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Asmi, Fahad; Zhang, Qing Yu; Anwar, Muhammad Azfar; Linke, Kristina; Zaied, Younes Ben

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SPECIAL FEATURE: ORIGINAL ARTICLE

Managing Climate Risks for a Sustainable Future: Adaptation Strategies and Resilience Building

Ecological footprint of your denim jeans: production knowledge and green consumerism

Fahad Asmi[1,2] · Qingyu Zhang[3] · Muhammad Azfar Anwar[3] · Kristina Linke[4] · Younes Ben Zaied[5]

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Abstract

Every pair of denim jeans produced contributes 33.4 kg of CO_2 into the atmosphere, consumes 3781 L of water, and occupies 12 m^2 of land to support its production. The consumption patterns and consumption behaviour of consumers are both vital determinants of their environmental performance and impact. This paper examines the environmental concerns, production knowledge, and related cognitive measures of consumers by mapping their intentions in the process of buying denim jeans. Consumers of denim jeans in mainland China were taken as a sample to achieve our research objective. Specifically, 1392 respondents were quantitatively investigated. The empirical results indicate that production knowledge, the ascription of responsibility, buying attitude, and personal norms are dominant factors in explaining consumers' buying intentions when purchasing denim jeans. Furthermore, we find that the relationship between cognitive factors and buying intentions is mediated by affordability. This study highlights the immediate need to measure the denim industry's ecological footprint (during the production phase) and communicate this to critical industry stakeholders (i.e. macro-level forces, environmentalists, current and potential consumers). The intention is to redefine the purchasing behaviour of future consumers of denim jeans.

Keywords Denim jeans · Production knowledge · Theory of planned behaviour · Norm activation model

Introduction

The offshore outsourcing practices during production by the fashion industry in low- and middle-income countries (LMICs) provide an opportunity for fashion brands to turn a blind eye to related ecological footprints (Bick et al. 2018). In other words, this internalisation trend encourages pollution havens and ecological degradation (Dinda 2004; Waqih et al. 2019). Environmental problems such as these, caused by unsustainable resource accumulation in the fashion industry, call for disruptive business models or a reshaping of the market structure designed to change consumption patterns. Sustainable use or consumption of fashion products is one strategy that can stimulate material circulation and reduce waste caused by frequent buying of fashion products. Denim jeans, considered a luxury garment product in the fashion industry (Zhang and Zhao 2019), are produced via a

Handled by Dayong Zhang, Southwestern University of Finance and Economics, China.

✉ Qingyu Zhang
q.yu.zhang@gmail.com

✉ Younes Ben Zaied
ybenzaied@edcparis.edu

Fahad Asmi
Fasmie@ustc.edu.cn

Muhammad Azfar Anwar
azfar@ustc.edu.cn

Kristina Linke
k.linke@rug.nl

[1] Department of Science Communication, University of Science and Technology of China, Hefei, China

[2] NeoBiz Solutions, Dubai, United Arab Emirates

[3] Research Institute of Business Analytics and Supply Chain Management, College of Management, Shenzhen University, Shenzhen, China

[4] Department of Accounting, Faculty of Economic and Business, University of Groningen, Groningen, The Netherlands

[5] OCRE, EDC Paris Business School, Paris, France

resource-intensive supply chain with complex decentralised business processes (Egels-Zandén et al. 2015). In the recent decade, these business processes have been highly criticised for large ecological footprints throughout the entire supply chain network (Kumar et al. 2020; Nasrullah and Rahim 2014). Levi et al. (2015) find that every pair of denim jeans produced contributes 33.4 kg of CO_2 into the atmosphere, consumes 3781 L of water, and occupies 12 m^2 of land to support its production.

Denim jeans are widely used fashion garments and as such, they are big business. Within the fashion business, denim jeans are viewed as an attitude, a lifestyle and a precise set of beliefs that influence the consumer's lifestyle. The value of denim jeans has evolved into a symbol rather than a mere numeric value for consumers. The development of the worldwide market size of the denim jeans industry, estimated to be in the vicinity of $56 billion (U.S. dollars) or more by the year 2020 (Regan 2015), supports this view. The transformation of denim jeans from work-ware to luxury attire can be witnessed in recent times. In addition, the ongoing trends of customer and information-focussed marketing have revolutionised the marketing content and modes of exposure to consumers. The entire supply chain involved in the production of denim jeans contributes in constructive ways to the region. However, practices such as offshore outsourcing to meet stakeholders' expectations, informal production and trade, are raising ethical, ecological and social issues (Braga and Abreu 2017), which require careful consideration. Consider the lifecycle processes involved in the production of denim jeans. This life cycle comprises cotton, fibre and fabric production, garment manufacturing, design and distribution, and post-purchase customer care, which can further lead to recycling or end of life of the denim jeans. Furthermore, the product lifetime of the jeans is influenced by consumers' decisions at the time of purchase. The notion of 'fast fashion', characterised by increased purchasing power for consumers, due to declining prices of products, has made it easy to replace available products frequently. This type of impulse-buying behaviour, replacing products rather than using them for sustainable periods, indicates that consumers have less consideration of environmental effects when they make purchases. The consequences of these consumer behaviours, due to reduced awareness of product knowledge combined with easy access to consumer products, are far-reaching.

Alarmingly, the production of denim jeans in the fashion industry is accountable for polluting ecosystems (Choudhury 2017) and causing serious health hazards (Periyasamy and Militky 2017a). Moreover, the post-purchase washing practices of consumers are a great threat to freshwater resources (Pal et al. 2017). The other issue about these products shows that, due to changing fashion and other trends, these products are disposed of before they complete their functional life. These unsustainable consumer behaviours certainly contribute to resource depletion, greenhouse gas emissions and other environmental issues and need to be understood and modified. Extending the length of time that products are kept in use (whether by their original or subsequent owners) can contribute to greater resource efficiency, with significant potential to reduce greenhouse gas emissions. These issues and consequences have attracted policymakers and marketers to devise strategies for sustainable production and consumption.

In the area of ecological impact, Amutha (2017) states that statistically, the production of denim jeans accounts for 1% of the world's greenhouse gas (GHG) emissions. In addition to production impact, consumers' post-purchase behaviour also accounts for GHG emissions, although this impact depends on the country a consumer lives in. However, on average, the combined production and post-purchase usage or impacts, including the washing and drying process, account for 24.6 kg CO_2-eq/FU (FU = functional unit) of emissions. In the context of consumption and usage behaviour, several studies have been conducted in recent years where fashion trends (FT) and information availability have been researched and found to be strong determinants of sustainable apparel purchase (Kumar and Yadav 2021). Paço et al. (2021) emphasised that consumers generally lack the necessary eco-centric information. Whereas McEachern et al. (2020) suggest that creative modes of communication about the ecological impact of apparel can increase public awareness and knowledge about their purchase's carbon footprint. Legere and Kang (2020) argued, on the other hand, that the psychological mapping, used by clothing-consumers, to connect social, economic and ecological aspects in a unified manner, is still a greater challenge. In other words, among the functional, ethical and financial attributes to define a sustainable purchase, economic and product efficiency are prominent ones (Rahman and Koszewska 2020). However, greenwashing practices and purposive marketing tactics also have an impact. Such practices are succeeding to actively label denim with adjectives such as relaxing, casual, fashionable and universal. It can be stated that the current denim jeans consumption and buying behaviour is an outcome of the gap between its perceived climate change risk perception and climate change action. Ma et al. (2021) emphasised the critical role of risk perception and adaptation efficacy in defining climate change adaptation and this current research seeks to extend this stance further.

Therefore, the following research questions have been formulated: (1) how significant are consumers' ecological concerns (EC) and ascription of responsibility (AR) towards the environment to explain their denim jeans purchasing behaviour? (2) what is the strategic role of the denim jeans (product) production knowledge of the consumers in identifying their denim jeans purchase intentions? (3) to what

extent can a psychological persuasive model based on eco-centric values and product attributes explain consumers' denim jeans buying intentions? The current research adds three important contributions to prior literature. First, the authors extend the theory of planned behaviour (TPB) and the norm activation model (NAM) in a unified manner to examine the potential impact of consumers' denim jeans production knowledge (DJPK) on their denim jeans buying intentions (DJBI). Second, we extend the literature by developing argumentation about the gap between climate change risks and eco-centric action, especially in the case of apparel (denim jeans) consumption, and by strategically underlining the role of product knowledge in mapping perceived climate change adaptation. Finally, the study strengthens the literature about the role of economic value (affordance) in sustainable buying intentions.

In the context of climate change adaptation principles recommended by the World Bank (2020), the possible way to build resilience demands (1) eco-centric rapid and inclusive development, (2) involvement of people to adopt sustainable behaviour, (3) protection of natural and critical resources, (4) help and communication with society, (5) producing momentum to create eco-centric change at the macro-level and (6) monitoring of eco-concerns change and the progress towards a sustainable world. In the current study, by underlining the role of consumers' knowledge, EC, affordance, and societal trends, the authors can claim the current initiative as a holistic approach to building resilience to climate change in the case of denim jeans consumption in society.

This study will be organised into the following sections: the next section reviews the literature on consumer knowledge and EC. The third section develops the theoretical model, including hypotheses. The fourth section addresses the research methodology and the fifth section reports the study results. Finally, in the sixth section, the study results are discussed and theoretical as well as practical implications are provided.

Consumer knowledge and ecological concerns

The resource-driven perspective in the literature addresses consumers' knowledge and awareness and can be located by exploring sustainable, luxury, branding, supply chain and socially responsible practices. Within the area of sustainable luxury, the literature argues that consumer awareness and knowledge about sustainable products are limited (Evans and Peirson-Smith 2018), and this psychological imbalance (attitude-intention gap) needs to be addressed to turn pro-environmental personal norms (PN) and sustainability concerns into practice (Han et al. 2017). Unsustainable consumption (in the area of luxury brands) is shown as the outcome of the power given to product designers and the practices of retailers and brand marketing (Athwal et al. 2019). In the literature related to fashion brands, Sonnenberg et al. (2014) highlighted the role of information exposure which includes labelling and media, while perceiving the eco-friendliness of apparel. Interestingly, the research concluded that printed information is less effective in defining pro-environment behaviour, especially in the case of developing regions. However, the normative social environment can play a significant role in mapping consumers' pro-environment behaviour. Alarmingly, consumers lacking ecological knowledge usually rely on environmental claims promoted by fashion brands (Teona et al. 2019). This highlights the significant role of socially responsible labelling and marketing practices. Hyllegard et al. (2012) stated that hanging tags with an explicit message and third-party affiliation to assure social responsibility increases the positive value of the brand. In ecological fears, Corporate social responsibility practices such as communicating the production process can help players in the fashion industry to avoid bad-buzz (Parguel et al. 2020).

From the demand-driven perspective, the literature addressing consumer knowledge and awareness can be located by exploring personal values, customer evaluation and behavioural intentions. Personal value underlines the consumers' readiness to change as well as the agreeableness among them to buy ethically marketed garment products (Stringer et al. 2020). However, the conflicting views about fashion and the environment during the process of selecting garments is still an open-ended challenge for the potential consumers, and this highlights their limited ecological knowledge as a hurdle to show the value of sustainable fashion (Moon et al. 2015). The literature argues that consumers' sense of eco-responsibility defines the process of customer evaluation and consumption in an eco-centric manner (Bürklin 2019). However, within the supply chain network of the fashion industry, retailers simply define themselves as the connecting node between consumers and producers, which underlines the immediate strategic institutional role (i.e. non-governmental organizations) to trigger eco-friendly consumer-driven concerns as a part of their evaluation process (Bürklin 2019).

The ecological footprint of any commodity, product or service is dependent on the sustainable ecological measures taken into account while creating, designing, producing and delivering the product to the target market. In the case of garments and the clothing industry, more than 30% of the fibre is synthetic, which creates huge challenges on the environmental front (Muthu 2014). The entire lifecycle of one pair of denim jeans leaves a significant ecological footprint presenting a great challenge for the world's ecological balance (Periyasamy and Militky 2017b), as shown in Fig. 1. A few of the market leaders in denim jeans, i.e. H&M, C&A

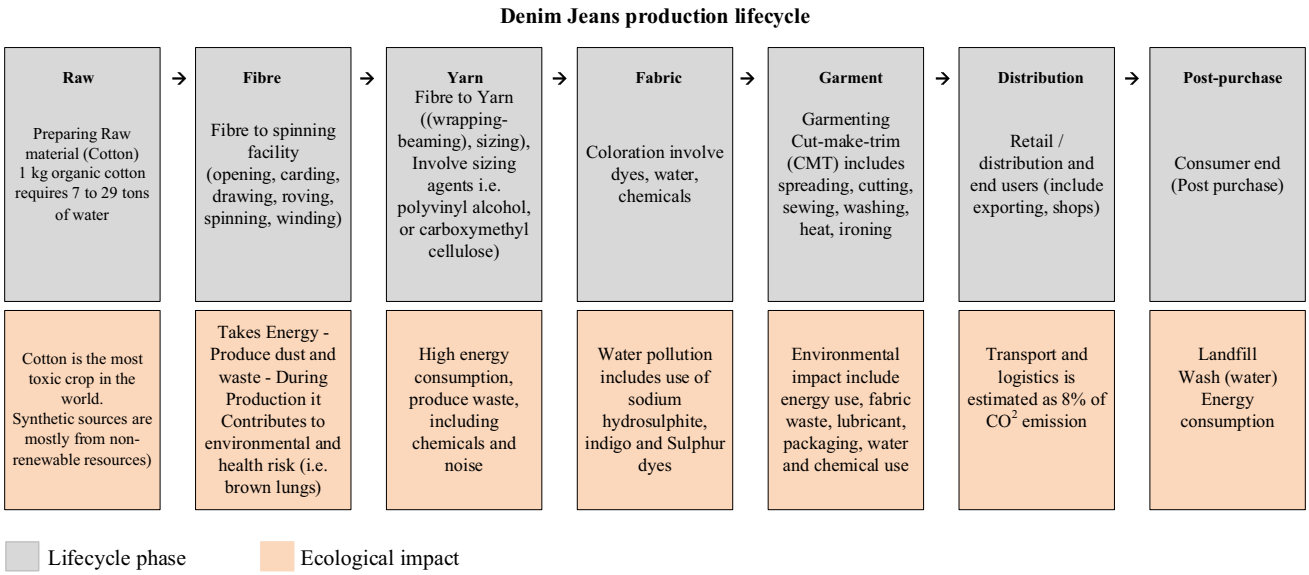


Fig. 1 Denim jean's lifecycle and its ecological impacts

and Levi Strauss, have begun to emphasise sustainable production by launching eco-friendly product lines (Garcia et al. 2019). Interestingly, the estimation of the ecological footprint, especially in the case of garments, is a great challenge, as each product line and length holds a distinctive range of phases in its lifecycle (Kumar et al. 2016). Garcia et al. (2019) argue that the ecological footprints need to be studied in the case of the textile industry (which includes denim jeans), and this information needs to be communicated to potential consumers to improve their sense of responsibility and ecological awareness.

The above-discussed literature highlights the following challenges which need to be addressed: (1) the consumer knowledge about ecological footprints as it is weak and can be categorised as a significant gap, especially in the case of the denim industry. (2) The literature related to EC of the fashion industry is mostly evolving in the western sphere of the globe. However, the severe environmental impact of the entire supply chain of the fashion industry can be witnessed in the eastern sphere (i.e. in low-to-middle-income countries), in pollution havens. It can be generalised that today's consumers are more conscious of the need for responsible and ethical consumption. However, the heterogeneity in eco-communication, and the affective and sentimental dimension of integrated marketing communication in the post-truth era have raised several fronts for eco-advocates, eco-information seekers and communicators to address eco-challenges and eco-threats (Howarth et al. 2020). Carlson et al. (1993) proposed the typology of ecological claims in advertisements and concluded that if consumers get confused by the ecological claim in the advertisement, it is likely to be perceived as deceptive. According to the United Nations Framework Convention on Climate Change, education, training, public awareness, participation, access to information and worldwide cooperation are the core driving forces of any eco-action (UNFCCC 2020). The unified view, created by involving scientists, policymakers and practitioners can therefore be said to produce evidence-based communication, where the Nature of Science (NoS), which includes process and product knowledge, can help to eliminate the misalignment, conspiracies, and misconceptions about eco-concerns for better decision making (Viner and Howarth 2014).

In the related literature, a dearth (Yan et al. 2020) has been observed to address consumers' knowledge and EC while mapping their garment purchases and consumption. None of the sources recorded the above-stated relationship in the case of denim jeans. The consumers of the fashion industry (including denim jeans) are unaware of their ecological footprints and the impact they are asserting on the environment.

Theoretical stance for behavioural modelling

Among the existing pool of persuasive socio-psychological models that can be used to examine constructs affecting an individual's behaviour and intentions, theory of planned behaviour (TPB) can be noted as the most influential and is intensively used in the fields of commerce (Pavlou and Fygenson 2017), health (Schmidt 2019), and environment (Rezaei et al. 2019). Ajzen's (1985) work on TPB extends the theory of reasoned action (TRA) by Fishbein and Ajzen (1975) by explaining intentions and behaviour as

the collective output of individuals' attitudes and subjective norms. However, TPB highlights the individual's motivation as the conscious view to follow specific behaviour(s). In other words, TPB conceptualises the intentions as the collective sum of individuals' attitudes, subjective norms, and behavioural control (Ajzen 1991a, b). In the critical perspective, the classic version of TPB addresses the controlled constructs and deliberately ignores any possible external construct, which can be considered its limitation (Stöckli et al. 2018). To address this limitation, various studies adapted an extended version of TPB by adding attributes to quantify sentiments (Oteng-Peprah et al. 2020) and environmental concerns (Panda et al. 2020) to maximise the measurable variance in intentions and behaviour. To address the pro-environment concerns, the individual's norms play a significant role in the process of mapping intentions (Panda et al. 2020).

In this current research initiative, norm activation model (NAM) will be considered since this addresses PN, feelings, and a sense of responsibility for being pro-environmental (Kim and Seock 2019; Nordlund et al. 2016; Nordlund and Garvill 2003). Schwarts (1977) proposed the NAM as this model consists of the attributes needed to underline the severity of the consequences that certain behaviours or actions potentially hold. The model is also used to examine the individual's sense of responsibility in the cases of hostile consequences. To map consumers' intentions when buying denim jeans, this current research initiative distinctively adapted TPB and NAM, which have been applied to measure energy-saving behaviour (Wang et al. 2018), shared services consumption (Kim et al. 2018), and food delivery services (Kim and Hwang 2020). Moreover, this study proposes production knowledge of denim jeans (a novelty of the research) as the key external factor while unifying NAM and TPB. The purposeful arrangement of constructs in the proposed model is intended to explore the explanatory power of EC in a holistic manner to define consumers' DJBI.

TBP-driven hypotheses

Ajzen (1991a, b) defined attitude as a way to evaluate certain behaviour. For instance, in a context of limited eco-literacy attitude, explained as the lack of awareness about the consequences and the lack of sustainable policy awareness, this attitude can lead to less pro-environment behaviour (Ren et al. 2016). On the other hand, the availability of constructive pieces of information, such as the demonstration of green practices, can influence individuals' attitudes towards a more pro-environment behaviour (Xue et al. 2016). In contrast, however, Gupta and Ogden (2009) underlined the social dilemma in which a pro-environmental attitude was noted as less meaningful to define green purchases. In fashion-related research in the targeted segment, for example, attitude tended to be driven by brand consciousness and innovativeness (Zhang and Kim 2013), which signifies the importance of attitude in the current study. Therefore, the following hypothesis is proposed:

H1: Attitude towards denim jeans (ADJ) positively influences consumers' DJBI

The control of beliefs about certain behaviours of any individual explains the capability to adapt or change any specific action or behaviour based on existing information and ability(ies) (Ajzen 2002) since a supportive environment can potentially help eliminate the perceived psychological barriers to performing a certain behaviour. In the broader perspective, the control of beliefs includes the belief to control one's actions and the ability to perform based on those beliefs (Zhang et al. 2019). This understanding also helps map an individual's choice and willingness to exert effort in a specific direction (Mirjana et al. 2018). Interestingly, in some cases of pro-environment behaviour related studies, the non-significant role of perceived behavioural control (PBC) can be noted (Thompson et al. 2020). However, the contrary view can also be seen in the literature, where, for example, PBC is noted as a strong determinant while explaining pro-environment behavioural intentions (Bopp et al. 2019; Wang et al. 2019). Therefore, the following hypothesis is proposed:

H2: Consumers' perceived behavioural control (PBC) positively influences consumers' DJBI

In terms of social psychology, social norms (SN) comprise an informal set of conduct assumed to be acceptable by society (Cislaghi and Heise 2018). Interestingly, in the case of environmental concerns, a subset of society (i.e. close group or team) can also hold a distinctive set of norms (Czajkowski et al. 2017) which can also be labelled as regularities in attitude within the group (Hogg and Reid 2006). Ajzen (1991a, b) emphasised the significant influence of the reference group on individuals' behaviour. The significant role of SN can be noted while mapping the pro-environmental intentions and behaviour in society (Kim and Seock 2019; Lin and Niu 2018; Thompson et al. 2020). The literature argues that informational and normative social influence significantly affects consumers' buying behaviour (Burnkrant and Cousineau 1975; Shukla and Drennan 2018). While addressing eco-concerned behaviour in the fashion industry, however, it remains confusing, complex and consequently not yet mature enough to be generalised (Bly et al. 2015). Thus, the current research initiative proposed the following hypothesis:

H3: Social norms (SN) (such as fashion trends) positively influence consumers' DJBI

NAM-driven hypotheses

In an altruistic context, PN define moral obligations (Schwartz and Howard 1981), and the existence of morality allows individuals to make rational decisions (Kim and Seock 2019). Moreover, the awareness of consequences plays a significant role in shaping individuals' moral obligations and pro-environment behaviour (Steg and de Groot 2010). Several empirical studies concluded that PN hold a noticeable role in explaining pro-environment behaviour (Kim and Seock 2019; Oteng-Peprah et al. 2020; Rezaei et al. 2019; Zhang et al. 2019). In line with the existing studies addressing the role of personal norms in clothing-related studies (Joanes 2019; Kim and Seock 2019), the authors propose the following hypothesis:

H4: Personal norms positively influence consumers' DJBI

Schultz's (1977) work connects an individual's altruistic traits (AT) and pro-environment intentions, suggesting these are the outcome of the perceived understanding of EC and AR. This, in turn, drives PN (moral values) to increase the readiness for change and to adopt pro-environment actions. In the meantime, constructive communication can trigger emotions and cognition, which can facilitate conditions for increasing pro-environmental change acceptance (Sommer et al. 2019). Similarly, the presence of self-transcendence and its supporting role in creating pro-environment behaviour is also noteworthy (Nordlund and Garvill 2003). Interestingly, Joanes (2019) recorded the AR as a weak construct in explaining PN in clothing-related research and insignificant in the case of mapping pro-environment behaviour (Liobikienė et al. 2020). The above findings showing the mixed behaviour of the construct encouraged the authors to examine the following hypothesis:

H5: Ascription of responsibility (AR) positively influences denim jeans consumers' PN

The literature argues that environmental concerns contribute strategically to the processes of making predictions, underlying risk perception and paying attention to green initiatives among individuals (Lozano et al. 2020). Attitudes towards EC do, however, vary in a society, based on individuals' intrinsic and extrinsic motivations (Schultz 2001). In the current study, EC are taken into account to define awareness of consequences since both factors help to change normative values (Hörisch et al. 2019) and encourage sustainable trends and future actions (Papagiannakis and Lioukas 2018). Numerous studies concluded that EC have a direct (Khan et al. 2019) and indirect (Zhang et al. 2019) effect on pro-environment behaviour. Moreover, EC have already been studied with TPB-based constructs (Chiu et al. 2020; Yarimoglu and Binboga 2019). Thus, the current research suggests the following hypothesis:

H6: Ecological concerns positively influence the TPB-based constructs (ADJ, PBC, and SN) and the NAM-based constructs (personal norms and AR), respectively.

Denim jeans production knowledge and its affordance

The consumer approach of 'take-use-dispose' is responsible for creating social and environmental issues (Koszewska 2019). Moreover, the constant increase in related ecological footprints also predicts the growth and expansion of fashion (including denim jeans) as an industry. This expansion indirectly drives contemporary production and leads towards the urge to develop a circular economic concept (Camacho-Otero et al. 2019; 2020). The literature argues that apart from technological intervention in existing business models (Gullstrand Edbring et al. 2016) and reduction in the wastes and disposals (Laitala 2014), the consumer's buying behaviour in the fashion industry (including Denim Jeans) needs to be transformed into an eco-friendly state. This would include reusability, repair-ability and recycling (Koszewska 2019). The subjective and objective nature of knowledge both help define apparel buyers' behaviour (Han 2019). EC are reflected as objective knowledge, and the items measured under this dimension address what was known to consumers. However, DJPK is reflected as subjective knowledge, and items measured under this dimension present the amount of knowledge the consumer thinks that he/she knows about the product. It can be argued that in the presence of limited knowledge, consumers usually draw assumptions based on cognitive perceptions by using available signals regarding product production (Mou and Shin 2018). The current research adopted the stance of Wu et al. (2014), which stated that the lack of eco-centric knowledge about products could lead to less eco-friendly purchases and consumption. Therefore, as one of the novelties of the current research, the authors believe that the influence of DJPK (subjective knowledge) and consumers' EC (objective knowledge) are equally important as exogenous factors.

H7: DJPK positively influences the TPB-based constructs (ADJ, PBC, and SN) and the NAM-based construct (personal norms), respectively.

The (fast) fashion industry provides potential consumers with an affordable price to enjoy fashion products (Joanes 2019). The affordability of low-price fashion products, which are also of good quality, contributes to toxic pollution in significant ways (Anguelov 2016). Interestingly in the fashion industry, the sales and marketing tactic of offering cheap and affordable prices still helps to grab the market shares for the market players (Bly et al. 2015). In other words, the offer of a conscious product line is not an active contributor to players' revenue in the fashion industry. The related terms of cost-consciousness (Becker-Leifhold 2018)

and price (Davies et al. 2012) have been adopted in behavioural research, addressing consumer fashion consumption. Prior research studied the moderation effect of behavioural mapping price (El-Said 2020) and price sensitivity (Wu et al. 2019). Thus, the following hypothesis is proposed based on argumentation in current research.

H8: Denim jeans affordance (DJA) strengthens the moderating relationship of the TPB-based constructs (ADJ, PBC, and fashion trend) and the NAM-based construct (personal norms) with the consumers' DJBI.

As a quick overview of the adapted instruments, Table 1 shows the operational definition of each construct adapted in the current research.

Methodology

Instrument

The authors developed the questionnaire for the current study by adapting instruments from the existing literature. Conceptually, the survey designed for this study includes two sub-sections. The first section comprises demographic and descriptive factors, i.e. age, gender, income, the role of EC during routine buying. The survey inquired whether consumers' would switch to the eco-friendly product if there was no price concern. Since Kumar and Yadav (2021) highlighted that gender differences exist in the process of defining consumers' eco-centric concerns and knowledge, the authors also chose to emphasize the role of gender. Moreover, previous studies underlined the role of economic value in defining sustainable consumption behaviour (Qing et al. 2020; Rahman and Koszewska 2020). The current study built on and adapted the work of multiple studies. The second section addresses items related to the constructs proposed by this study. The three-item scale used by Gug et al. (2014) and Guo and Liu (2019) was, for example, adopted in this study to measure the perceived value perceived green self-efficacy, respectively. The work by Cheung and To (2019) and Sun et al. (2017) was also taken into consideration to map both the perceived level of product knowledge and the buying intentions of consumers purchasing denim jeans (product). In addition, the three-item scale from the research of Lien et al. (2015) and Mital et al. (2016) was adapted to measure the effects of affordance and FT on purchasers of denim jeans. Furthermore, the work of Yun and Kim (2019) and Kim and Seock (2019) was adapted to measure the NAM-based perceived ascription of responsibility and personal norm. Finally, the three-item scale used by Yarimoglu and Gunay (2019) was adapted in this study to measure attitudes towards denim jeans (ADJ). Each construct-related item was designed using a 5-point Likert scale (ranging from 1 = strongly disagree to 5 = strongly agree).

Since the instrument was first developed in English and the survey was collected from the Chinese population through WeChat users, it was important, as observed by Keren et al. (2021), to address the instrumental validity and reliability, hence, back-translation of the questionnaire was performed. For this reason, the authors invited a team of five Chinese people who were classified as native Chinese speakers. These five people assisted in translating the English version of the survey into the Chinese language. The Chinese version of the survey was then re-translated back into English to eliminate the semantic-related ambiguities. Fifteen

Table 1 Operationalised definition of each proposed construct

Construct	Adapted/operational description	References
Ecological concern (EC)	The individual's concerns about the environment, and the desire to harmonise with nature	Gug et al. (2014)
Ascription of responsibility (AR)	The buyer's degree of affection and obligation to engage in altruistic action or behaviour	Yun and Kim (2019)
Denim jeans affordance (DJA)	As an extrinsic cue and as an antecedent to define value, affordance represents the amount/price one must give up to buy denim jeans	Lien et al. (2015)
Attitude towards denim jeans (ADJ)	It is an outcome of negative and positive evaluation of denim jeans (attributes) based on personal belief	Yarimoglu and Gunay (2019)
Perceived behavioural control (PBC)	In an eco-centric manner, it defines the individual's belief and competence to achieve self-defined eco-centric goals	Guo and Liu (2019)
Personal norms (PN)	Based on intrinsic values and moral obligation (self-expectation) to engage in eco-centric decision making	Kim and Seock (2019)
Fashion trends (FT)	As a part of hedonic motivation and TPB's social factor, it underlines the buyer's motivation to get his/her effort recognised by friends and family and draw pleasure from the buying experience	Mital et al. (2016)
Denim jeans production knowledge (DJPK)	It defines individuals as knowledgeable about the denim jeans production process, eco-centric qualities/attributes and how production processes affect the environment	Cheung and To (2019)

participants were involved in the pilot study, the purpose of which was to provide valuable feedback which could potentially help to revise and improve the questionnaire survey.

Data collection

This study used the cross-sectional survey approach to collect its data because this approach had been previously used in mapping consumer behaviour research (Sajjad et al. 2020; Dhir et al. 2021). The study population was chosen from China as China was responsible for 40–50% of global garment and textile production in the past decade. This huge production volume fueled by high consumerism emitted 18,486 billion tons of CO_2 in 2020. If these figures are projected onto global garment fashion production, China accounts for 36.9 billion tons of CO_2 emissions (Huang et al. 2017). Furthermore, the average expenditure on clothes by households in China in 2019 was 1832 Yuan, whereas per capita expenditure was 1338 Yuan. Most of the apparel market in China, 98%, comprises non-luxury goods. The apparel market volume presents 25,532 million pieces of clothing with an estimated growth of 4.2% in 2022, where each person, on average, will purchase 18 pieces in a year. These facts portray the aptness of choosing Chinese consumers to investigate the mode, therefore the sample, of this study.

The survey data were collected randomly using electronic and traditional mediums, regardless of gender, age, and other demographic differences. Potential consumers were approached virtually through Weibo and WeChat. Other responses were collected on busy streets and within the academic institutions (i.e. universities and colleges) across several cities (such as Hefei, Hangzhou and Shanghai) in mainland China and asked to scan a QR code. Participants were told that successfully completing the survey could result in prize money between RMB 5 and 15 (USD 0.80–2.40) to motivate the potential consumers. Potential participants who agreed to take part in the research initiative needed at some point in their lives to have purchased a pair of denim jeans to be considered appropriate for the survey. Participants who met this condition were interviewed regardless of their socio-economic complexities. To achieve the prime goal of the study, around 2500 potential respondents were approached via electronic media or using traditional interviews. However, the response count of 1392 could be collated for mapping behaviour. The descriptive profile of the collected sample is listed in Table 2.

Non-response bias testing

We ensured the reliability of the collected data and adopted the approach used by Armstrong and Overton (1977) and Hulland et al. (2018) to measure the non-response bias. In this approach, 20% of the initial and latter parts of the total responses were compared using the chi-square test. By recording no significant difference between both data groups, the study can be claimed to be free of non-response bias-related issues.

Empirical results

Measuring data normality

The SPSS-Statistics ver 26, SPSS-AMOS ver 24 and ADANCO ver 2.0.2 were used to analyse the data. Initially, the normality of the data was computed by measuring the kurtosis value, which was recorded as being below the upper-cutoff limits, as suggested in the literature. Furthermore, satisfactory scores for multicollinearity among items were evaluated by measuring the variance inflation factor (VIF) as advised by Hair et al. (2014) in the

Table 2 Surveyed sample profile

Characteristic	Detail	Frequency	Percentage
Gender	Male	537	38.58
	Female	855	61.42
Age	Under 25	582	41.81
	25–35	469	33.69
	Above 35	341	24.50
Household income (in RMB)	Under 10,000	368	26.44
	10,000–15,000	767	55.10
	Above 15,000	257	18.46
Do environmental concerns affect my routine purchase decision?	Yes	967	69.47
	No	425	30.53
I will switch to an eco-friendlier brand of denim jeans if the price and quality are approximately the same	Yes	935	67.17
	No	457	32.83

literature (see Appendix). The research adopted a single method for collecting data, and the study recorded 33.71% variance extracted from a single construct. Therefore, it can be concluded that the study is free of common method bias because the single-factor variance is less than 50% (Podsakoff et al. 2003). Liang's et al. (2007) approach was further adopted to measure common method biases. The loadings of constructs observed in PLS were significant since the p-value noted was less than 0.001 and zero common method factor's loading was recorded as significant.

Measurement model testing

On the level of the saturated model, the authors computed internal and external reliability and validity. The satisfactory scores for the constructs noted as Cronbach alpha (α), Henseler and Dijkstra's (p_A) and Composite Reliability (CR) were observed to be above the recommended value of 0.70. Moreover, these constructs were also noted to be acceptable on the measure for average variance extracted (AVE), for which the recommended cut-off value is 0.50 (Hair et al. 2012). The tabular output of the measurement results is listed in Table 3. The external validity (see Appendix) was computed through the approach used by Fornell and Larcker (1981) and Henseler et al. (2016). Thus, the results indicate that the variables' scales are internally and externally valid and reliable. Moreover, the nomological validity has also been computed by measuring variables' correlation as proposed in the theoretical model. Finally, the model fit indices for saturated models were computed, which resulted in acceptable limits as suggested by Hu and Bentler (1999). The observed fit indices are summarised as follows: CMIN/df = 3.87, TLI = 0.954, NFI = 0.951 CFI = 0.963 and RMSEA = 0.06.

Proposed model evaluation

The authors also adopted ADANCO (version 2.0.1) to compute and verify the proposed model. The results are

Table 3 Variables' internal reliability testing

Construct	Items	Fact. load	ρ_A	Cron. α	Avg. vari. ext.	Comp. reli.
Denim jeans production knowledge (DJPK)	DJPK1	0.944	0.942	0.945	0.853	0.946
	DJPK2	0.916				
	DJPK3	0.911				
Ecological concerns (EC)	EC1	0.825	0.945	0.939	0.839	0.940
	EC2	0.965				
	EC3	0.952				
Ascription of responsibility (AR)	AR1	0.932	0.914	0.910	0.774	0.911
	AR2	0.883				
	AR3	0.821				
Attitude towards denim jeans (ADJ)	ADJ1	0.980	0.969	0.968	0.912	0.969
	ADJ2	0.941				
	ADJ3	0.943				
Perceived behavioural control (PBC)	PBC1	0.988	0.978	0.978	0.937	0.977
	PBC2	0.973				
	PBC3	0.940				
Fashion trend (SN)	SN1	0.925	0.963	0.962	0.895	0.962
	SN2	0.972				
	SN3	0.941				
Personal norms (PN)	PN1	0.959	0.937	0.936	0.881	0.937
	PN2	0.918				
Denim jeans buying intentions (DJBI)	DJBI1	0.967	0.971	0.971	0.908	0.967
	DJBI2	0.936				
	DJBI3	0.956				
Denim jeans affordance (DJA)	DJA1	0.963	0.972	0.971	0.921	0.972
	DJA2	0.956				
	DJA3	0.960				

Fact. load, factor Loadings; ρ_A, Dijkstra view; Cron. α, Cronbach alpha; Comp. reli., composite reliability; Avg. vari. ext., average variance extracted

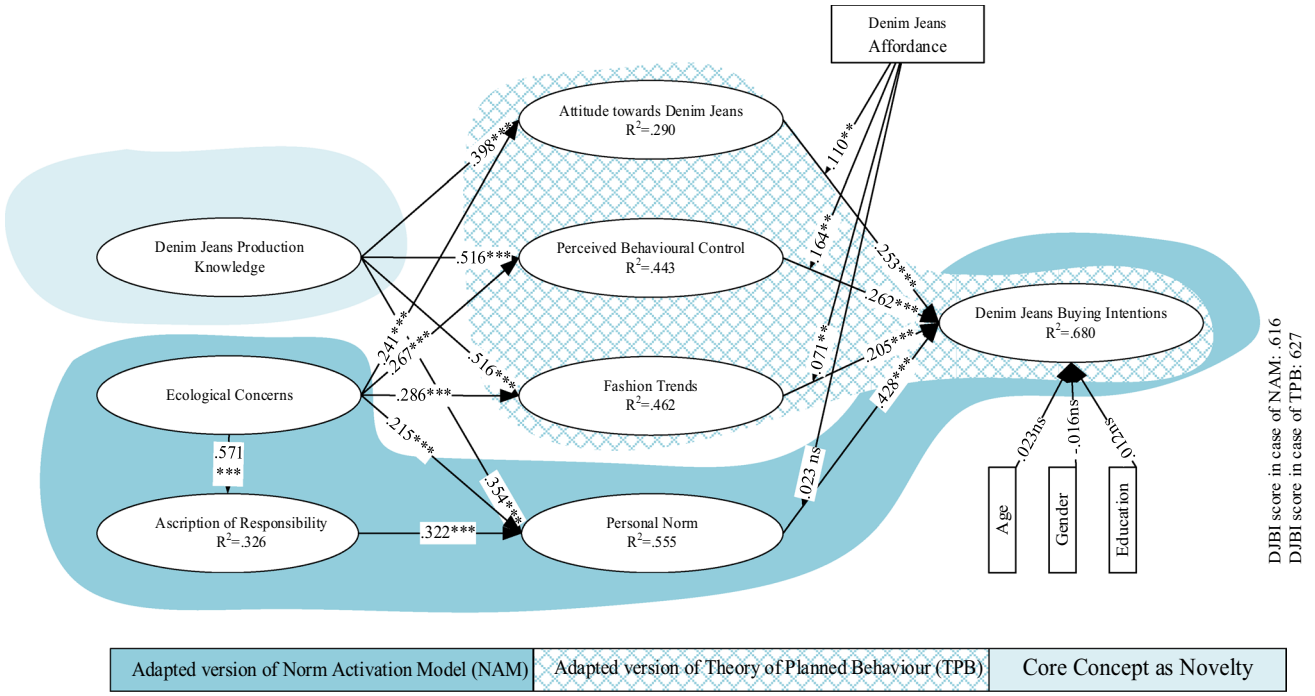


Fig. 2 Path analysis of proposed model

shown graphically in Fig. 2. All hypotheses as proposed in "Theoretical stance for behavioural modelling" (as a part of structural path analysis) were significant (except moderating effects). However, none of the control variables (age, gender and income) in this study were significant.

Any variance (R^2) from each of the determinants, which was observed to be above 0.20, underlines the significant explanatory strength of each of the determinants of the study.

This is particularly the case of the R^2 in the following determinants: AR, ADJ, PBC, FT, personal norms (PN), and DJBI—observed, respectively, as 0.326, 0.290, 0.443, 0.462, 0.555, and 0.680—signifying the sufficient explanatory strength of the proposed model.

Fitness measures and effect size

We also computed the model used in this study with SPSS-AMOS, resulting in model fit indices within the acceptable limits as suggested by Hu and Bentler (1999). The model fit of the indices were reported as follows: CMIN/df = 4.11, TLI = 0.955, NFI = 0.953 CFI = 0.963 and RMSEA = 0.07. Moreover, while comparing the proposed model with the traditionally adapted models (such as TAM and NAM), the variance explained by the proposed model was comparatively high. The impact of each of the exogenous factors over the endogenous factors was mapped and measured by adopting Cohen's (1977) approach, where the f^2 scored less than 0.02, 0.15 and 0.35, and was consequently interpreted as weak, medium, and strong influences, respectively. The effect size of each proposed hypothesis is shown in Table 4. The table particularly illustrates that the hypotheses H6 (a and e) were noted as weak relations because their f^2 was noted to be around 0.070. However, all other proposed hypotheses were significant and had significant effect sizes.

Moderation analysis

The hierarchical regression analysis was conducted to measure the impact of DJA while mapping the relationship between the exogenous factors to define DJBI in mainland China. The results show that DJA was tested as the key moderator in the process of conceptualising consumers' intentions to buy denim jeans (DJBI). DJBI, in turn, was noted as positively significant in the case of ADJ (H8a: $\beta = 0.110$, $\rho \leq 0.01$), perceived behavioural control of consumers (PBC) (H8b: $\beta = 0.164$, $\rho \leq 0.01$) and denim jeans fashion trend (FT) (H8c: $\beta = 0.071$, $\rho \leq 0.01$) while exploring its impact on consumers' intentions to buy denim jeans (DJBI). Alarmingly, DJA was observed to be non-significant in the process of mapping PN (H8d: $\beta = 0.023$, $\rho \geq 0.05$). The interaction plots for moderation-related hypotheses are shown in Fig. 3. The tabular outcome of moderating results is listed in Table 5.

Table 4 Path analysis of proposed model

Sr	Path	Beta	Significance level	Standard error	Cohen's f^2	Effect size
H1	ADJ → DJBI	0.253	***	0.042	0.1224	Weak–medium
H2	PBC → DJBI	0.262	***	0.035	0.1264	Weak–medium
H3	SN → DJBI	0.205	**	0.040	0.1399	Weak–medium
H4	PN → DJBI	0.428	***	0.069	0.1539	Medium
H5	AR →PN	0.322	***	0.044	0.1122	Weak–medium
H6(a)	EC → ADJ	0.241	***	0.029	0.0697	Weak
H6(b)	EC → PBC	0.267	***	0.025	0.1086	Weak–medium
H6(c)	EC → SN	0.286	***	0.027	0.1292	Weak–medium
H6(d)	EC → PN	0.215	***	0.035	0.0696	Weak
H6(e)	EC → AR	0.571	***	0.025	0.4835	Strong
H7(a)	DJPK → ADJ	0.398	***	0.036	0.1898	Medium–strong
H7(b)	DJPK → PBC	0.516	***	0.027	0.4068	Strong
H7(c)	DJPK → SN	0.516	***	0.029	0.4206	Strong
H7(d)	DJPK → PN	0.354	***	0.033	0.1718	Medium–strong

*, ** and *** indicate significance of the estimate at 10%, 5% and 1%, respectively

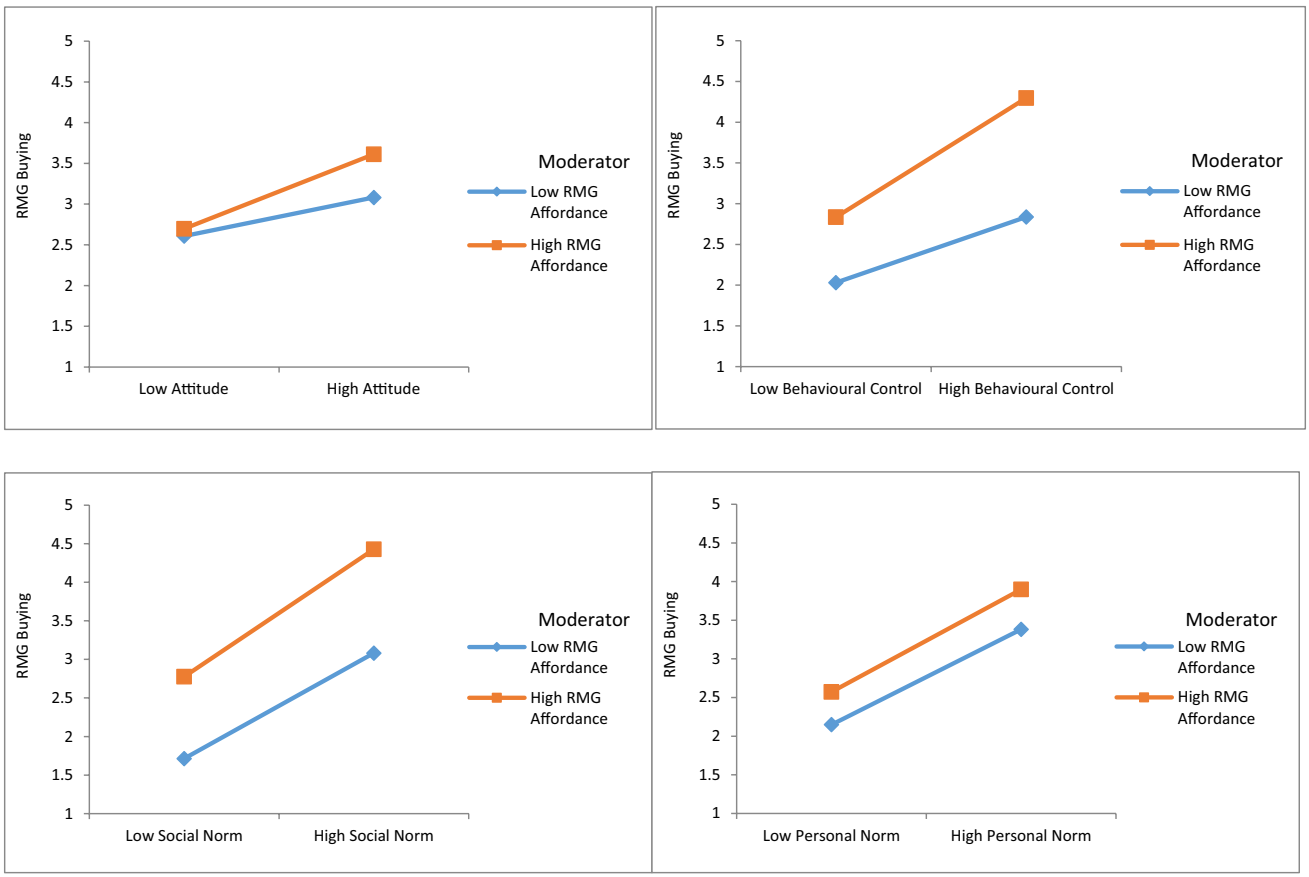


Fig. 3 Interaction plots to explain the effect of affordance of denim jeans (ADJ) while defining the exogenous effect of (from top left clockwise) attitude, perceived behavioural control, PN, and SN (social norms) on denim jeans buying intentions

Table 5 Hierarchal regression analysis for moderator testing

Sr	Moderating effects	Coefficient (scores)	Description
H8(a)	AFF * ATT → RBI	0.110**	AFF strengthen the positive relationship between ATT and RBI
H8(b)	AFF * PBC → RBI	0.164**	AFF strengthen the positive relationship between PBC and RBI
H8(c)	AFF * SN → RBI	0.071**	AFF strengthen the positive relationship between SN and RBI
H8(d)	AFF * PN → RBI	0.023ns	

*, ** and *** indicate significance of the estimate at 10%, 5% and 1%, respectively

Discussion and implications

This research investigated the antecedents of buying behaviour in the purchase of denim jeans by using the theoretical stance of NAM and TPB. The study proposed fourteen direct relations and four mediating effects while investigating the proposed constructs.

The current findings highlighted several valuable links to a comprehensive, persuasive psychological model. For instance: (1) the statistical results underline the explanatory power of DJPK to define: ADJ (H7a: $\beta = 0.398$, $\rho \leq 0.001$); PBC (H7b: $\beta = 0.516$, $\rho \leq 0.001$); social norm (fashion trend) (SN) (H7c: $\beta = 0.516$, $\rho \leq 0.001$); and finally PN (H7d: $\beta = 0.354$, $\rho \leq 0.001$) dominates, as compared to EC while influencing ADJ (H6a: $\beta = 0.241$, $\rho \leq 0.001$); PBC (H6b: $\beta = 0.267$, $\rho \leq 0.001$); SN (fashion trend) (SN) (H6c: $\beta = 0.286$, $\rho \leq 0.001$); and personal norm (PN) (H6d: $\beta = 0.215$, $\rho \leq 0.001$). The existing literature argues that eco-concerns hold the potential to affect the consumers' attitude (Jaiswal and Kant 2018), efficacy (Sharma and Dayal 2016), social (Munerah et al. 2021) and personal normative environment (Qi and Ploeger 2019). To extend the public understanding of green behaviour and potentially change their green behaviour, this study extends prior research by comparing and underlining the strategic role of product production knowledge (subjectively). We find that product production knowledge has a more significant effect on consumers than EC (objective). This finding supports the argument of Han (2019). Furthermore, AR was observed as highly significant in the process of defining the PN of consumers (H6e: $\beta = 0.571$, $\rho \leq 0.001$). Moreover, AR was also noted to have a strong influence on Personal Norm (H5: $\beta = 0.322$, $\rho \leq 0.001$), and this is supported by the existing literature (Giordano et al. 2018; Li et al. 2020). The literature argues that social norm and PN play a significant role while mapping green consumer behaviour (Kim and Seock 2019). This study concluded that PN (H4: $\beta = 0.428$, $\rho \leq 0.001$) is a more dominating construct compared to SN (H3: $\beta = 0.428$, $\rho \leq 0.01$) in the mapping of denim jeans purchasing intentions. Furthermore, the findings from the current research aligned with the literature in the sense that it satisfied the fundamental exogenous factors proposed by traditional TPB while defining purchase intentions. For example, it includes both ADJ (H1: $\beta = 0.253$, $\rho \leq 0.001$) and PBC (H2: $\beta = 0.262$, $\rho \leq 0.001$), as suggested by Kim et al. (2021) and Joanes (2019), respectively.

The presence of apparel production knowledge reflects the fact that consumers are already informed about the product they want to purchase and, therefore, may not be driven to get more production information. Second, it implies that consumers feel the information provided about the product is sufficient to make a decision that would satisfy their moral obligations and enable them to be more confident about their purchasing decisions. The level of consumers' knowledge about a product is a factor that substantially influences the purchase because it reduces their worries about the social and environmental impacts of their purchases. As such, the level of consumer knowledge about the product's production process reflects consumers' effectiveness in carrying out consumption. Information about the process of production of certain products, as well as consumers' perceptions about these products, both, need more investigation to make sound recommendations.

This research also observed a significant relation between EC and FT followed by perceived behavioural control and attitude. These results are in line with Coelh and Jaiswal and Kant (2018), indicating that consumers focus on attaining a balance between a natural environment. This also indicates that the consumers' concerns reveal the belief that they have less confidence in their ability to improve the environmental quality. The high association between concerns, FT and attitude reflects a concern-behaviour gap in the current sample, implying that consumers are highly concerned and informed, but think themselves incapable of improving the environmental conditions by altering their purchasing behaviour.

This study further observed a significant impact regarding PN. These findings are aligned with Kim and Hwang (2020), Munerah et al. (2021), whom indicate the influential role of responsibility in cognition development towards a sustainable lifestyle. Enhanced AR will significantly influence behaviour through PN. The feeling of responsibility for actions forces consumers to find access to products that can reduce the impact of their purchases on the environment. A

condition to do so is that consumers can gather more information to perform sustainable purchases confidently.

The impact of attitude on consumers' decision to buy denim jeans appears to be significant in the current study and is aligned with prior research of Dhir et al. (2021). These prior studies indicate an attitude-behavioural gap in the process of buying green products and further highlight the important role of attitudinal factors in behavioural change. Attitudinal factors can predict consumers' buying intentions. This indicates that consumers place less emphasis on green options when they consider the impact of their purchasing.

The impact of PBC on the process of purchasing denim jeans appears, in this study, to be the second most significant factor. These findings match those of Munerah et al. (2021), who indicate that consumers' adoption of green-behaviour causes consumers to purchase green products more extensively than the standard (non-green) alternatives. This behaviour also indicates enhanced self-efficacy or confidence about an individual's actions and is an important factor in altering their purchasing behaviour; whereas perceived- behavioural control does not help consumers make such decisions. The effect of PN on consumers' decision to buy denim jeans appears to be the most significant factor in the current study, and these findings are in line with Munerah et al. (2021), thus indicating the significant effect of PN on purchase intentions of consumers. PN can be defined as moral obligations and can trigger behavioural changes. This suggests that if the EC of the consumers are aligned with PN, they will least prefer to purchase denim jeans as they feel high moral obligations to do so.

Our study also observed the critical role of affordance in defining perceived attitude, perceived behavioural control, FT and PN found similar results regarding the importance of affordance. This indicates that the higher price of green apparel is the main hurdle for buying attitude and that the purchase of green apparel is mostly driven by economic value. The important role of affordance observed in multiple studies also indicates the strategic role of economic value in consumer decision making in the market as well as highlights the crucial role of price sensitivity which can drive the green attitude among consumers. Economic concerns are the latent problem for developing PN that would motivate consumers to consume green product. In other words, the relatively high prices of green products discourage consumers' attitudes, whereas more affordable green apparel can increase the public willingness to purchase green apparel. Consumers' decisions to purchase any given product are based on perceived-product value, and the affordability of products can be enhanced by providing green value. Affordance can significantly enable and guide consumers towards behavioural change, where higher affordance can motivate consumers to adopt a sustainable lifestyle (Kumar and Yadav 2021).

Theoretical implications

The study provides three main contributions to prior literature. First, conceptualising consumers' buying behaviour in the process of purchasing denim jeans (defined by Muthu (2014) as a long-life product with a huge ecological impact) in the presence of EC is a novel conceptualisation. Although the supply-side of the production of denim jeans was previously discussed by Egels-Zandén et al. (2015), who examined sustainability in the supply chain, the challenging role that remains, according to Jiang et al. (2012), is to address social responsibility. However, no previous studies in which the conceptual mapping of consumer behaviour was proposed (specifically in the case of denim jeans) could be traced. The initiative of this study has conceptualised the behavioural model, based on the lead generated by previous literature by Moon et al. (2015). This particular research showed that EC and fashion-ability could co-exist. Therefore, our study used the determining power of EC to define fashion (denim jeans) buying behaviour.

Second, using DJPK as a construct to define consumers' persuasive psychological factors to adopt luxury fashion (denim jeans) is an additional novel attribute of this study. Consumer knowledge about the supply-side had previously been researched, for example, by Evans and Peirson-Smith (2018), who emphasised the role of brands in enhancing consumers' knowledge while mapping sustainable consumption. Moreover, De Angelis et al. (2017) suggested that luxury brands should adopt more innovative designs to increase green consumption since consumer knowledge is limited. The current study extended and adapted the concerns raised by Garcia et al. (2019) that the consumers' knowledge of production (including knowledge of processes) needs to be studied further. The proposed conceptualisation can help to understand the influence of product production knowledge on consumers' attitudes, as well as normative settings (personal and social) and behavioural control (includes efficacy) in the case of luxury fashion purchases. None of the previous studies highlighted the role of any product production knowledge to define consumption behaviour.

Third, in terms of the structural layout of the proposed model, the study simultaneously compared the meaningfulness and effectiveness of 'Ecological Concerns' and 'Product Production Knowledge' as constructs. Han (2019) predicted that subjective knowledge plays a dominating role in the mapping of purchase behaviour (while having the direct/indirect experience and objective/subjective knowledge only as determinants in the case of apparel purchasing behaviour). In addition to supporting Han's (2019) findings, the current research initiative further extends the conceptualisation of subjective and objective knowledge as exogenous factors while adapting NAM and TPB models in the unified

persuasive psychological view. This can be claimed as a further theoretical novelty of the study.

Practical implications

Although almost every recent study related to ecology and the fashion industry emphasizes the need to increase communication with the stakeholders and express the seriousness and intensity of ecological footprints, the fashion industry continues to ignore these findings and is leaving the responsibilities for the future world to the next generations. Moreover, prior literature concluded that ecological claims and concerns communicated to the target segment could be addressed as part of communication about the product, process, image, and ecological facts (Carlson et al. 1993). Our study implies that the fashion industry (including denim jeans) is not process-oriented (especially production-related), meaning content promotion and claims are not very visible. Moreover, fashion luxury brands are keener towards the product, image or ecological facts oriented ecological claims. As one of the distinctive practical implications of the current research, the study underlines the significance and urgency needed to address the process/production-oriented ecological claims. These claims need to be differentiated and a new blue ocean market strategy must be created. The current research extends the research by Teona et al. (2019) and concludes that fashion brands' substantive claims will help them sustain and grow their market share. However, instead of promoting the green product lines, as suggested by Teona et al. (2019), the current study underlines the critical role of sharing the product production knowledge since this helps produce more long-lasting change and a favourable view among consumers. It is clear and understandable that the supply-side of the fashion industry is fighting for market share by following FT offering product quality and economic value. However, the luxury fashion industry (including denim jeans) has remained unclear in the information it provides to its end-consumers about the production process of its products. The authors of this study argue that end-consumers need to have access to the production phase-related information about a product to enable the creation of eco-concerned change in the industry.

As stated in the "Introduction", the authors claimed that the proposed behavioural modelling is in line with the World Bank (2020) recommendation for climate change adaptation and to build resilience. From the primary findings, it can be stated that product production knowledge is an essential construct to define potential behavioural change. In contrast of NAM-based constructs (EC and AR) and other existing perceived behavioural models (including TPB), findings concluded that product production knowledge is more influential and holds significantly higher explanatory power while mapping potential consumers' attitude, efficacy and norms in the case of defining sustainable apparel consumption behaviour. The research implicates that product production knowledge can be more strategic to define the responsible behaviour of potential consumers, which can further drive macro-level consumer-centric change in apparel and other related industries. In other words, the findings highlight the relatedness and connectivity of consumer-centric sustainable change, which can address the dark aspect of apparel/garments and other industries which are the great challenge for the UN's Sustainable Development Goals (SDGs) (including clean water, responsible consumption and production, climate action, and life on land). Apart from the product production knowledge, the study also underlines the critical role of affordance, which can help to empower potential concerns to adopt sustainable or any eco-centric initiative. In the present phase of the industrial revolution, where bricks and clicks are synergising to offer the best optimal solutions with the least possible carbon footprints, the role of affordability for each of the stakeholders is essential. Primary findings conclude that resilience/sustainable change can only be sustained when it provides affordable solutions for each stakeholder who can help address the UN's SDG of sustainable innovation, affordance, and responsible production and consumption.

As explored through the bibliometric review and literature, most of the prior research was performed in the western hemisphere; however, the main pollution havens are situated in the eastern hemisphere of the globe. Therefore, the authors believe that the endeavour to promote the production/process-based ecological claims needs to be framed in more customised ways that can specifically address regional climatic issues. This regional specificity will help to redefine and reshape the potential consumers' perception of the brand and products offered. For example, product production knowledge which addressed droughts and smart water consumption in Australia would be more likely to drive noticeable and significant positive change in consumers' perception, adoption, and consumption behaviour. Likewise, addressing waste management or avoidance of air contamination throughout the production phase in parts of eastern and south-eastern Asia would also provide the consumers with a more urgent and relevant reality to promote change in their perceptions and behaviour.

Conclusion and future studies

This study is the first of its nature to underline the role of consumers' product production knowledge when purchasing a product (especially in the case of denim jeans). The valuable findings underline the consumers' perspective by comparing the consumers' subjective and objective ecological knowledge and proposing the possible blue ocean strategy

for fashion brands by emphasising the potential role of process/production based ecological claims for future advertising and support for institutional forces (i.e. policymakers and non-government organizations) to create pressure on the supplier side by taking consumers into their confidence for sustainable ecological change in their processes (production phase).

The study contains several limitations. Firstly, we collected data from the digital medium to conceptualize denim jean's buying behaviour, which excluded potential denim jeans buyers/consumers who avoid digital media (digitally divided). Therefore, the generalizability of the current findings is limited.

Second, the instrument of the research was self-reported. Therefore, diversity in terms of mode of data collection could be adopted in future studies. Third, the inter-relatedness of SN (FT) and PN could be tested further. Similarly, the association between AR and DJPK could be tested. Fourth, the currently proposed model comprises buying intentions only. This could be extended further to examine the sustainable use/(i.e. the potential of the product to be reused or recycled). Moreover, as underlined by Levi Strauss and Company (2015), post-purchase handling of the product by the consumer also holds a significant ecological impact. Therefore further study could examine consumers' awareness about responsible behaviour after purchase. Finally, to validate and generalize the observed findings, the proposed model could be tested on other related luxury fashion products (i.e. leather goods).

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