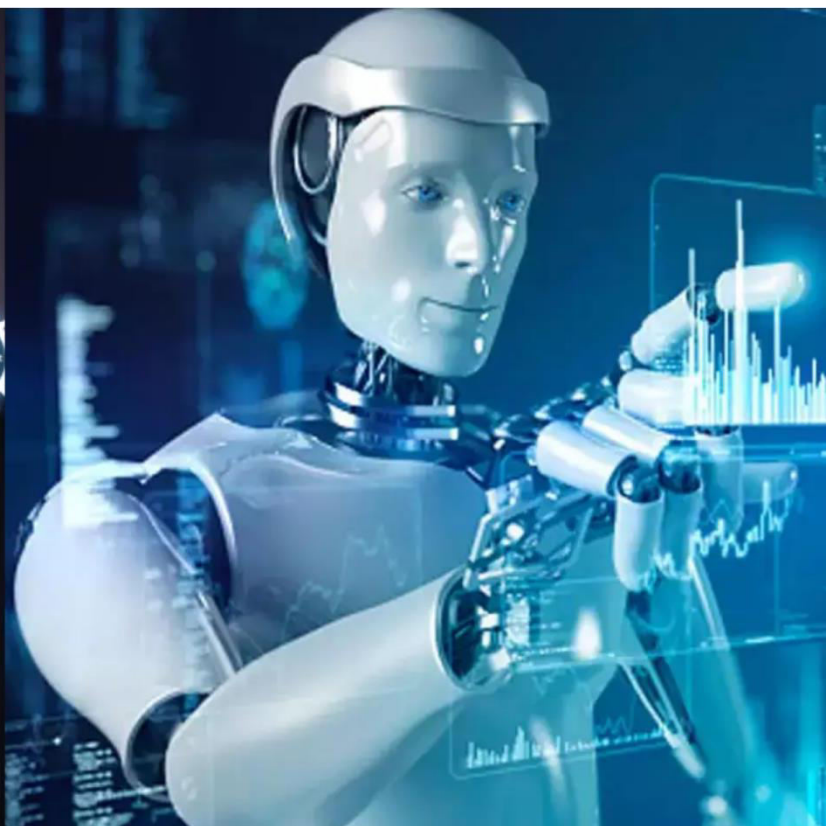




International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 9.935

Volume 15, Issue 7, July 2026

AI, Product-Market Fit in Sports Textile Startups: Consumer Needs, Performance Claims, and Adoption Barriers in Athlete-Focused Products

Avyay Jain

Student, Nord Anglia International School, Dubai, United Arab Emirates

ABSTRACT: This research explores product-market-fit in sports textile startups with the support of artificial intelligence, specifically in terms of the number of consumer needs, performance claims and adoption barriers in athlete-oriented products. The study discusses comfort, breathability, moisture management, durability, price, functionality and brand trust, as key factors that influences consumer adoption, using secondary research. The results show that the acceptance in the market does not always follow technological innovation. Consumers need real-life performance benefits and real value that 'makes sense' in terms of product price. Consumer insights can be analysed and preferences identified using AI to help startups segment and enhance product development. Finally, the study highlights the potential for integrating AI-driven insights with consumer-centric innovation to enhance product-market fit and adoption.

KEYWORDS: Artificial Intelligence; Product-Market Fit; Sports Textiles

I. INTRODUCTION

The sports and fitness textile market is rapidly changing and people are now looking for products that offer comfort, performance, functionality, and durable materials. Sports enthusiasts and gym users are no longer just checking how the sportswear looks; factors such as its fit, breathability, moisture management, hygiene, durability, and the trust in product claims, as well as price, are all now part of the decision-making. (Ajzen, 1991). Meanwhile, artificial intelligence (AI) is opening up new possibilities for sports textile startups to gain insights into consumer preferences, analyse feedback and personalise products and make better product development decisions. But technological innovation isn't always enough to ensure a successful business. Product-market fit means that the startup has found a true need in the market and created a product or service that offers enough value to make them want to use the product (Bouschery, Blazevic and Piller, 2023).

This research paper explores the connection between AI, product-market fit and consumer adoption in sports textile start-ups, focusing on the effects of product-market fit on the adoption of AI within athlete-focused products. It uncovers the way in which consumers evaluate sports textiles product performance claims and what factors affect the willingness to use new sports textiles. Barriers such as high cost, comfort and durability concerns, brand credibility and trust in claims of performance are also taken into account. In addition, the research explores how to harness consumer insights and AI-driven strategies to alleviate uncertainty, bolster credibility and craft products that align more closely with market requirements for early-stage sports textile brands. In summary, the paper seeks to give a business perspective on the path sports textile innovations can take from an athlete's felt pain to a commercial and sustainable product.

II. RATIONALE AND OBJECTIVE

Rationale

The need of this research comes from the fact that more and more innovation and consumer-oriented product development is gaining importance in the sports textile industry. While AI and advanced textile technology may have plenty of potential, many products geared toward athletes could end up not meeting the real needs of consumers, or offering inadequate value (Brem, Giones and Werle, 2023). For Product Market Fit, therefore, it's vital to know what factors make a product comfortable for your audience, durable, and cost-effective while also knowing their performance and what claims you can make about your product. Comfort, durability, pricing, performance claims, and

brand trust are all factors that need to be understood to achieve Product Market Fit. The study's findings are significant for sports textile startups as it highlights the importance of leveraging consumer insights and AI to inform the creation of marketable, credible, and desirable products.

Objectives

1. To examine the key consumer needs and preferences influencing the adoption of athlete-focused sports textile products.
2. To evaluate the influence of performance claims, product characteristics, pricing and brand trust on consumers' purchasing and adoption decisions.
3. To identify the major barriers to product adoption and explore how AI can support sports textile startups in achieving stronger product-market fit.

III. METHODOLOGY

The methodology of this research is secondary research that is used to analyze product-market fit, consumer needs, performance claims and the barriers to emergence in the sports textile consumer market for athlete-focused sport startups. No primary data will be collected. Secondary research is suitable for the researcher who can look at the existing academic research, critically analyse it and find some patterns, concepts and gaps in the research without interviewing or surveying people (Johnston, 2014). The study will look at peer-reviewed journal articles only, academic books and scholarly publications on sports textiles, consumer behaviour, product-market fit, innovation and technology adoption, and artificial intelligence from the search engine of Google Scholar. Google Scholar aims to make scholarly literature available, such as papers and conference proceedings, theses, academic books. Literature will be chosen in accordance with the objectives of the research, academic credibility and publication date of the literature. The findings from the gathered evidence will be analysed thematically to pinpoint common factors influencing consumer adoption, such as comfort, durability, pricing, performance, trust and technological advances. Even if there is no human subject in the study, it is still significant in terms of ethical standards. The research will accurately represent authors' findings, avoid plagiarism and provide appropriate citations. Secondary information will not be twisted, misapplied, or cherry-picked to fit a certain point of view. If personal and/or sensitive information is included in information published, confidentiality and responsible use will be maintained.

IV. LITERATURE REVIEW

Theme 1: Consumer Needs and Preferences in Athlete-Focused Sports Textiles

The success of a product-market fit is all about the needs of the consumer as innovative products are only commercially successful when the features of a product align with the problem and expectation of its target consumers. For sports textiles, besides their visual appearance, there are other demands by consumers such as comfort, fit, breathability, moisture management, flexibility, durability, and suitability of the textile for various physical activities (Brem, Giones and Werle, 2023). It is found in literature that sportswear is a functional product, which directly interacts with the human body when used during exercise. Therefore, the characteristics of the textiles can have a positive effect on physical comfort as well as product quality from the consumer's standpoint. Comfort is especially vital to sportswear since it is worn during the period of elevated body temperature leading to perspiration and extra motion. Studies on sports and exercise wear shows that fit and comfort are linked, and that there are varying priorities based on consumer characteristics and physical activity levels (Gama and Magistretti, 2025). This indicates that a start-up should not rely on the fact that one product from the sports textiles will meet all the consumers' requirements equally. Rather, the product development should take into account the requirements of the target market segment.

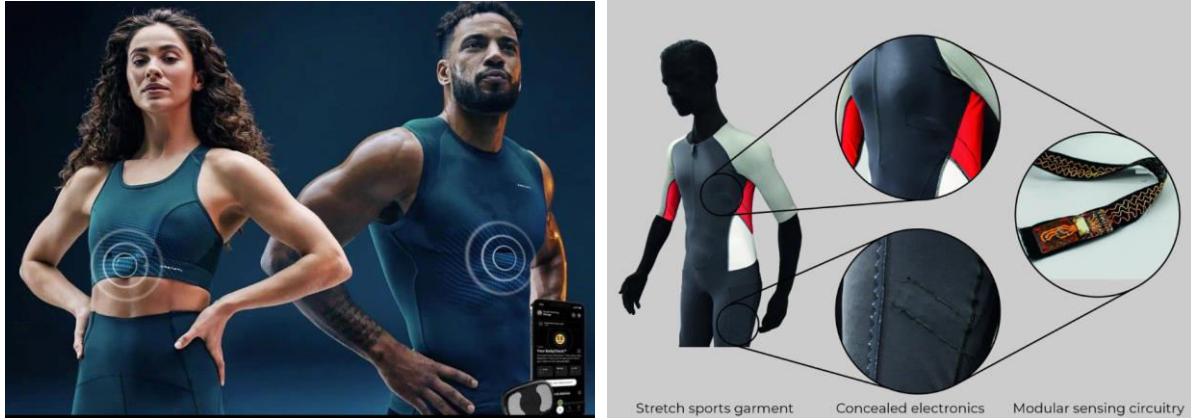


Figure: Integration of artificial intelligence and smart textile technologies in athlete-focused sportswear

This presents an opportunity for athlete-based startups like AeroDry to find a "product-market fit. The product must have a recognisable consumer problem and not the technology problem itself and not a problem that the consumer has no interest in solving (Islam et al., 2025). For athletes, for instance, discomfort from sweat accumulation during intense workouts may be a more effective value proposition than to just add new technological elements, for instance. Endurance sports players, for example, might value thermoregulation and durability more, while gym users might consider flexibility, looks and comfort. The literature thus confirms a consumer-oriented approach to sports textile development. Knowing what consumers need can help startups prioritize product features that offer more value over the others that don't (Johnston, 2014). Consumer insight can then minimize the chances of creating a technically advanced product that does not address a viable customer need.

Theme 2: Performance, Comfort and Functional Value of Sports Textiles

The second dominant theme is the sport textiles functional performance. In the modern era, increasing research is directed toward developing technologies that enhance moisture management, thermoregulation, mechanical support, protection and general physiological comfort (Kim, Chan and Gupta, 2007). Smart textiles and smart technologies, along with specialised fibres, fabric structures and coatings, can be integrated into sports textiles to react to an environmental or physiological stimulus. The management of moisture is especially critical as sweat can have a detrimental effect on comfort during exercise. Fabrics that are breathable and moisture wicking may help to carry moisture away from the skin, which can enhance the users tactile and thermal feelings. Thermoregulation is also significant as changes in body temperature during exercise can be quite large (Kumar et al., 2019). So, a garment's heat and moisture management capability is a possible value-added factor for consumers. But it is not possible to think about functional performance without taking comfort into account. A technically high-tech material can have poor commercial applications if it is "uncomfortable" or causes mobility problems or fails to function well after washing numerous times. Smart sportswear refers to garments equipped with technology that enhances their performance and functionality. The perceived comfort of the garment, which includes both material comfort and ergonomic design, as well as the comfort associated with the technological integration, are highlighted as key factors contributing to the acceptance of smart sportswear by recent research (Lee, Son and Lim, 2025). This illustrates the need to consider how technology performs in relation to the user's physical experience.

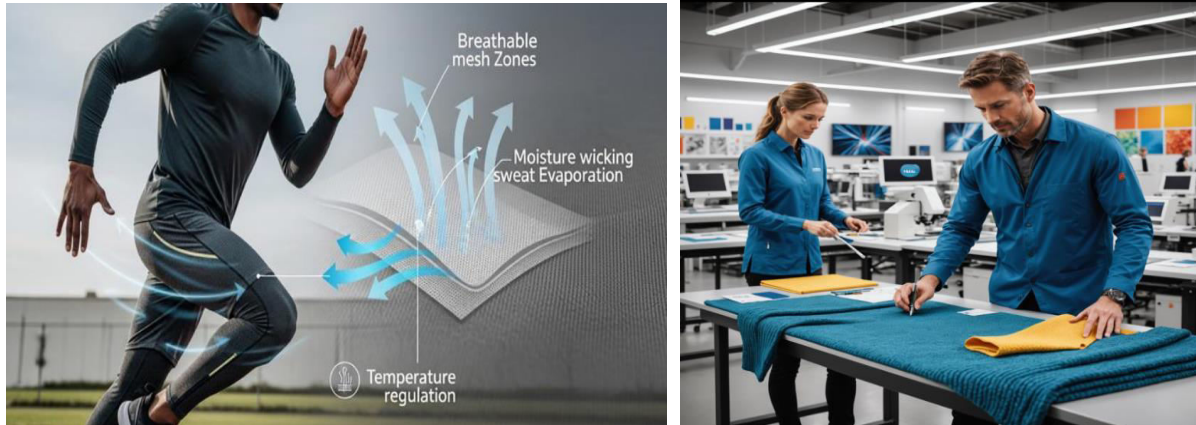


Figure: Functional sports textiles designed for moisture management and thermal comfort

This correlation is of special interest for AeroDry. The benefits of a performance-based sport textile should be interpreted and made known to the consumer. Any claims concerning sweat management, breathability, and odour control or temperature regulation should be matched with the actual product properties. This also helps build the product-market fit basis as the consumer will find a product with value if it is solving a real problem (Lim, Kim and Cheong, 2016). A similar trend is cited in the literature where future sports textiles are becoming ever more individualised. They offer digital manufacturing and the use of advanced technologies to create products based on the characteristics of the body, on its level of activity and its performance requirements. However, the development becomes more complex and production costs might also rise with personalisation. Startups must, therefore, consider the technological sophistication as well as its cost and usefulness to consumers (Marion and Fixson, 2021).

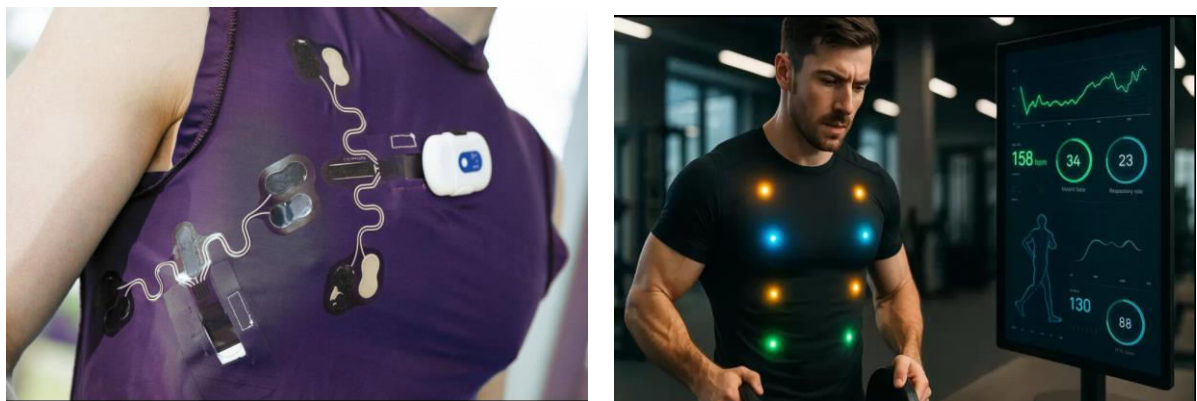


Figure: Smart textile integration for monitoring athlete performance

Theme 3: Performance Claims, Consumer Trust and Perceived Value

Another area that is important is the performance claims as consumers may not be able to check the technical attributes of sports textiles before buying. Claims for moisture-wicking, temperature management, odor resistance, compression, durability, and/or performance improvement can impact consumer expectations of value (Mustak et al., 2021). But the benefits of these claims are subject to consumers' belief in and connection to them. For sports textile start-ups, a key issue is thus the connection between technical evidence and consumer communication. If the message is unclear or overstated, it can lead to doubts in the consumer, and a company can spend a great deal of money researching a new and improved textile. On the other hand, providing clear information about products' features can be helpful to consumers in grasping the value of a specific material or construction. Technical performance is just one part of perceived value. The benefits of a product in comparison to its price, convenience, appearance, comfort, and durability and expected usefulness are the criteria consumers use to evaluate the product (Ramratan and Choudhary, 2020). Therefore, only a performance claim that consumers think is worth the total price of the product is commercially

relevant. This is especially crucial for start-ups, as big brands in the sportswear industry have better brand visibility and consumer confidence. A new company may then require more evidence to convince consumers of the validity of its claims in the performance. Transparent communication, providing information that is clear and understandable to all, and demonstrations of measurable product characteristics can strengthen trust, if undertaken through independent testing.

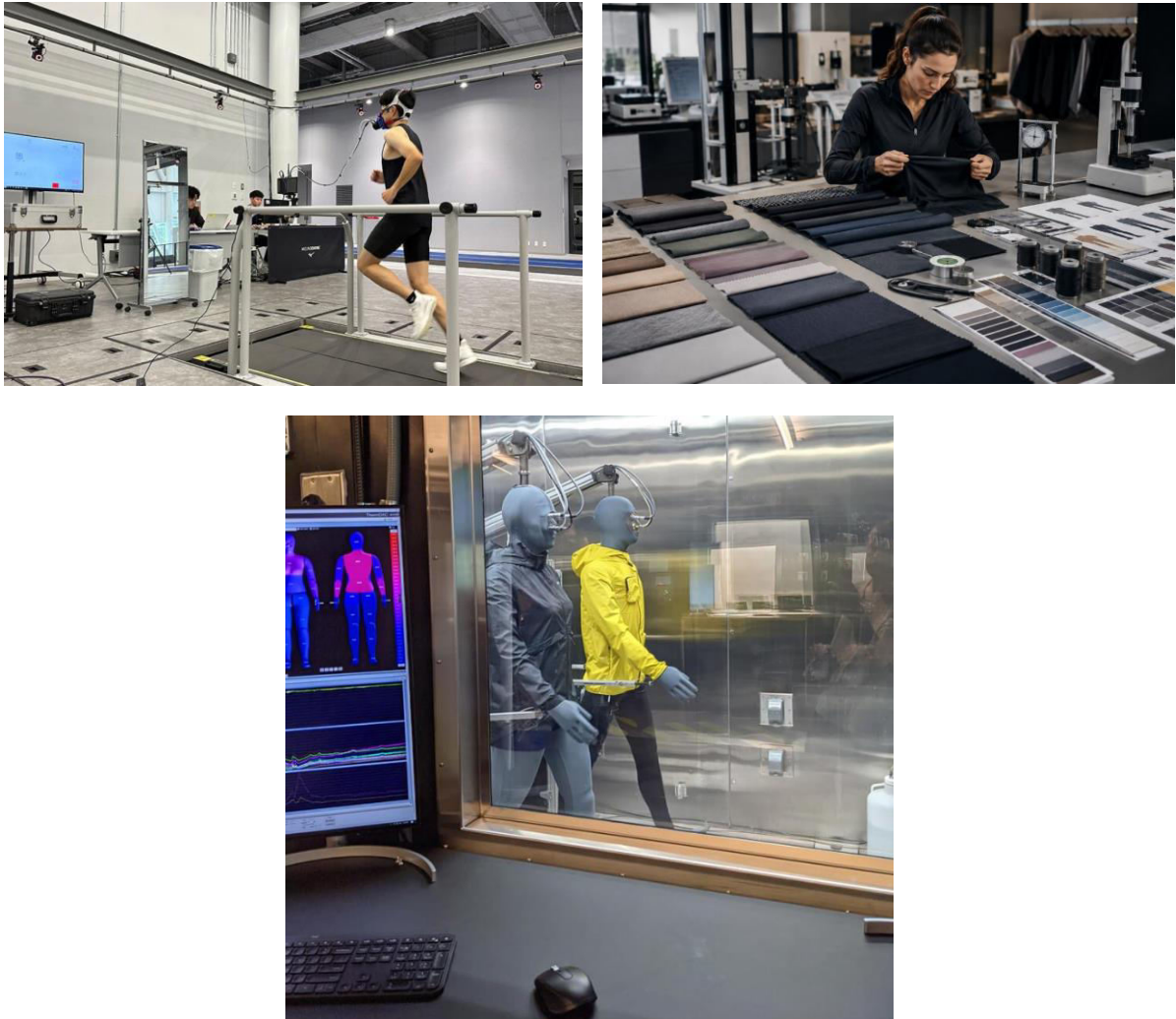


Figure: Testing and validation of sports textile performance characteristics

So, for AeroDry, the performance claims should relate directly to measurable product outcomes. The brand could not just focus on the technology or textile technology but also how it would help the consumer to derive a specific benefit from it (Suganthi and Senthilkumar, 2018). For instance, if AI is working to analyse customer data and find consistent issues related to sweat build-up, the product development that results should be linked to a defined moisture-management benefit. The literature then indicates that trust is a key link between innovation and adoption. It is important for consumers to have a belief that the product can provide the consumer with the benefits promised by the innovation, before they will see the innovation as valuable (Thibaut et al., 2019). Credibility is a part of product-market fit, which is why it is important.

Theme 4: Adoption Barriers in Innovative and Smart Sportswear

There are several challenges for the consumer to embrace new sports textiles, despite their potential for innovative applications. One of the most apparent is the price. The use of advanced materials, sensors, embedded electronics and

special manufacturing processes can also lead to greater production costs, which can lead to higher retail prices (Venkatesh et al., 2003). If the extra benefits aren't apparent or not very significant, consumers might not be willing to pay a premium. Another possible obstacle is comfort. Smart sportswear can potentially contain electronic components, sensors, or other technological features that could impact the garment's weight, flexibility, breathability or tactile comfort. In some cases, if the technology in clothing reduces the basic function, the consumer could refuse the product even if its technical features are good. Durability is also a crucial factor. Sportswear often gets washed, stretched, sweated and used to the max. Thus, consumers may doubt as to whether advanced features will continue to work in the long run (Wu and Chalip, 2013). The issue can be more critical for smart textiles where electronic or sensing elements can further create durability concerns.

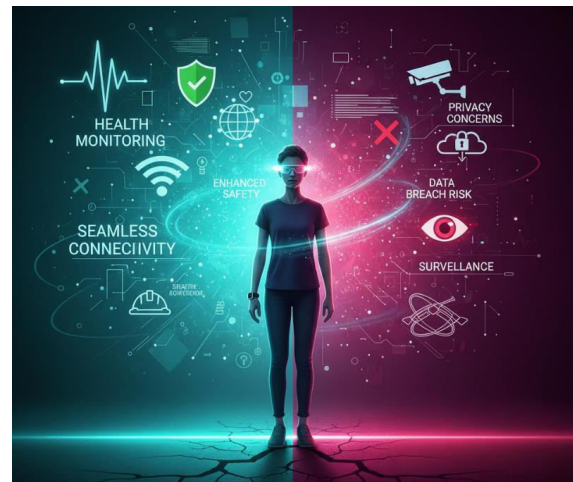
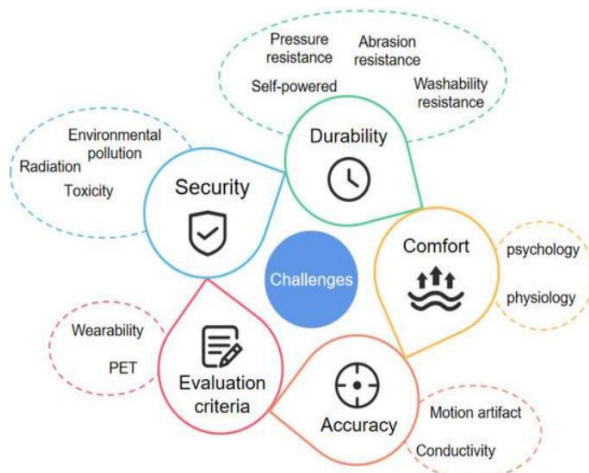


Figure: Key barriers to the adoption of smart sportswear technologies

Sportswear is also becoming more intelligent and may introduce privacy and data-related issues. Smart garments which are able to gather physiological or behavioural data can provide valuable data, but can also raise concerns regarding the collection, storage and processing of personal data. These concerns may affect consumers' adoption of the technology-enabled products. The other obstacle is the technical complexity of the technology itself. The consumer might not know what the smart textile does or if it has any noticeable value to them for the activity they are involved in. This poses a communication problem for startups (Yang et al., 2016; Yu et al., 2016; Zo and Choi, 2016). This means that innovation must be converted into easily understandable and pertinent consumer advantages. The literature thus suggests that adopting should not be considered as a direct result of technological progress. The willingness of consumers to embrace new sportswear innovations is shaped by the interplay between product performance, comfort, cost, usability, and trust in the product, along with perceived value. The willingness of consumers to purchase a new sportswear innovation is influenced by the product performance attributes, comfort, cost, usability, and trust in the product, as well as perceived value. The barriers are going to be found early in the startup as working out issues at the product development stage will minimise the risk of the market rejecting the product.

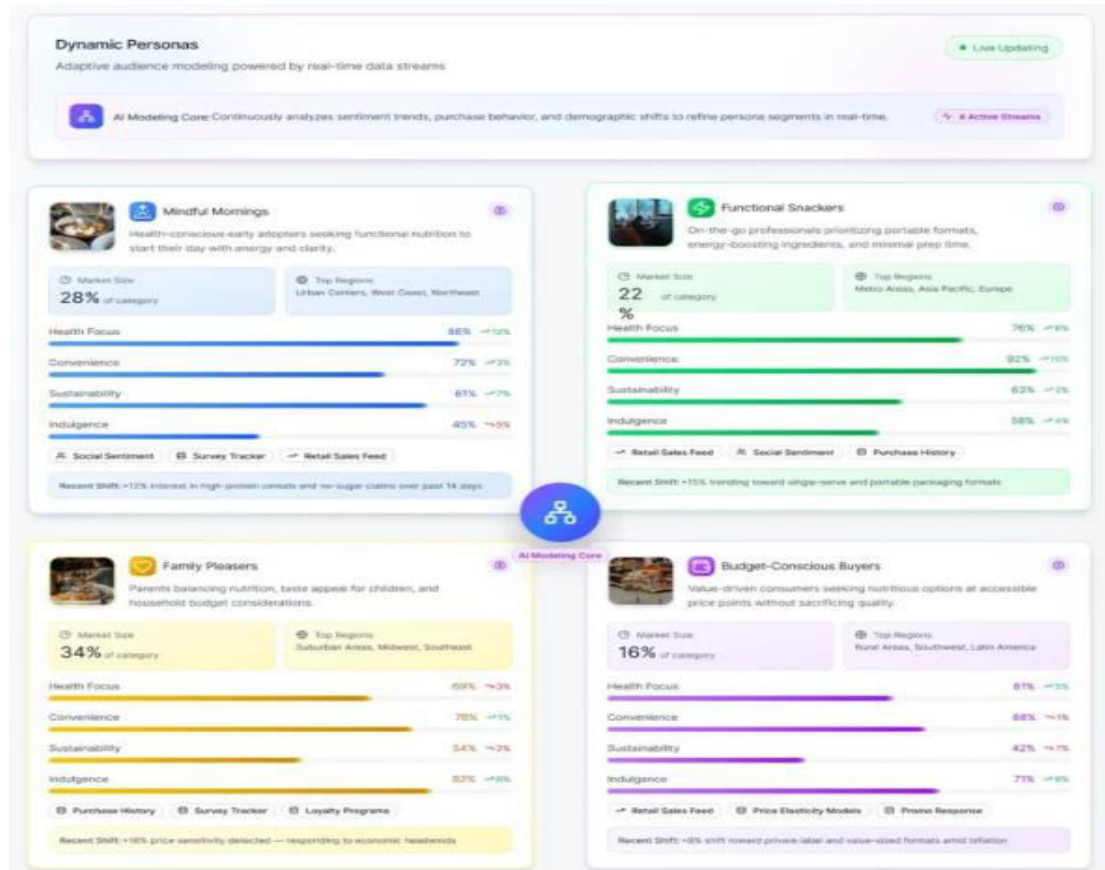
Theme 5: Artificial Intelligence and Product-Market Fit in Sports Textile Startups

The last theme is about using AI to aid with product-market fit. AI can potentially enhance the product development process by helping startups analyze vast amounts of consumer data, detect trends, and aid in quicker experimentation. Rather than blindly taking customers' preferences for granted, businesses can rely on data-driven methods for uncovering common complaints, features that customers would like to see in a product, and shifting market needs (Zhou et al., 2025). AI can help generate customer insights by analysing customer reviews, feedback and behavioural data. This can be useful to determine if consumers are focused on how the textile deals with sweat, comfort, fit, durability, cost and any other attribute for a sports textile start-up. These findings can help to guide product design and priorities. AI can also aid personalisation. The sportswear selection varies depending on the activity, weather, body shape and personal taste. Analysis using artificial intelligence might also help startups to acquire various segmentation of consumers and to create a product or suggestion oriented to each of them (Lobo, Cortez and Rivera, 2026). The method is in line with the global trend of customised sports textiles. Another possible area of contribution is the speed

at which experiments are conducted. Limited financial and human resources make it all the more important for startups to avoid inefficiency in product development. The analysis can be supported by AI, which can help to prioritise product concepts and determine which features seem to be more strongly related to consumer demand. It's not a way to get rid of uncertainty, but it could be a resource for startups to quickly test their assumptions. It's important to note, however, that AI should never replace consumer understanding. Data can be biased, can show some market behaviours and can miss out on motivations that are not easy to measure. Algorithmic recommendations might then lead to technically sound but not well differentiated products (Low and Ramayah, 2023). However, human judgment cannot be replaced in the interpretation of consumer needs and in determining which problems should be addressed.

AI's Role in Product Development





Consumer Insights

Know Your Customers' Wants. Exceed Their Expectations. Leverage AI-powered consumer insights to craft products that shoppers love.

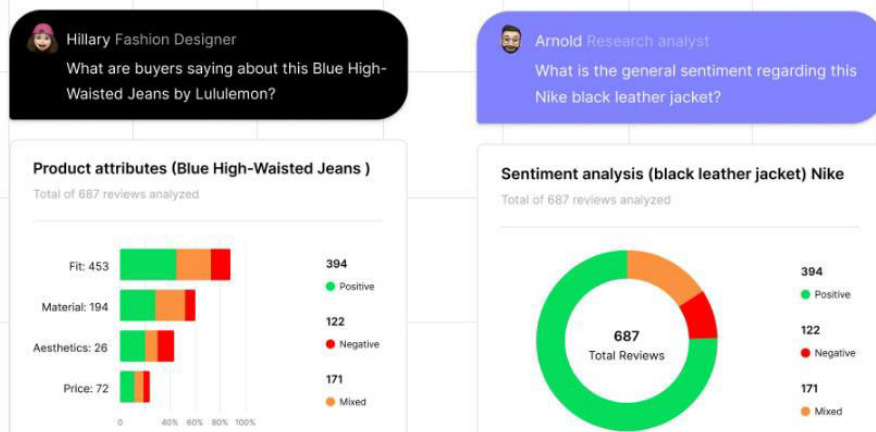


Figure: Application of AI in consumer insight generation and product development

In general, the literature indicates that product-market fit is the result of a genuine problem they face in the market and a valuable product solution, and a clearly defined target market. While AI can enhance this process through customer insights, experimentation, segmentation and personalisation, it is not the technology itself that generates product-market fit (PMF) (Sahut and Laroche, 2025). The best way for AeroDry would then be to leverage AI as an enabler but to continue to follow a consumer-centred product development process. In all five themes, the literature shows that the innovation of sports textiles is not only about being technologically novel, but also has to succeed in the athletes' field. In terms of consumer adoption, comfort, function, credible performance, affordability and durability and trust are key factors. Concurrently, AI provides startups with the chance to better comprehend these elements and create products based on consumers' needs and their proof of needs. There is a lack of work integrating these dimensions from the product-market-fit of sports textile startups, especially in early stages. This serves as a basis for exploring the potential of AeroDry to meet the needs of athletes, and the technological prowess of the company, as a commercially viable product.

V. CONCLUSION

This study investigated the relationship between AI, Product-Market-Fit and consumer adoption in athlete-driven sports textile start-ups. The results of the secondary literature show the key of successful innovation of sports textiles is the ability to meet real consumers' needs, instead of the level of technological sophistication. Comfort, fit, breathability, moisture management, durability and functionality continue to be key factors that affect the consumer's perception of sportswear value. The study also shows that performance claims, brand credibility can have significant impact on adoption. When products are new and innovative, consumers must become aware of their benefits and have confidence in them, especially when they are fighting off an established brand. Other factors that can inhibit adoption include price, comfort, durability, and technological complexity or data usage concerns. As such, there is a need for advanced functionality that is also affordable, usable and easily communicated, for startups. AI can help with analyzing customer feedback, uncovering preferences, aiding in market segmentation, and aiding in product development, among other uses. AI, however, is not a steadfast replacement for consumer-centred decision making, but a tool that enables. The product-market fit challenge for AeroDry lies in aligning AI insights with defined athlete pain points and quantifiable product advantages. The key challenge for AeroDry is to ensure that the AI-driven insights are translated into tangible product advantages and clearly understood athlete pain points. The research concludes overall that technological innovation is best supported by the development of consumer value, trust and practical usability.

REFERENCES

1. Ajzen, I. (1991) 'The theory of planned behavior', *Organizational Behavior and Human Decision Processes*, 50(2), pp. 179–211. doi: 10.1016/0749-5978(91)90020-T.
2. Bouschery, S., Blazevic, V. and Piller, F.T. (2023) 'Augmenting human innovation teams with artificial intelligence: Exploring transformer-based language models', *Journal of Product Innovation Management*, 40(2), pp. 139–153. doi: 10.1111/jpim.12656.
3. Brem, A., Giones, F. and Werle, M. (2023) 'The AI digital revolution in innovation: A conceptual framework of artificial intelligence technologies for the management of innovation', *IEEE Transactions on Engineering Management*, 70(2), pp. 770–776. doi: 10.1109/TEM.2021.3109983.
4. Gama, F. and Magistretti, S. (2025) 'Artificial intelligence in innovation management: A review of innovation capabilities and a taxonomy of AI applications', *Journal of Product Innovation Management*, 42(1), pp. 76–111. doi: 10.1111/jpim.12698.
5. Islam, M.T., Hosen, M.I., Islam, T., Al Mamun, M.A. and Islam, T. (2025) 'Advancements in functional smart and wearable textiles for sportswear applications', *RSC Advances*, 15, pp. 50206–50232. doi: 10.1039/D5RA07231J.
6. Johnston, M.P. (2014) 'Secondary data analysis: A method of which the time has come', *Qualitative and Quantitative Methods in Libraries*, 3, pp. 619–626.
7. Kim, H.W., Chan, H.C. and Gupta, S. (2007) 'Value-based adoption of mobile Internet: An empirical investigation', *Decision Support Systems*, 43(1), pp. 111–126. doi: 10.1016/j.dss.2005.05.009.
8. Kumar, V., Rajan, B., Venkatesan, R. and Lecinski, J. (2019) 'Understanding the role of artificial intelligence in personalized engagement marketing', *California Management Review*, 61(4), pp. 135–155. doi: 10.1177/0008125619859317.

9. Lee, J., Son, J. and Lim, S. (2025) 'Consumer's contradictory needs: Functionality and sustainability on purchase intentions for sportswear', *Journal of Global Fashion Marketing*, 16(2), pp. 173–195. doi: 10.1080/20932685.2024.2434861.
10. Lim, C.H., Kim, K. and Cheong, Y. (2016) 'Factors affecting sportswear buying behavior: A comparative analysis of luxury sportswear', *Journal of Business Research*, 69(12), pp. 5793–5800. doi: 10.1016/j.jbusres.2016.04.176.
11. Lobo, J.L., Cortez, W.T. and Rivera, L.M.C. (2026) 'Sportswear preferences and purchase decisions among Filipino university students: A sociodemographic analysis', *Frontiers in Behavioral Economics*, 5. doi: 10.3389/frbhe.2026.1809068.
12. Low, M.P. and Ramayah, T. (2023) 'It isn't enough to be easy and useful! Combined use of SEM and necessary condition analysis for a better understanding of consumers' acceptance of medical wearable devices', *Smart Health*, 27, 100370. doi: 10.1016/j.smhl.2022.100370.
13. Marion, T.J. and Fixson, S.K. (2021) 'The transformation of the innovation process: How digital tools are changing work, collaboration, and organizations in new product development', *Journal of Product Innovation Management*, 38(1), pp. 192–215. doi: 10.1111/jpim.12547.
14. Mustak, M., Salminen, J., Plé, L. and Wirtz, J. (2021) 'Artificial intelligence in marketing: Topic modeling, scientometric analysis, and research agenda', *Journal of Business Research*, 124, pp. 389–404. doi: 10.1016/j.jbusres.2020.10.044.
15. Ramratan, R. and Choudhary, A.K. (2020) 'The influence of yarn and knit structure on comfort properties of sportswear fabric', *Journal of Textile and Apparel, Technology and Management*, 11(2).
16. Sahut, J.-M. and Laroche, M. (2025) 'Using artificial intelligence (AI) to enhance customer experience and to develop strategic marketing: An integrative synthesis', *Computers in Human Behavior*, 108684. doi: 10.1016/j.chb.2025.108684.
17. Suganthi, T. and Senthilkumar, P. (2018) 'Moisture-management properties of bi-layer knitted fabrics for sportswear', *Journal of Industrial Textiles*, 47(8), pp. 1985–2002. doi: 10.1177/1528083717692594.
18. Thibaut, E., Vos, S. and Scheerder, J. (2019) 'The purchase price of runners' sports apparel: Combining observational and survey data at running events', *International Journal of Sport Finance*, 14(3). doi: 10.32731/IJSF.143.082019.03.
19. Vallé, R., Seitz, J., Kanbach, D.K. and Schuhmacher, M.C. (2026) 'The use of artificial intelligence in new product development: A systematic literature review, conceptual framework, and future research agenda', *Technovation*, 153, 103541. doi: 10.1016/j.technovation.2026.103541.
20. Venkatesh, V., Morris, M.G., Davis, G.B. and Davis, F.D. (2003) 'User acceptance of information technology: Toward a unified view', *MIS Quarterly*, 27(3), pp. 425–478. doi: 10.2307/30036540.
21. Wu, D.G. and Chalip, L. (2013) 'Expected price and user image for branded and co-branded sports apparel', *International Journal of Sport Management and Marketing*, 22(3), pp. 224–240. doi: 10.1177/106169341302200305.
22. Yang, H., Yu, J., Zo, H. and Choi, M. (2016) 'User acceptance of wearable devices: An extended perspective of perceived value', *Telematics and Informatics*, 33(2), pp. 256–269. doi: 10.1016/j.tele.2015.08.007.
23. Yang, M., Luo, M., Jin, J. and Zhang, J. (2025) 'Exploring consumer adoption of smart sportswear through an integrated acceptance model based on perceived comfort', *Scientific Reports*, 15, 35878. doi: 10.1038/s41598-025-19809-7.
24. Zhou, M., Wu, J., Huang, L., Miao, M., Cui, Y. and He, X. (2025) 'Smart textiles: Sustainable, self-powered, portable, and durable wearable textiles for human health monitoring', *Chemical Engineering Journal*, 525, 170097. doi: 10.1016/j.cej.2025.170097.



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