Purchase Intention Toward Three-Dimensional Knitted Shoes: A conceptual framework

Nahid Shabani
Illinois State University

Keywords: 3D Knitted Shoes, Shoe upper, Knitting, Seamless Knitting

Introduction: Despite being relatively new and challenging, 3D knitting technology has been recently used in shoes industry due to its inherent stretch and compression properties (West, 2019; BLAGA et al.,2020). 3D Knitting is a seamless technology that eliminates cutting and sewing processes. (Mahbub et al., 2014). As a result of growing environmental consciousness and culture shift towards athleticism and wellness, consumer preferences have quickly shifted towards 3D knitted shoe uppers. (Davis, 2019). In determining the factors that influence consumer behavior and their purchasing decisions, researchers have neglected to deeply investigate the driving variables that lead consumers to procure 3D knitted shoes. This article aims to propose a conceptual framework of critical factors that influence consumers intention toward purchasing 3D Knitted shoes.

Literature Review: Knitted shoes is one of the growing trend in the footwear industry (Ozdemir et al., 2020)**.** 3D Knitting is the fabric production technique offering great comfort by elasticity and adjustment to the body and allowing freedom of movement. This knitting technological innovation is seamless with using only one yarn to feed all the needles and creates connected loops in the process (Duarte et al., 2020). However, Flat knitting machines can produce complete shoe uppers, using 3D seamless knitting technology. 3D Knitting technology by joining the stages of shoe upper production, creates ready-to-wear pieces, and considerably reducing work time and labor intensive use. (Duarte et al., 2020). The footwear industry utilizing 3D Knitting methods to conform to regulations to decrease environmental pollution caused by sewage, exhaust, and contaminants (Tsai & Jhong, 2019). When it comes to 3D knitting in shoes, they create an excellent opportunity to reduce waste material and labor needs (Ozdemir et al., 2020). This advancements in knitting technology hold the sustainable promise of an entirely labor-free and fully automated shoe upper production process which eliminates cutting, sewing, and heat-setting (Davis, 2019). Multiple applications of 3D knitting are possible, from casual and fashion shoes to technical and sport shoes (West, 2019). However, fit, comfort, lightness, and mobility (made-to-fit concept) are the key factors of 3D knitting attractiveness (West, 2019). This innovative technology in knitting has provided many opportunities to make the personalized fitting come true. Through the use of 3D knitting solutions, each upper is completed. The result is a completely seamless shoe upper and a 60% reduction in waste. One of the major advantages of 3D knitting is that it opens door for streamlining concept-to-market time by implementing a realistically local production. Furthermore, with body scanning and digital knitting, customized functional compression shoes can be created. This 3D knitting features enables customers to order customized shoes and have them delivered within a few days, greatly reducing manufacturing and distribution times (Davis, 2019). 3D knitted shoe also provides comfort like socks besides a trendy and athletic look (West, 2019). In recent years, the footwear industry has been one of the pioneers of mass customization (MC) (West, 2019). It is reported that consumers are willing to pay only 10 to 30% more for a pair of personalized shoe (Ozdemir et al., 2020). It seems, however, that MC trials have not been successful in footwear because of high costs, long production times, and inability to satisfy consumers. In addition, material selection plays an

important role in designing footwear, which greatly determines the user comfort. The 3D knitted shoe upper provides superior air permeability and minimal absorption of moisture and water, improving the circulation of the shoe, also known as the chimney effect. Nonetheless, previous studies show that when consumers see versatile design, they are more likely to convey their interest and express positive opinion regarding the product, and this increase sale (Belleau et al., 2007). Finally, seamless knitting eliminates numerous production steps and serious environmental issues by presenting green production in the footwear industry. Harmful products will also affect the willingness of customers to buy and use products.

Conceptual Framework: According to the literature, we propose the following prepositions and develop a conceptual framework (Figure 1) in order to investigate how factors impacts consumers' intention to purchase 3D Knitted Shoes:

Proposition 1: Accuracy of shoe fitting will influence consumer intention to purchase 3D Knitted shoes.

Proposition 2: Customization of shoe design will influence consumer intention to purchase 3D Knitted shoes.

Proposition 3: Shoe comfort will influence consumer intention to purchase 3D Knitted shoes.

Proposition 4: Versatility in shoe design will influence consumer intention to purchase 3D Knitted shoes.

Proposition 5: Choice of sustainable product will influence consumer intention to purchase 3D Knitted shoes.

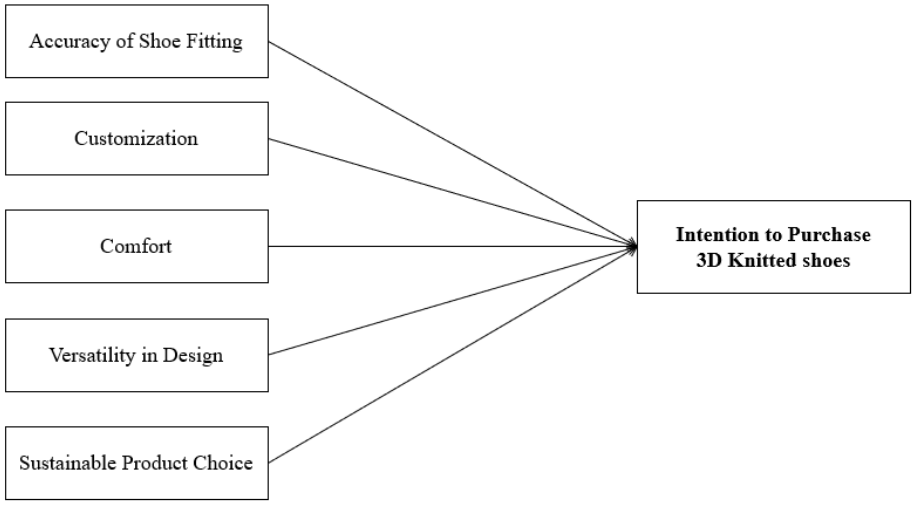

Figure 1. Proposed Framework of variables influence Intention to Purchase 3D Knitted Shoes

Conclusion: While seamless knitting technology continues to improve, there are still many limitations. In search of a more perfect product, shoe upper manufacturers and consumers are looking to 3D knitting, which promises elimination of environmental impact. In the future, Production companies can hope to equip each of their retail store with a 3D knitting machine so customers can take their foot measurements and order customized shoes in store. Despite the progress being made in 3D knitting solutions in the shoe manufacturing industry, a comprehensive acceptance is still far away. However, it is highly imperative that the 3D knitting solution maintains the versatility and flexibility of shoe uppers (Davis, 2019).

References

West, A. J. (2019). Innovations in knitting at ITMA 2019 Barcelona, Spain. *Journal of Textile and Apparel, Technology and Management*.

Blaga, M., Penciuc, M., & Ștefan, E. I. (2020). TEACHING THREE-DIMENSIONAL SHAPING FOR KNITTING TECHNICAL APPLICATIONS. *eLearning & Software for Education*, *3*.

Mahbub, R., Wang, L., & Arnold, L. (2014). Design of knitted three-dimensional seamless female body armour vests. *International Journal of Fashion Design, Technology and Education*, *7*(3), 198-207.

Davis, H. (2019). *Pai Lung: Why global brands are racing towards a comprehensive 3D knitting solution*. Knitting Trade Journal.

Wicaksono, I., Hwang, P. G., Droubi, S., Wu, F. X., Serio, A. N., Yan, W., & Paradiso, J. A. (2022, July). 3DKnITS: Three-dimensional Digital Knitting of Intelligent Textile Sensor for Activity Recognition and Biomechanical Monitoring. In *2022 44th Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC),* (pp. 2403-2409). IEEE.

Ozdemir, M., Cascini, G., & Verlinden, J. C. (2020). A mass personalization framework for knitted footwear. In *9th International Conference on Mass Customization and Personalization–Community of Europe (MCP–CE 2020) Novi sad, Serbia*, 2020, 175-183

Duarte, A. Y., Sanches, R. A., Lima, F. S., & Queiróz, R. S. (2020). Technological Innovations in the production of sportwear: From conventional production to industry 4.0. *Product Management & Development*, *18*(1), 19–25.

Tsai, W.-H., & Jhong, S.-Y. (2019). Production decision model with carbon tax for the knitted footwear industry under activity-based costing. *Journal of Cleaner Production*, *207*, 1150–1162.

Belleau, B. D., Summers, T. A., Xu, Y., & Pinel, R. (2007). Theory of reasoned action: Purchase intention of young consumers. *Clothing and Textiles Research Journal*, *25*(3), 244-257.