning point as it dramatically shifts from the traditional manual design process to the application of comprehensive digital technology. This transformation includes replacing hand drawing and physical modeling with computer-aided design (CAD) software, 3D simulation technology, artificial intelligence (AI), big data, and the Internet of Things (IoT). These technologies not only save time and costs but also greatly expand the creative capabilities of designers.

Previously, it took designers 5 to 7 days to complete a design from drawing to sample. OptiTex software allows this process to be completed in 1 to 3 days. OptiTex fully integrates 2D pattern design functions, 3D product simulation, and automatic plotting, saving up to 20% of materials compared to traditional manual methods. Enterprises such as TBS Group and Hoang Anh Garment Factory in Vietnam are typical examples of the successful application of this software to optimize production processes [1].

In addition, artificial intelligence and big data are also being deeply integrated into fashion design. According to research by Luan *et al.* (2024), AI and Big Data help simulate 3D virtual models accurately and support designers in predicting trends and consumer behavior, making more thoughtful design decisions [2]. A typical example is Clo3D software, which incorporates AI to simulate real-time fabric movement and is currently widely used in the high-end design industry.

Not only stopping at specialized software, tools such as Photoshop, CorelDraw, or PAD System also play an essential role in supporting pattern editing, color matching, and idea development. This creates an interdisciplinary creative ecosystem, helping designers flexibly combine many tools to develop products more effectively [3].

Digital fashion is also an essential direction in the sustainable development strategy. According to research by Ludaš *et al.* (2024), inkjet printing, digital printing, and plasma surface modification technologies are helping manufacturers shorten processes, reduce waste, and save resources [4]. In particular, Falsafi's PinaClutch - No Waste project (2024) uses biodegradable pineapple leather to design a zero-waste fashion wallet, a typical demonstration of the ability to combine digital technology and environmentally friendly materials [5].

From an academic perspective, Fan & Poonyaprapha's (2024) research shows that fashion design today is an art and extends to areas such as consumption, industrialization, and social impact [6]. By integrating 3D body scanning technology and CAD software, brands such as Hugo Boss have provided personalized products, improved user experience, and

p-ISSN 3093-3242
e-ISSN 3093-3579
https://doi.org/10.51316/jst.189.etsd.2026.36.2.12
Received: Apr 11, 2025; Revised: Apr 23, 2025;
Accepted: May 6, 2025; Online: Mar 24, 2026.

increased production efficiency [7].

However, it cannot be denied that the process of technology integration also poses many challenges, especially in developing countries like Vietnam. Businesses must adapt quickly from human resource training requirements and software investment to changing leadership thinking.

Meanwhile, digitalization also allows brands to approach sustainable development strategies more deeply. For example, the application of blockchain technology in tracing the origin of raw materials is becoming increasingly popular, helping the fashion industry ensure transparency and environmental responsibility [8].

Finally, today's fashion design cannot be without the role of creative innovation associated with high technology. New-generation designers are taking advantage of technologies such as AI, Augmented Reality (AR), Virtual Reality (VR), and Non-Fungible Tokens (NFTs) to create "virtualized" products with a high level of interaction in line with digital market trends and modern consumer expectations [9].

In short, technology helps improve productivity and reduce costs. It opens a new era for the fashion industry - where data drives creativity, the environment is protected by technology, and consumers are connected in a sustainable, transparent, and personalized fashion ecosystem.

1.2. Research Objectives

This study aims to comprehensively evaluate the effectiveness of OptiTex software in optimizing the design and production process of garments in Vietnam's garment industry. Through a combination of surveys from industry experts and practical experiments at enterprises, the study focuses on clarifying:

- The degree of improvement in design time when using OptiTex;

- Effectiveness in saving costs of sample production and raw materials;

- Accuracy of 3D simulation compared to actual product;

- Challenges in the process of applying software in enterprises;

- Ability to integrate software into training and sustainable fashion trends.

Therefore, the study aims to propose specific solutions to improve the applicability of OptiTex in practice while contributing to the development orientation of digital technology in the Vietnamese garment industry.

1.3. Novelty and Practical Significance of the Research

This study serves as a pioneering effort in assessing the practical application of OptiTex software within the context of Vietnam's garment industry amidst an accelerated push toward digital transformation. In contrast to previous research, which predominantly focused on Computer-Aided Design and Computer-Aided Manufacturing (CAD/CAM) solutions such as Clo3D, Gerber, or Lectra - typically tailored for large-scale corporations or the high-end fashion sector - the present study emphasizes OptiTex, an integrated and multifunctional tool. While OptiTex offers relatively greater accessibility for small and medium-sized enterprises compared to traditional high-cost solutions, its initial licensing expenses still warrant careful strategic consideration.

The novelty of the research is reflected in the simultaneous combination of quantitative surveys from industry experts and practical experiments at enterprises to provide an objective assessment of design efficiency, simulation accuracy, cost, and material savings. In particular, the research does not stop at analyzing software features but also delves into proposing directions for improvement, from simulation algorithms and user interfaces to the ability to integrate training and new technologies such as AI and Big Data.

In practical terms, the research results will help:

- Garment businesses appreciate the specific benefits of investing in 3D design software;

- Training institutions update their curriculum to match technological trends in the fashion industry;

- Individual designers apply modern design tools to shorten the creative process, save costs, and quickly respond to market needs.

The research contributes to the premise for the widespread application of digital design software in the production process towards a modern, flexible, and sustainable fashion industry.

2. Experiments

To evaluate the effectiveness of the OptiTex software application in optimizing apparel design and production, the study was conducted based on two primary methods: a quantitative survey of fashion industry experts and a practical experiment at a garment enterprise. Combining both methods ensures the objectivity and comprehensiveness of the research results.

2.1. Online Survey with 106 Participants

To evaluate the effectiveness and practical application of OptiTex software in fashion design, the research team conducted an online survey via the Google Forms platform. The survey consisted of 15 questions, combining closed and open-ended questions, focusing on four main content groups: (1) design efficiency, (2) material savings, (3) 3D simulation accuracy, and (4) difficulties in using the software.

A total of 106 individuals working in the fashion industry participated in the survey, including designers, design lecturers, and students, CAD/CAM experts, and representatives of garment manufacturing enterprises.

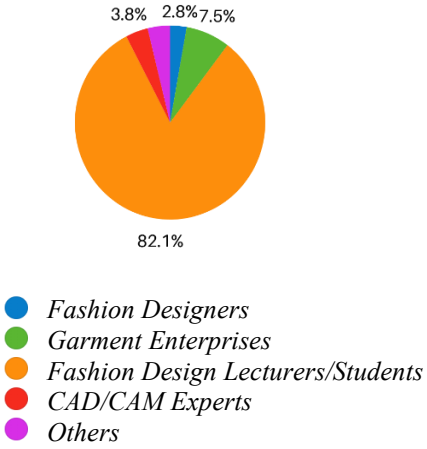

Fig. 1. The proportion of groups of subjects participating in the survey

Collected data were processed using descriptive statistics to determine the trends in evaluation and response according to each key criterion. The qualitative responses were also analyzed in content to identify common barriers when implementing software in production and training practices.

Survey results show:

- More than 70% of participants noted that OptiTex reduced design time by 20% or more, with 30.2% achieving savings of up to 60%.

- 53.7% said the software helps reduce the cost of producing prototypes, thanks to its accurate 3D simulation capabilities, thereby reducing the number of physical tests and saving materials.

These results reflect the positive role of OptiTex in shortening product development cycles, optimizing resources, and supporting businesses to improve production efficiency. At the same time, this shows the potential of the-software in promoting the digital transformation of the fashion industry towards a more sustainable and flexible direction.

2.2. Experiment at Hai Ngoc Garment Company Limited

To verify the practical effectiveness of OptiTex software in a real production environment, the research team experimented with Hai Ngoc Garment Company Limited. Two designs were selected for the testing process as following:

Model DR-SL-HN0121A: used to test the ability to simulate fit through digital analysis.

Model HN061223: applied the entire process of 2D pattern design, 3D simulation, automatic pattern layout, and actual sample sewing.

All steps in the design–simulation–manufacturing process are recorded to monitor and evaluate technical indicators such as design time, number of physical sample tests, material consumption, and deviation between the simulation model and finished product. The "Fit Analysis" tool integrated into the software helps to check the fit, tension, and material deformation visually on the 3D model.

The images in Fig. 2, Fig. 3, Fig.4, and Fig. 5 illustrate the process on model HN061223:

Fig. 2. Photographs of two experimental design samples

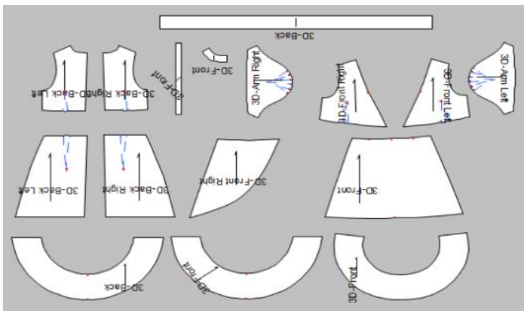

Fig. 3. 2D pattern design of costume details

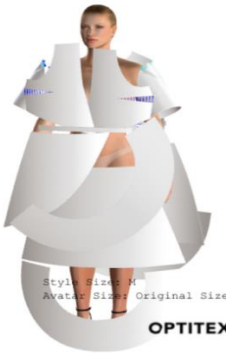

Fig 4. Attaching the 2D pattern to the 3D mannequin

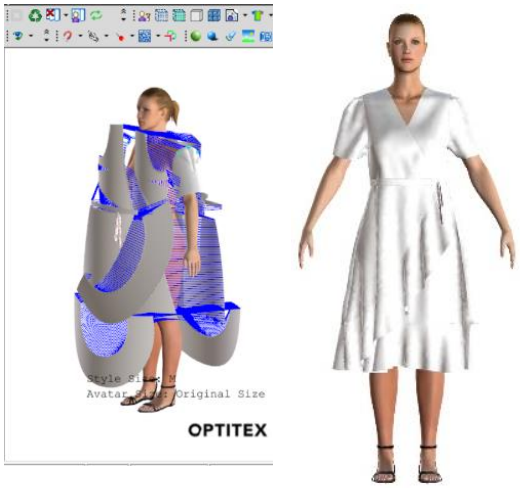

Fig. 5. Complete digital sewing simulation on a 3D platform

This experimental process aims to create a foundation for comparing simulation results with real products as a quantitative basis for the OptiTex performance evaluation in Section 3.3.

3. Results and Discussion

3.1. Overview of OptiTex Software in Vietnam

3.1.1. Applications of OptiTex software in The Garment Industry in Vietnam

In the context of the Vietnamese garment industry, which promotes digital transformation to enhance competitiveness, OptiTex 3D design software has become an essential solution to modernize the production process. With the ability to integrate 2D pattern design, 3D product simulation, and automatic layout optimization, OptiTex not only helps shorten the product development cycle but also minimizes material waste, thereby supporting the direction of sustainable development in the industry.

In fact, this software is being widely applied in more than 50 enterprises in Vietnam, including typical names such as TBS Group, Meko, Gen-nex, Simone, VinFast, and Toyota Boshoku. Using OptiTex has helped these enterprises improve labor productivity, optimize supply chain management, and shorten the time from design to production. In addition, the ability to simulate 3D accurately also supports the design team in making quick decisions while reducing the number of times to create physical samples, saving time and costs.

A concrete demonstration of the effectiveness of OptiTex software comes from Elcatex Group - one of the largest textile enterprises in Central America. Elcatex has applied OptiTex to completely digitize the design process, thereby shortening product development time, reducing costs, and improving the accuracy of 3D designs. In particular, Elcatex affirms that OptiTex is the only software that allows comprehensive control from design concept to production in a closed system, which aligns with their sustainable development strategy [10].

Learning from successful models such as Elcatex provides valuable references to Vietnamese enterprises, especially small and medium enterprises looking for integrated, economical, and efficient design-production solutions. Not only a technical support tool, OptiTex is also a strategic lever for comprehensive digital transformation, opening up opportunities for innovation, process optimization, and sustainable development for the Vietnamese textile and garment industry.

A survey was conducted with businesses and experts in the industry to assess the popularity of OptiTex software in Vietnam's garment industry. The survey results show that OptiTex is widely applied in many large enterprises, improving the design and production process. Fig. 6 illustrates the percentage of businesses that have been and are using OptiTex software in practice.

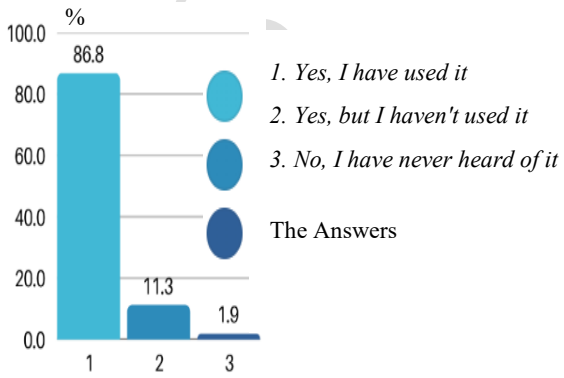

Fig. 6. Chart showing the popularity of OptiTex in Vietnamese garment enterprises

3.1.2. Challenges in applying OptiTex

In the Vietnamese garment industry, which increasingly promotes digital technology, OptiTex software has affirmed its position as one of the most popular 3D design and simulation solutions. Many large enterprises such as TBS Group, Meko, Simone, or Gen-nex have actively deployed this software in product development. Thanks to the ability to integrate pattern design, visual simulation, and automatic diagram making, OptiTex helps to significantly shorten the design-production cycle while minimizing errors in technical stages. Implementation practice at several factories shows that the application of OptiTex not only improves work efficiency but also contributes to saving materials and limiting the number of sample testing times, thereby reducing costs and time to bring products to market. This is also why this software is gradually becoming the priority choice in the digital transformation process of the Vietnamese fashion industry.

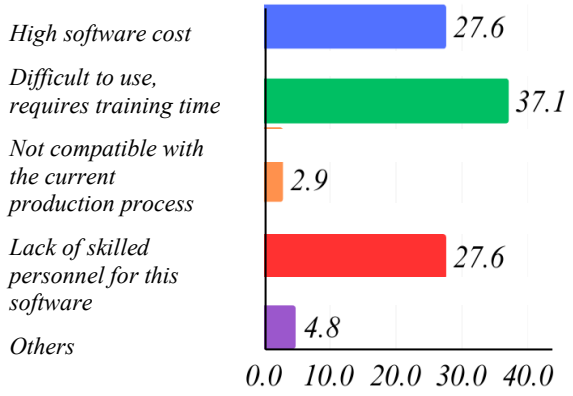

Fig. 7. Results of the online survey (n - 106) on the main difficulties encountered when using OptiTex software

3.1.3. Practical applications of OptiTex in garment optimization

3D Simulation - Reduce Physical Prototypes, Save Cost

Previously, designers had to create multiple physical prototypes to test shape, fit, and materials, which was time-consuming and costly. However, with OptiTex, 3D simulation helps to test the drape, shape, and movement of the garment on a virtual model before actual production. This significantly reduces the number of physical prototypes. According to a study by Rastogi & Keserwani (2024) [11], OptiTex can reduce design time by 30% - 50%, creating a huge advantage for businesses in product development.

Automatic plotting - Reduce material waste

In the past, fabric cutting was mainly based on manual experience, which easily caused material waste; then, with OptiTex, the automatic plotting system helps to maximize the fabric area and minimize industrial waste. According to research by Pengpeng *et al.* (2017) [1], the fabric layout optimization algorithm in OptiTex helps reduce 10% - 20% of material consumption, bringing significant economic benefits.

Automate production scheduling - Increasing productivity and profitability

Businesses often have difficulty coordinating labor, materials, and production time. By integrating the Simplex algorithm, OptiTex helps automate production scheduling, optimize work efficiency, and minimize errors. Rachman (2017) [12] demonstrated that OptiTex can help increase productivity and reduce production costs thanks to its intelligent optimization capabilities.

Inventory Management - Reduce Excess Inventory, Respond Quickly to Market Demand

Inaccurate inventory management can cause businesses to produce excess or shortages, affecting operating costs. OptiTex allows firms to adjust production flexibly and efficiently by analyzing market data. Daniel *et al.* (2020) [13] have proven that this software helps reduce excess inventory and optimize production processes.

3.1.4. OptiTex Application Trends in The Vietnam Fashion Industry

Adopting OptiTex in the Vietnamese fashion industry is increasingly important as it improves productivity and quality in garment manufacturing. OptiTex, a leading fashion design and manufacturing software, is being adopted to streamline processes, improve design accuracy, and facilitate better communication between stakeholders. This trend is particularly relevant given the industry's growth and the need for sustainable practices.

Sustainable Fashion - Towards Eco-Friendly Production

As the fashion industry increasingly faces pressure from environmental issues and sustainable development requirements, OptiTex software is an essential green technology solution that helps businesses optimize their design and production processes. Thanks to its precise 3D simulation capabilities, designers can test the shape, drape, and technical characteristics of garments on the digital platform without creating physical samples, thereby significantly reducing waste and resource consumption during the testing phase.

In addition, the software's automatic pattern-making feature helps maximize fabric area, limiting industrial waste generated by traditional cutting and sewing. This is a practical solution to support fashion businesses in minimizing environmental impact while improving material use efficiency.

According to Quang *et al.* (2020), digital design-enabled technologies such as OptiTex can significantly contribute to the green transformation of the Vietnamese fashion industry, by reducing waste and improving production efficiency right from the initial design stage [14].

Product personalization – Meeting the demand for custom design

The development of digital design technology, especially OptiTex software, has opened up the possibility of realizing personalized design solutions - a trend consumers increasingly prefer. With the ability to automatically jump sizes, adjust designs according to specific measurements, and create realistic 3D models, OptiTex allows brands to create limited collections suitable for each customer's requirements. This represents a significant competitive edge, catering to modern consumers who prefer customized products over mass-produced ones and prefer "tailor-made" products that express individual personality.

Beyond the ability to customize sizes, OptiTex also supports designers in developing complex and aesthetically pleasing garment structures. Thanks to a powerful simulation interface and a diverse fabric library, designers can directly test styles, materials, and cuts on the digital platform, optimizing designs to suit the preferences of each customer group. Oh and Bae's research (2022) shows that the Vietnamese fashion market is shifting towards sophisticated, romantic, and elegant designs. This trend can be effectively realized with tools like OptiTex [15].

From there, the software acts as a design tool. It becomes a bridge between product personalization and innovation strategy, promoting the domestic fashion market's development in a flexible and customer-centric direction.

Digital Fashion - NFT and E-commerce Applications

OptiTex technology supports brands in creating digital designs instead of physical samples. In particular, the NFT fashion trend is growing strongly, helping businesses sell virtual designs on digital platforms. This is an excellent opportunity to expand the market in e-commerce and metaverse.

3.2. Survey Results on the Effectiveness of OptiTex Software in Garment Design and Production

A survey of 106 participants found that OptiTex software reduced design time by 20% - 60%, with 42.5% of users reporting time savings of 20% - 40% and 30.2% recording savings of 41% - 60%. Compared to the study by Wang *et al.* (2020) [16], this result is consistent with previous studies on the impact of 3D simulation software in the fashion industry in Fig. 8.

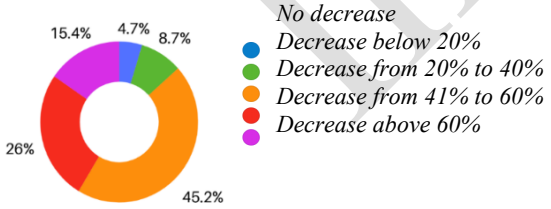

Fig. 8. The chart showing the time savings when using OptiTex compared to the manual method

In addition, 53.7% of participants reported that OptiTex significantly reduced the cost of prototype roduction, consistent with the study by Smith *et al.* (2022) [17], which showed that the use of 3D simulation software could save 10% - 15% of raw materials during the manufacturing process.

3.3. Experimental Results at Hai Ngoc Garment Company

To evaluate the practical effectiveness of OptiTex software in the production environment, the research team conducted experiments at Hai Ngoc Garment Company Limited with two design models: DR-SL-HN0121A and HN061223. The experiments focused on three main contents: (1) 3D simulation accuracy, (2) automatic plotting efficiency in saving materials, and (3) the ability to shorten production time and reduce physical samples.

3.3.1. 3D simulation accuracy

Using the "3D Fit Analysis" tool, the research team determined that the average deviation between the simulated and actual products was only about 0.35 cm. The error mainly comes from the physical factors of the real fabric, such as drape and stretch, which cannot be simulated completely accurately. However, the overall accuracy reached 92%, showing that the software has high applicability in digital design. This result is similar to the study by Sun *et al.* (2021) [18], which found that 3D simulation achieved a compatibility of 85-95% depending on the type of material in Fig. 9.

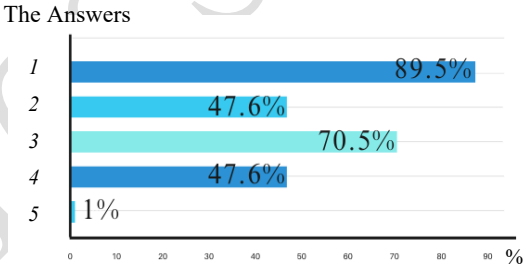

Fig. 9. 3D simulation accuracy chart

1. *Realistic 3D simulation helps check the fit before production.*
2. *Reduces prototype production costs*
3. *Improves accuracy in cutting and mass production.*
4. *Enhances creativity for designers.*
5. *Others.*

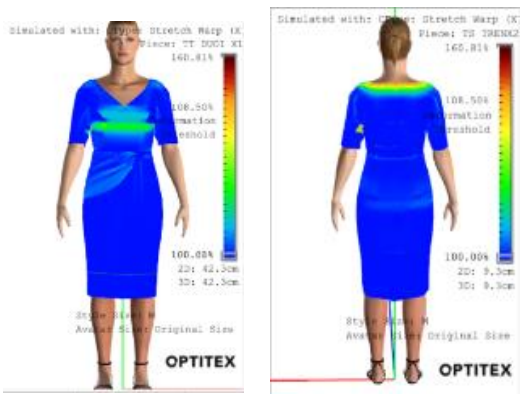

Fig. 10. 3D simulation sample fit check

The software also integrates a color map (Fit Map) that visually shows deviations, over-stretching, or over-stretching points, helping designers make accurate adjustments before actual production.

3.3.2. The effectiveness of OptiTex automatic plotting in material optimization

OptiTex software allows for plotting with optimal material consumption. In model HN061223, the amount of fabric used is reduced by about 12% compared to the manual method. The plotting time is also reduced from 40 minutes to 28 minutes, corresponding to a time saving of 30%.

The software supports adjusting input parameters such as fabric size, cutting-edge distance, and direction, providing a practical layout and minimizing material waste.

Fig. 11. Diagram of item code HN061223 size S/1 - L/1 using OptiTex

3.4. General Assessment and Recommendations for Improvement in the Application of OptiTex Software

Experimental results show that the accuracy of 3D simulation using OptiTex software is, on average, 92%, with an average error of only 0.35 cm compared to the actual product. A more detailed analysis shows that the error due to fabric drapes is about 6.5%, especially in soft fabrics with high drapes. In comparison, the error due to elasticity is only about 1.75%, proving that the software can simulate the fabric's elastic properties quite accurately. These results confirm that OptiTex is a valuable tool in the fashion industry, helping improve the accuracy of the design and production process.

In addition to high precision, applying OptiTex also brings significant efficiency in optimizing the production process. According to research, this software helps reduce design time by 20% - 60% while saving about 12% of raw materials thanks to the ability to create diagrams automatically. This not only helps reduce production costs but also limits fabric waste, contributing to the sustainable development of the garment industry.

Although OptiTex offers many benefits, some improvements must be made to expand its application in the fashion industry. First, the software needs to upgrade its fabric simulation algorithm to reduce errors in reproducing the drape and stretch of highly elastic fabrics. In addition, the software licensing cost is still relatively high, making it difficult for small and medium-sized enterprises to access this technology. Finally, organizing more in-depth training courses will help users maximize the features of OptiTex, improving the effectiveness of practical applications. If these improvements are implemented, OptiTex will become an even more optimal solution in the fashion industry, supporting the design, production, and material management processes more effectively.

a) 3D Simulation b) Actual product after sewing

Fig. 12. Visual comparison between 3D simulation and actual product after sewing

4. Conclusion

This study conducted a comprehensive evaluation of the effectiveness of the OptiTex software application in apparel design and production through a survey of 106 industry experts and practical experiments at Hai Ngoc Garment Company Limited. The results showed that OptiTex is a powerful support tool for improving productivity, optimizing design processes, and minimizing costs in the fashion industry.

Specifically, the software helps reduce design time by 20% to 60%, save about 12% of raw materials thanks to automatic mapping algorithms, and achieve an average 3D simulation accuracy of up to 92% compared to the actual product. Features such as visual simulation, digital fit analysis, and the ability to check for errors before producing real samples have helped reduce the number of physical tests while improving the quality and accuracy of the output product.

In addition to the apparent benefits, the study identified several barriers to practical implementation, including software licensing costs, operational complexity, and high user skill requirements. To overcome these limitations, the research team proposed solutions to improve the fabric simulation algorithm, simplify the user interface, enhance in-depth training, and integrate new technologies such as AI, big data, and blockchain into the software platform.

With its practical contributions and open development prospects, OptiTex software is expected to continue to be an essential platform to promote the digital transformation process in the Vietnamese fashion industry. At the same time, this is also the basis for training schools and businesses to cooperate to build a modern, sustainable, and highly adaptable design and production ecosystem in the 4.0 technology era.

Acknowledgments

The authors would like to sincerely thank Ho Chi Minh City University of Industry for creating favorable conditions for the research and implementation of this article. We also thank Hai Ngoc Garment Company Limited for providing data and an experimental environment, along with experts and designers in the garment industry, as well as lecturers and students who participated in the survey and contributed valuable ideas to the research.

Your support and contributions have helped us complete the article effectively. Thank you very much!.

References

[1] W. Pengpeng, X. Jiajun, and S. Qun, Garment layout automatic optimization method, U.S. Patent 11,523,649 B2, Jul. 21, 2017.

[2] X. Luan, N. Ahmad, M. Zaimmudin, and M. Zain, Technological innovations in fashion design: A comprehensive review, International Journal of Entrepreneurship and Management Practices, vol. 7, no. 24, pp. 117–135, Mar. 2024.

[3] Z. Nana, Analysis of the Promotion of Computer to the Development of Garment, in Emerging Trends in Intelligent and Interactive Systems and Applications, Proceedings of the 5th International Conference on Intelligent, Interactive Systems and Applications (IISA2020), Springer, 2020, pp. 291–295. https://doi.org/10.1007/978-3-030-63784-2_36

[4] A. Ludaš, I. Čorak, M. I. Glogar, and S. E. Ražić, Inkjet tisak i plazma u konceptu digitalne mode [Inkjet printing and plasma in the concept of digital fashion], Koža i obuća (Croatian Journal of Leather and Footwear Technology), vol. 73, no. 1, May 2024, (in Croatian). https://doi.org/10.34187/ko.73.1.1

[5] Z. Falsafi, PinaClutch-no waste, International Textile and Apparel Association Annual Conference Proceedings, Jan. 2024. https://doi.org/10.31274/itaa.17576

[6] J. Fan and P. Poonyaprapha, Ten years of fashion design research scientometric analysis of research: research overview, frontiers and evolutionary paths, International Journal of Sociologies and Anthropologies Science Reviews, vol. 4, iss. 6, Nov–Dec 2024. https://doi.org/10.60027/ijsasr.2024.4881

[7] S. Thadepalli and Mr. U. Choudhary, Synergy of real and digital worlds - promising insights for the future generations of fashion, International Journal of Recent Technology and Engineering (IJRTE), vol. 13, no. 1, May 2024, pp. 22–26. http://www.doi.org/10.35940/ijrte.A8054.13010524

[8] E. A. Orisadare, O. E. Achukwu, A. A. Ogunyemi, D. O. Adedeji, I. J. Diyaolu, E. I. Ugwu, A. O. Oluwatope, K. O. Bakare, and I. O. Awoyelu, Digitalisation and green strategies: a systematic review of the textile, apparel and fashion industries, Circular Economy and Sustainability (Springer), vol. 5, iss. 4, Apr. 2025. https://doi.org/10.21203/rs.3.rs-4804089/v1

[9] A. Joy, Y . Zhu, C . R . Peña, M . Brouard, Digital future of luxury brands: Metaverse, digital fashion, and non-fungible tokens, Strategic Change, vol. 31, iss. 3, May 2022. https://doi.org/10.1002/jsc.2502

[10] Elcatex - OptiTex, Sustainable Product Development With 3D, https://optitex.com/media/Optitex-Elcatex_case_study-EN.pdf?utm_source=chatgpt.com, Accessed Mar. 2, 2025

[11] M. Rastogi and H. Keserwani, Impact of technology on various facets of the fashion industry, International Journal For Multidisciplinary Research (IJFMR), vol. 6, iss. 2, Mar–Apr. 2024.

[12] M. Rastogi and H. Keserwani, Impact of Technology on Various Facets of the Fashion Industry, International Journal For Multidisciplinary Research, vol. 6, iss. 2, Mar–Apr. 2024. https://doi.org/10.36948/ijfmr.2024.v06i02.15845

[13] Shah, V. and Agarwal, S., Technology innovation holds the key to victory for the fashion industry's bright future, ShodhKosh: Journal of Visual and Performing Arts, vol. 5, iss. 5, pp. 613–621, May 2024. https://doi.org/10.29121/shodhkosh.v5.i5.2024.1964

[14] Tri Tran Quang, Tu Tran, Alang Tho, and John Burgess, Chances and challenges of Vietnam's garment industry in the new trend of sustainable development, in 2020 5th International Conference on Green Technology and Sustainable Development (GTSD), Ho Chi Minh City, Vietnam, 27–28 November, 2020. https://doi.org/10.1109/GTSD50082.2020.9303100

[15] H. Oh and S. J. Bae, A study on the fashion design of Vietnamese female consumers to promote the Vietnam fashion market, The Korean Society of Design Culture, vol. 28, no. 3, 2022, pp. 275–288. https://doi.org/10.18208/ksdc.2022.28.3.275

[16] Evridiki - Eurydice Papachristou, N. Bilalis, 3D virtual prototyping traces new avenues for fashion design and product development: a qualitative study, Journal of Textile Science & Engineering, Apr. 2017. https://doi.org/10.4172/2165-8064.1000297

[17] K. A. Schuck and J. K. Perret, Optimizing the production of fashion goods as means to a more sustainable garment industry, in XXXI ACEDE International Conference, 2022.

[18] E. Lee and H. Park, 3D virtual fit simulation technology: strengths and areas of improvement for increased adoption industry, International Journal of Fashion Design, Technology and Education, vol. 9, no. 1, 2016, pp. 59–70. https://doi.org/10.1080/17543266.2016.1194483