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Green product attributes and green purchase behavior

Green product attributes

A theory of planned behavior perspective with implications for circular economy

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Abstract

Purpose – Nowadays, understanding green consumers has become very critical given its implications for marketers to understand and communicate green purchase patterns on the one hand, and to design and strategize both product offerings and customer services on the other hand. The purpose of this paper is to examine the interaction effect of product attributes on the degree of environment concern, the intention of green purchase and a series of green purchase proposed patterns. This paper is built on the theory of planned behavior, and expands it by replacing subjective norms and perceived behavioral control with respectively environmental knowledge and perceived consumer effectiveness, and also by extending purchase behavior to three types of purchase patterns, namely, unconditional purchase, conditional purchase and accidental purchase.

Design/methodology/approach – The interaction effect is analyzed through ANOVA, whereas path analysis is used to understand path strengths of proposed model, which is assessed through standardized regression weights and significance through p -value.

Findings – Overall, this study reveals the importance of product attributes in the decision-making process of green purchasers.

Research limitations/implications – This study deals with environmental behavior in general, and further research with a focus on specific behaviors is needed in this field investigating the rise of green consumption.

Practical implications – Product attributes play a role in the decision making of consumers willing to buy green products, and both communication and promotion of green products should integrate product attributes accordingly.

Originality/value – Worldwide, consumers are buying more and more green products, and this study leads to a better understanding of the decision-making process of consumers' green products.

Keywords Environmental concern, Accidental purchase, Conditional purchase, Green product attributes, Unconditional purchase

Paper type Research paper

1. Introduction

The transition from a linear economy toward a resource-efficient circular economy is currently underway (Domenech and Bahn-Walkowiak, 2019) and, over the years, there is an increasing formal commitment toward the circular economy with, for instance, the recent action plan toward the circular economy by the European Commission (2015). In the meantime, the rise of green consumption has garnered curiosity from academia over the years (Al Mamun *et al.*, 2018; Chang and Chen, 2013; Chen and Chang, 2013; Chen *et al.*, 2018; Codini *et al.*, 2018; Justin *et al.*, 2016; Lee *et al.*, 2013; Molina-Azorin *et al.*, 2009; Ritter *et al.*, 2015; Romani *et al.*, 2016; Song and Wang, 2018; Wang, 2017). Such a trend about increasing purchase of environmentally friendly products is supported by various reasons mentioned in the academic literature, including a consequence of improved environmental knowledge driven by consumers' environmental concerns (Diamantopoulos *et al.*, 2003; Walker, 2013),



or the result of socially responsible decision-making processes coming from personal ethical orientations or a set of pro-environmental personal values and attitudes (Antil, 1984; Anderson and Cunningham, 1972; Webster, 1975). As indicated by Diamantopoulos *et al.* (2003), other reasons may explain the increase of green consumption, the attributes of green products for instance. Indeed, compared to non-green products, green products' specific characteristics – including recyclability, durability, biodegradability, renewability, low emission, local production, energy efficiency – may lead to both green purchase intention and effective green purchase. Precisely, in this study, the arising question consists of understanding the extent to which consumers do purchase green products due to environmental concern or due to product attributes such as cost effectiveness due to energy efficiency. Furthermore, to build on existing literature dealing with green purchase behavior, this study aims at understanding the extent to which the degree of environmental concern turns into different purchase types, namely, unconditional purchase, conditional purchase or accidental purchase. Overall, in relation with the rising consumption of green products in India – specifically in appliances, white goods and hybrid cars – our study aims at examining green consumption in India through the lenses of customers' environmental concerns vs other drivers for green purchases.

Therefore, the purpose of this paper consists of:

- (1) examining the interaction effect of product attributes – mainly product risks and product benefits – on the relationships between purchase intention, degree of concern and purchase patterns;
- (2) exploring the extension of theory of planned behavior (TPB) in green purchase behavior by replacing subjective norms and perceived behavioral control with respectively environmental knowledge and perceived consumer effectiveness (PCE); and
- (3) investigating three proposed green purchase patterns, namely, unconditional purchase, conditional purchase and accidental purchase.

The research paper has been structured in the following sections. Section 2 presents the theoretical background. Then, Section 3 indicates the proposed model and associated paths. Next, Section 4 is dedicated to both data analysis and findings, and Section 5 offers conclusions as well as theoretical and managerial implications.

2. Theoretical background

Over the years, more and more entities are transitioning toward a resource-efficient circular economy (Domenech and Bahn-Walkowiak, 2019), where the main idea consists of creating a regenerative system where products, components and materials are maintained at their highest value for as long as possible and resources can be productively recovered and reintegrated in the economy (Webster, 2015). This concept of circular economy involves a systemic change that encompasses innovation and technology systems but also policies, society, business models and finance (European Commission, 2015). Despite advanced and digital manufacturing technologies are able to unlock the circularity of resources within supply chains, the connection between circular economy and Industry 4.0 remains unexplored, as indicated by Jabbour *et al.* (2018) who have proposed a detailed research agenda accordingly.

Consumers' pro-environmental behavior remains a complex research topic of interest which has been studied through a variety of frameworks describing relationships between factors, including demographic, socioeconomic, psychographic and behavioral ones. Amongst frequently used frameworks, there are, namely, the Attitude–Intention–Behavior framework, the Value Action Gap model (Blake, 1999), the Knowledge–Attitude–Pro

behavior (Burgess *et al.*, 1998), the Knowledge–Attitude–Intention including situational factors (Hines *et al.*, 1986/1987), the Altruism–Empathy–Pro-social behavior (Schwartz, 1977; Eisenberg and Miller, 1987; Borden and Francis, 1978), the Green Perceived Value/Risk–Green Purchase Intentions (Chen and Chang, 2012) or the Green Consumer Profile–Ecologically Conscious Consumer Behavior (Akehurst *et al.*, 2012). Overall, throughout this multiplication of frameworks, there is a trend in terms of improving the predictive power of attitudes and intentions.

In the most recent years, multiple analytical models considering environmental issues have been developed with a view to improve managers' decisions in terms of both supply chain management and carbon emission costs, including a nonlinear program providing an optimal supplier selection and lot-sizing policy along with carbon emissions under Big Data environment (Lamba *et al.*, 2018), an integrated model considering stochastic demand, supplier capacity and carrier capacity in a carbon trading environment (Kaur and Singh, 2018), an environmentally sustainable procurement and logistics model for a supply chain (Kaur and Singh, 2017a, b), a dynamic nonlinear mixed integer model to design sustainable procurement logistics for disaster resilient supply chain management (Kaur and Singh, 2016) or a flexible dynamic sustainable procurement model (Kaur and Singh, 2017c). Overall, from a quantitative standpoint, such analytical models have increased the understanding of how to integrate environmental parameters into managers' decision-making processes. Another trend consists of integrating behavior models wherein additional determinants of behavior are introduced such as social norms, intentions, values and situational factors (Olson and Zanna, 1993). Contributing to this trend, our study relies on an extension of the TPB (Ajzen, 1988, 1991), which is itself an extension of theory of reasoned action (TRA) (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975). Based on Sharma and Joshi (2017), if majority of consumers may have pro-environmental motivations, pro-environmental beliefs and even pro-environmental intentions, few consumers would convert their motivations to actual green purchases unconditionally, which suggests that green purchases may be a distinct type of pro-environmental behavior. Accordingly, our study explores various factors for this discrepancy in intentions, and actual purchase behavior.

2.1 Theory of planned behavior (TPB)

Fishbein and Ajzen (1975) came up with the TPB which was originally based on the TRA developed in 1967 starting with a focus on customer behavioral intentions as the most important predictor of actual human behavior wherein intention is willingness to engage in a particular behavior (Han and Kim, 2010; Ajzen 1985). One important assumption made by Ajzen and Fishbein (1980) was that individuals are rather rational, make informed decisions and do consider the implications of their actions before engaging or not engaging in a behavior. Moreover, Ajzen and Fishbein (1980) point out two determinants of behavior, namely, behavioral beliefs related to consequences of the behavior on the one hand, and normative beliefs related to prescriptions of others on the other hand. This well-known TRA framework looks at behavioral intentions as the main predictors of behaviors rather than attitudes. Following Godin and Kok's (1996) realized inadequacies and limitations about TRA, the TPB was created by adding a third element (e.g. perceived behavioral control) to the original theory.

The TPB has been applied in a wide spectrum of situations, including predicting exercise intentions (Gatch and Kendzierski, 1990), predicting smoking behavior (Godin *et al.*, 1992), predicting vigorous physical activity of corporate employees (Kimiecik, 1992), intentions to commit driving violations (Parker *et al.*, 1992), analyzing its effect on policy issues (Bright *et al.*, 1993), analysis of both similarities and differences in effect of attitudes and subjective norms on behavioral intentions (DeBono and Omoto, 1993), understanding financial contribution or commission effect of attitudes toward a certain behavior (Kurland, 1996), direct application of

TPB to examine health issues (Nguyen *et al.*, 1996) or revisiting intention and actual visit behavior in tourism (Ziadat, 2015). Moreover, TPB is one of the most influential theories in social and health psychology (Armitage and Conner, 2001). Furthermore, TPB is also validated in the context of pro-environmental behavior (Arvola *et al.*, 2008).

TPB and its several extensions have been used to explore and understand both environmental concerns and environmental knowledge as antecedents of purchase intention for green products (Kamonthip *et al.*, 2016). On numerous occasions, TPB has served as the base theoretical framework in predicting and investigating wide pro-environmental behavior – from travel mode choice, water conservation, energy consumption, to ethical investment, food choice (Stern, 2000) and recycling (Davies *et al.*, 2002; Taylor and Todd, 1995) and explore citizens' behavior intention level, environmental concern and perceived government support in the EIA participation process (Persada *et al.*, 2015).

Several antecedents of extended TPB to environmental behavior exist in the academic literature. First, Mei-Fang Chen's (2015) study has included moral obligation in addition to attitude and subjective norm as an extension to the TPB model in predicting one's intentions to engage in energy savings and carbon reduction behaviors to mitigate climate change problems. Second, other studies (Bamberg *et al.*, 2003; Bamberg and Moser, 2007) have integrated the norm activation model (NAM) with TPB (Ajzen, 1991). Personal norms were not considered as important by some studies for understanding people's pro-environmental behavior (Thøgersen and Ölander, 2006) and several studies support the association of pride and guilt with personal norms within the NAM (Schwartz, 1977). Onwezen *et al.* (2013) confirmed the self-regulatory function of anticipated pride and guilt as a causal factor between behavior and personal norms. Third, Tikir and Lehmann (2011) examined both climate-friendly behavioral intentions and psychological processes. Attitudes and norm were explained by egalitarian value, individualist value and fatalist value playing the role of mediators to show interdependencies between both approaches. Fourth, Kaida and Kaida (2016) confirmed that eco-centric and anthropocentric values facilitate pro-environmental behavior, and that pessimistic anticipation of future subjective well-being facilitates pro-environmental behavior in the present. Fifth, Nguyen *et al.* (2016) revealed that biospheric values may mitigate perceived inconvenience associated with eco-friendly products as it would enhance consumers' attitudes toward environmental protection, their subjective norms and environmental self-identity, thus encouraging active engagement in pro-environmental purchase behavior. Finally, Hines *et al.* (1986/1987) proposed "situational factors" such as economic constraints, social pressures and opportunities to choose different actions as influential factors in environmental behavior.

Lindenberg and Steg (2007) argued that TPB focuses primarily upon self-interest motives and pro-environmental behavior is heavily influenced by money, time and effort expended, fear, threat, mood or past experience (LaMorte, 2016). Also, environmental or economic factors which may influence a person's intention to perform a behavior are not taken into account even if it does consider normative influences (LaMorte, 2016). Another limitation of TPB relates to the fact that TPB does not consider change in decision over a time period. Moreover, the time frame between "intent" and "behavioral action" is also not addressed by TPB. In addition, despite that perceived behavioral control has been an important addition to TPB, it does not take into account actual control over behavior (LaMorte, 2016). It also ignores personal values and self-identification with green consumerism (Sparks and Shepherd, 1992), and also the extent to which it influences pro-environmental behavior at generic levels. At behavior-specific levels, self-identity (Whitmarsh and O'Neill, 2010) refers to the extent to which individuals see themselves as someone who performs a specific pro-environmental behavior (Van der Werff *et al.*, 2013), such as recycling (Mannetti *et al.*, 2004). Last but not the least, Ajzen and Fishbein (1980) argued that from three antecedents proposed by them, any given situation would determine

the appropriateness of these to predict intentions. The relative importance of attitudes, subjective norms and perceptions of behavioral control is expected to vary from behavior to behavior and population to population for the prediction of intentions. Ultimately, Ajzen (1991) clarified inclusion of additional predictors other than the three core components of attitude, subjective norms and perceived behavioral control.

This study adopts TPB model and considers environmental attitude as it is in the original TPB, and it also includes environmental knowledge and PCE as constructs leading to purchase intention predicted by various levels of environmental concern and moderated by product attributes, mainly product risks and product benefits (Sharma and Joshi, 2017). The authors also propose under purchase behavior three actual purchase patterns, namely, unconditional purchase, conditional purchase and accidental purchase (Figure 1).

2.2 Subjective norms

Given subjective norms are not expected to be as critical as they would be in the case of conspicuous products or important social issues (Oliver and Bearden, 1985), and also given that previous studies (Dabholkar, 1994; Warshaw, 1980) have asserted the minimal influence of subjective norms in attitudinal models where intentions to behave may occur, subjective norms as a variable is not included in this study.

2.3 Perceived behavior control (PBC) and perceived consumer effectiveness (PCE)

In our study, PBC has been substituted by PCE given our study aim is to explore the influence of product attributes on purchase, assuming that individuals buy green products because they believe that it would help them save the environment. As posited by Ellen *et al.* (1991), PCE is a related component to the concept of PBC proposed in TPB (Ajzen, 1991). PBC represents the perception of ease or difficulty to perform a behavior while PCE is more relevant in our study as it views a person's perception of what would be the consequence of his behavior. PCE is also referred as a belief that one can positively influence the consequences to problems (Straughan and Roberts, 1999). Several researchers (Berger and Corbin, 1992; Kinnear *et al.*, 1974; Webster, 1975) elaborated PCE as the conviction that individuals have the ability to manipulate the outcome of their actions in a positive manner. Meanwhile, if the consumers sense that their behavior will not result into the intended outcome, it may negatively affect the intention and behavior (Ellen *et al.*, 1991). This is why PCE appears in this study as an antecedent of purchase intention.

2.4 Environmental knowledge

In order to act effectively to produce desired outcomes, individuals require to be well-informed in terms of environmental knowledge (Ajzen, 2011). Grob (1991) argues that environmental knowledge is a subcategory of environmental awareness, where environmental awareness consists of being aware of the impact of human behavior on the environment. As Fietkau and

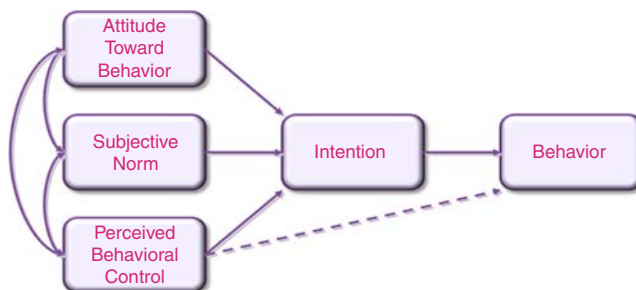


Figure 1.
Original TPB model
by Ajzen (1991)

Kessel (1981) point out, there are two components of environmental awareness, namely, cognitive and affective. Knowledge-based component is cognitive and perception-based component is affective, and both may act as a modifier of attitudes and values but may not directly influence behavior. Moreover, Fietkau and Kessel (1981) see these as elements of value and emotional involvement leading to pro-environmental consciousness, and hence intentions of pro-environmental behavior, but do not posit a direct relationship between environmental knowledge and pro-environmental behavior. A meta-analysis done by Hines *et al.* (1986/1987) on 128 behavioral studies suggests that knowledge is an important element amongst others factors, namely, focus of control, attitude, verbal commitment and individual sense of responsibility behavior. In their model of responsible environmental behavior based on TPB, knowledge had two variables: on the one hand, knowledge of issues that is familiarity of a person with the environmental problem and its causes, and on the other hand, knowledge of action strategies meaning a person has to know how his actions are going to increase or lower impact on the environmental problem. A study by Ajzen (2001) assessed knowledge about the environment to predict a category of behavior and concluded that knowledge can sometimes be predictive of attitudes and behavior. However, Diekmann and Preisendoerfer (1992) claim that detailed technical knowledge does not lead to pro-environmental behavior. Other incentives, namely, economic advantages such as cost effectiveness or fuel efficiency, can motivate people to act pro-environmentally without doing it out of environmental concern. Overall, in this study, we include environmental knowledge as an important predecessor to behavioral intention clubbed with environmental attitude and PCE. As the study explores actual purchase pattern, environmental knowledge is a major factor in informed choice of products.

2.5 Environmental concern

Grob (1991) pointed out the following relationship between emotional reaction and a pro-environmental behavior: the stronger a person's emotional reaction, the more likely this person will be concerned and will engage in pro-environmental behavior. Diamantopoulos *et al.* (2003) referred to environmental concern as a major factor in consumer decision-making process, and they have studied environmental concern using three dimensions, namely, knowledge about green issues, attitudes toward environmental quality and environmental sensitive behavior. This study proposes environmental concern with degrees of concern that is low concern and high concern. Kalafatis *et al.* (1999) indicated that environmental concern might be reflected by increasing number of intention to purchase green products, which could be interpreted as the following proposition:

- P1.* The higher the concern, the higher the intention, or the lower the concern, the less likely the intention to purchase green.

In the proposed model in our study, we consider environmental concern as a mediating factor between intention and purchase behavior. The degree of concern should predict in turn the influence of product attributes mainly product risks and product benefits on green purchase (Sharma and Joshi, 2017).

2.6 Product attributes

The majority of the studies on pro-environmental behavior have adopted a psychological perspective, but if we consider pro-environmental behavior from a free market perspective, green purchases would be more of a cost-benefit choice. For almost four decades, consumer psychology has won the claim as influential factor leading consumers to engage in various forms of green consumerism. However, as Sachdeva *et al.* (2015) mentioned that situational factors (Hines *et al.*, 1986/1987) and product attributes (Gan *et al.*, 2008) may be the culprits for non-conversion of intentions into actual purchase. In this regard, a low-cost/high-cost

model was used by Diekmann and Preisendoerfer (1992) to explain the contrast between environmental attitude and pro-environmental behavior. In this model, cost is both economic costs and psychological costs like time and effort. The contention is that people will indulge in low-cost pro-environmental behavior than one that is costly or inconvenient. Thus, even people with high levels of environmental awareness might not be willing to make bigger lifestyle sacrifices. These sacrifices could also be tradeoffs with product choices.

While earlier studies have majorly researched environmental behavior as an antecedent or a function of intention which in turn is outcome of environmental knowledge and environmental attitude, it is worth noting that very few researchers have explored the importance of product attributes in understanding consumer behavior and green purchase decision, as stated by Sharma and Joshi (2017). The research findings of Gan *et al.* (2008) who are among few who have studied importance of product attributes concluded that consumers who are conscious about the environment are more likely to purchase green products and that product attributes such as price, quality and brand are always first considered when making green purchase decision. On the one hand, Gan *et al.* (2008) contributed in understanding how consumers determine what product is a green product, and how different attributes are of relative importance to consumers, while on the other hand, Ng *et al.* (1993) found that if prices were cheaper or comparable to normal products, some consumers would purchase green products.

In our study, we explore both perceived relative benefits and perceived relative risks as product attributes which influence the process from intention to purchase. Product benefits are cost effectiveness, fuel or energy efficiency, price, durability, quality, availability and overall functionality of green products. Product risks are high price, low functionality, non-durability, inconvenience, discomfort, unavailability, high cost associated with green products. Overall, product attributes play the role of intervening or moderating variables with some interaction effect on actual purchase (Sharma and Joshi, 2017).

2.7 Actual purchase

With environmental concern playing the role of a mediating factor between intention and purchase behavior, the authors propose three types of actual purchase patterns. Here the purchase intention may or may not be the antecedent of green purchase. More than intention it is the degree of concern and product attributes that will result into certain type of green purchase. Thus, a consumer may make an intentional or unintentional purchase, which may be unconditional, conditional or accidental green purchase (Sharma and Joshi, 2017).

2.8 Role of intentions

Intentions are assumed to be reflecting motivation toward performing a certain type of behavior. Intentions also indicate the degree of effort one would put to perform a behavior and the willingness to try (Ajzen, 1991).

2.9 Intentional unconditional purchase

The contention is the following one: the higher the level of environmental concern, the higher the probability of unconditional green purchases. In this context, an unconditional purchase is where the consumer puts no condition on purchase, which means that the consumer is not influenced by product risks associated with green products. Product risks could be high price, less durability, low on functionality, low quality along with other risks of non-availability, inconvenience and discomfort associated with green products. In such case, the consumer who is highly concerned shall make an intentional unconditional purchase (Sharma and Joshi, 2017).

2.10 Intentional conditional purchase

In such scenario, consumers with a lower level of concern will get the higher probability of conditional purchase. Here, consumers will be strongly influenced by product attributes mainly benefits associated with products. Even if environmental concern is low, consumers are willing to make green purchase on the condition that product expectations are met. Product benefits like price, quality, durability, functionality, convenience, comfort, availability, cost effective, energy efficient and low maintenance are important conditions for the purchase. Here a consumer with low concern will make an intentional and conditional purchase.

2.11 Unintentional accidental purchase

Preuss (1991) mentioned that some people may indulge in unconscious pro-environmental behavior, which is not based on fundamental values but based on economic incentives. Consumers with no or low concern and with no intention of buying green products may end up making accidental purchase because of product benefits associated with green products. In this particular scenario, price, durability, cost efficiency, quality, convenience, availability cost effective, energy efficient, low maintenance, schemes and discounts are product benefits that may attract accidental unintentional green purchase (Sharma and Joshi, 2017).

3. Proposed model and paths

The relationships between variables discussed in the previous section shape into a proposed model (see Table AI, proposed model). Each and every path depicted in the model function as predictors is going to be investigated through data analysis. Hypothetical paths listed below are closely linked to the proposed model. The hypothetical model studies the direct and mediating influences as well as the interaction effect of various independent variables, mediating and intervening variables on three dependent variables.

3.1 Independent variables

In our study, selected independent variables encompass demographic and psychographic factors which determine green purchase behavior. Demographic variables include age, gender, occupation, income, education and city of the respondents. Demographic respondents' profiles are provided in Table AII. Psychographic factors include environmental knowledge, environmental attitude, PCE and purchase intention. High and low degree of environmental concern mediates the relationship between intention and purchase which is also affected by the interaction of product attributes.

3.2 Dependent variables

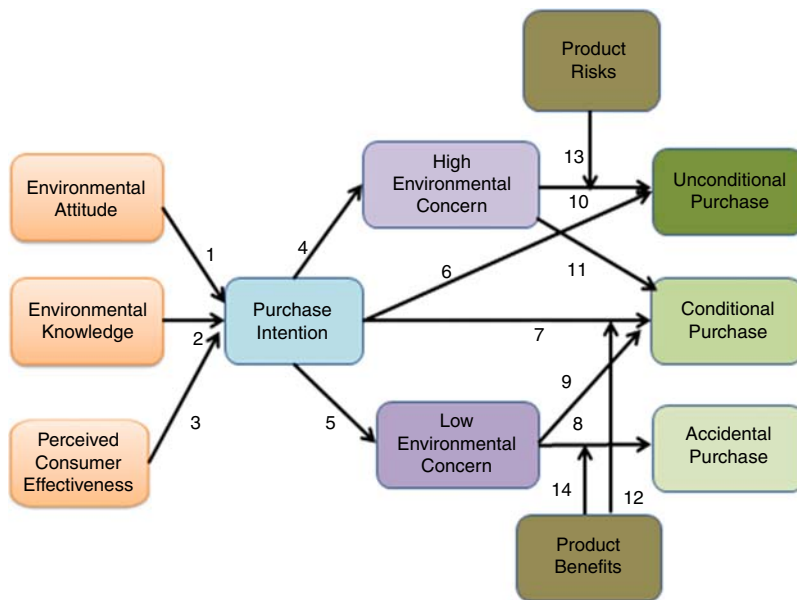
Selected dependent variables include three variables unconditional purchase, conditional purchase and accidental purchase.

3.3 Intervening/mediating

Environmental concern with a degree of high and low concern mediates purchase intention and actual purchase. Product attributes mainly risks and benefits influence relationship between degrees of concern certain type of purchase pattern that could predict either unconditional purchase, conditional purchase or accidental purchase.

3.4 Path analysis

The complex relationships between dependent and independent variables are simultaneously tested with standard regression analysis estimated through a path model predicting or revealing influences between variables. Overall, the proposed model depicted in Figure 2 shows 11 paths and 3 moderating effects to be investigated.



Green product attributes

Figure 2. Extended TPB model: degree of environmental concern, product attributes and type of green purchase

3.5 The hypothetical model

The model consisted of three independent variables (environmental knowledge, environmental attitude and PCE), five mediator variables (purchase intentions, high concern, low concern, product risks and product benefits) and three dependent variables (unconditional purchase, conditional purchase and accidental purchase).

The hypothetical paths are given below:

- (1) EA→PI, environmental attitude predicts purchase intentions.
- (2) EK→PI, environmental knowledge predicts purchase intentions.
- (3) PCE→PI, PCE predicts purchase intentions.
- (4) PI→HC, purchase intention predicts high concern.
- (5) PI→LC, purchase intention predicts low concern.
- (6) PI→UP, purchase intentions predict unconditional purchase.
- (7) PI→CP, purchase intentions predicts conditional purchase.
- (8) LC→AP, low concern predicts accidental purchase.
- (9) PB→CP, products benefits predicts conditional purchase.
- (10) HC→UP, high concern predicts unconditional purchase.
- (11) HC→CP, high concern is a significant negative predictor of conditional purchase.

Paths numbered 12, 13 and 14 indicate the moderating effects and intend to investigate four hypotheses given below:

- H1. Product risks influences relationship between high environmental concern and unconditional purchase.

H2. Product benefits influence the relationship between low concern and conditional purchase.

H3. Product benefits influence the relationship between low concern and accidental purchase.

H4. Influence of demographics on the type of purchase.

4. Results and discussion

Both strength and significance of identified paths were assessed using standardized regression weights and *p*-value. We estimated the path model to understand specifically the relationship between purchase intention and the three types of purchase, that is, unconditional purchase, conditional purchase and accidental purchase and whether the degree of environmental concern which may be high or low along with the product attributes, namely, product risks and product benefits influences this relationship. Out of 11 identified paths, 8 paths were supported.

Overall, the proposed model has strong statistical support to most of the proposed paths. The paths which are not supported are EA with PI, PI with CP and PI with LC:

- The study reconfirms that environmental attitudes do not influence purchase intentions as established by earlier studies. EA→PI was statistically insignificant ($\beta = 0.089$, $p = 0.060$); hence, we can infer that environmental attitudes have no influence on purchase intentions.
- Relationship between conditional purchase and purchase intention, PI→CP ($\beta = 0.062$, $p = 0.215$), is statistically not supported; hence, we can infer that purchase intention is not a predictor of conditional purchase.
- Purchase intention is not a predictor of low concern: PI→LC ($\beta = 0.94$, $p = 0.045$). The path is not proven statistically and one can infer that purchase intention may not predict low concern for the environment.

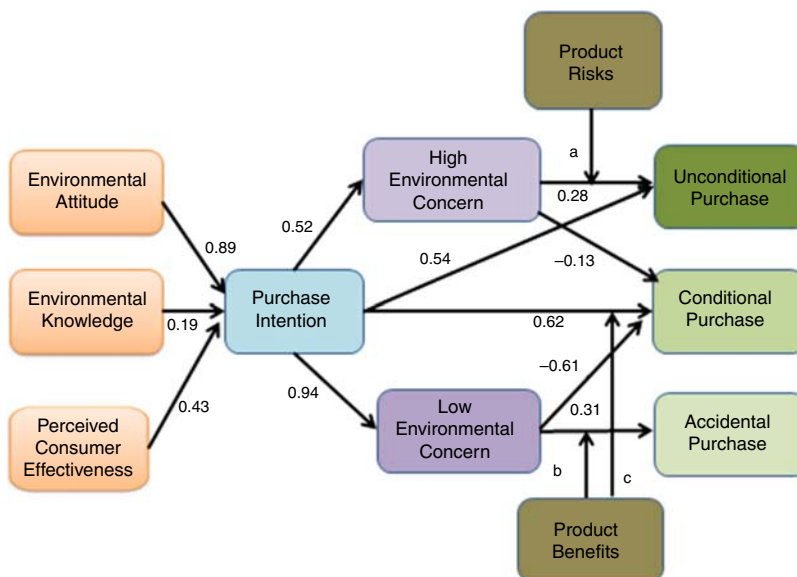
All other paths were statistically supported:

- PCE predicts purchase intentions: PCE→PI ($\beta = 0.433$, $p = 0.000$). This path is statistically predicted. We can infer that if the consumer perceives that his purchase of green product will be effective, the consumer may have purchase intentions. This was earlier established in the literature. The PCE of the respondents is strong, and they feel that each person can have a positive impact on society and buying green can help solve environmental problem.
- Environmental knowledge predicts purchase intentions: EK→PI ($\beta = 0.190$, $p = 0.000$). This relationship was also established in the literature stating that people with high concern may bear inconvenience and discomfort. The path is statistically predicted, and one can infer that knowledge about environmental issues certainly influences purchase intentions.
- Relationship between purchase intention and high concern is also supported: PI→HC ($\beta = 0.523$, $p = 0.000$). This shows that the path is statistically predicted, and one can infer that if an individual has a green purchase intention he may be highly concerned for the environment.
- HC predicts unconditional purchase: HC→UP ($\beta = -0.289$, $p = 0.007$). This supports the theory proposed by the authors that consumers with high concern for the environment may make unconditional purchases.
- HC predicts conditional purchase: HC→CP ($\beta = -0.136$, $p = 0.007$). This path is also statistically proven. We can infer that individual with high concern may also make conditional purchase.

- Low concern predicts conditional purchase: LC→CP ($\beta = -0.167, p = 0.000$). This path is statistically predicted. We can infer here that consumers who are not concerned or low on their concern for the environment may make conditional purchase. These conditions could be product benefits associated like incentives and cost effectiveness which are attractions for them to buy green products. They intentionally purchase products because of benefits.
- Low concern predicts accidental purchase: L→AP ($\beta = 0.316, p = 0.000$). This path is statistically predicted. We can infer that low concern predicts accidental purchase. Consumers may accidentally purchase as the green product was at par with other non-green product. Thus, the consumer may unintentionally indulge into green purchase.
- Purchase intention predicts unconditional purchase: PI→LC ($\beta = 0.548, p = 0.000$). This relationship is statistically proven and supported. It can be inferred that purchase intention may predict unconditional purchase (Figure 3).

4.1 To understand whether demographics have any influence on type of purchase made

RQ1. Do demographics have any impact on the type of purchase?



Notes: a: the main effect (high environmental concern) is significant at $t=9.741, b=0.57, p=0.000$. Interaction effect (high concern \times unconditional purchase) is insignificant at $t=1.528, b=0.018, p=0.127$. Hence, product risks do not influence the relationship between high concern and unconditional purchase. b: the main effect (low environmental concern) is significant at $t=-9.288, b=-0.474, p=0.000$. Interaction effect (low concern \times conditional purchase) is at $t=7.783, b=0.094, p=0.000$. Hence, product benefits do influence the relationship between low concern and conditional purchase. c: the main effect (low environmental concern) is significant at $t=7.414, b=0.510, p=0.000$. Interaction effect (low concern \times accidental purchase) is at $t=-2.432, b=-0.040, p=0.015$, as p -value is less 0.05, product benefits do influence the relationship between low concern and accidental purchase

Figure 3.
Proposed model

Level of significance ($\alpha = 0.025$). From the analysis it is observed that (refer Table AIII) p -values for the demographic variables age, income, occupation and gender are more than 0.025; hence, we accept the entire null hypothesis related to these variables concluding they do not influence the type of purchase made:

- Education does have a significant influence on type of purchase made.

Since the impact of education is examined on each department variable separately, we use Bonferroni corrected α level to avoid α inflation; we therefore divide α by number of dependent variables. Hence, the new $\alpha = 0.05/3 = 0.016$. From between the subject effects table we can see that education has an impact on accidental purchase $F(3, 391) = 4.420$, p -value = 0.005. Education does not impact conditional purchase nor is unconditional purchase impacted. The difference for accidental purchase is seen for UG at 2.7, graduate 2.9, PG 3.09 and PhD at 3.2. So we conclude that accidental purchase is influenced by education:

- City impacts the type of purchase made.

Since Pillai's trace was significant, univariate ANOVA was conducted on each dependent variable separately to determine the statistically significant multivariate effect. Since the impact of city is examined on each dependent variable separately, we use Bonferroni corrected α level to avoid α inflation; we therefore divide α by number of dependent variables. Hence, the new $\alpha = 0.05/3 = 0.016$. From between the subject effects table we can see that p -value for conditional purchase is 0.067, unconditional purchase is 0.031 and accidental purchase is 0.064 which depicts that unconditional purchase is influenced by location where Pune as a city has the highest mean. To understand where the difference lies let us see the descriptive mean. Nasik is at 2.9, Aurangabad at 2.8, Pune at 3.19 and others at 3.13. One can conclude that Pune citizens indulge into unconditional purchase more than Nasik, Aurangabad and other cities in the study.

RQ2. Do product risks influence the relationship between high environmental concern and unconditional purchase?

Statistical test: multiple regression analysis (as the independent variable high environmental concern measured on a continuous scale regression is used to analyze this relationship).

Variables and measurement: Independent variable – high environmental concern, and moderating variable – product risks.

Dependent variable – unconditional purchase.

Hypothesis to be tested:

H_0 . Product risks do not influence relationship between high concern and unconditional purchase.

(Interaction effect = 0):

H_1 . Product risks do influence relationship between HC and UP.

(Interaction effect \neq 0).

$R^2 = 0.384$, hence high concern can have 38 percent of impact on dependent variable unconditional purchase.

ANOVA test is significant at the 5 percent level of significance.

[$F(2, 400) 124.78$], p -value = 0.000. This shows that the model has predictive ability.

From the coefficient table it can be seen that the main effect (high environmental concern) is significant ($t = 9.741$, $b = 0.57$, $p = 0.000$).

Interaction effect (high concern \times unconditional purchase) is insignificant.

$t = 1.528$, $b = 0.018$, $p = 0.127$. Hence, product risks do not influence the relationship between high concern and unconditional purchase.

Conclusion: the null hypothesis that consumers with high concern do not get influenced by product risks and make unconditional purchase is supported:

RQ3. Whether product benefits influence the relationship between low concern and conditional purchase?

Statistical test: multiple regression analysis (as the independent variable low environmental concern measured on a continuous scale regression is used to analyze this relationship).

Variables and measurement: Independent variable – low environmental concern, moderating variable – product benefits and dependent variable – conditional purchase.

Hypothesis to be tested:

H_0 . Product benefits do not influence the relationship between low concern and conditional purchase.

(Interaction effect = 0):

H1. Product benefits do influence relationship between LC and CP.

(Interaction effect \neq 0).

$R^2 = 0.18$, hence low concern explains 18 percent of variance on dependent variable conditional purchase.

ANOVA test is significant at the 5 percent level of significance.

$[F(2, 388) 45.012]$, p -value = 0.000.

This shows that the model has predictive ability.

From the coefficient table it can be seen that the main effect (low environmental concern) is significant ($t = -9.288$, $b = -0.474$, $p = 0.000$).

Interaction effect (low concern \times conditional purchase) is $t = 7.783$, $b = 0.094$ $p = 0.000$.

Hence, product benefits do influence the relationship between low concern and conditional purchase.

Conclusion: the proposition that low concern and conditional purchase is influenced by product benefit is supported:

RQ4. Whether product benefits influence the relationship between low concern and accidental purchase?

Statistical test: multiple regression analysis (as the independent variable low environmental concern measured on a continuous scale regression is used to analyze this relationship).

Variables and measurement: Independent variable – low environmental concern, moderating variable – product benefit and dependent variable – accidental purchase.

Hypothesis to be tested:

H_0 . Product benefits influences relationship between low concern and accidental purchase.

(Interaction effect = 0):

H1. Product benefits do influence relationship between LC and AP.

(Interaction effect \neq 0).

$R^2 = 0.149$, hence high concern explains 14 percent of variance on dependent variable accidental purchase.

ANOVA test is significant at the 5 percent level of significance.

$[F(2, 401) 34.988]$, p -value = 0.000. This shows that the model has predictive ability.

From the coefficient table it can be seen that the main effect (low environmental concern) is significant ($t = 7.414$, $b = 0.510$, $p = 0.000$).

Interaction effect (low concern \times accidental purchase) is $t = -2.432$, $b = -0.040$, $p = 0.015$, as p -value is less 0.05, product benefits do influence the relationship between low concern and accidental purchase. The hypothesis that product benefits influence the relationship between low concern and accidental purchase is supported:

- Product risks influence relationship between high environmental concern and unconditional purchase. Statistical test factorial ANOVA results show that product risks do not influence the relationship between high concern and unconditional purchase. The proposed hypothesis that risks do not impact the purchase decision and the consumers may indulge in unconditional purchase as they are highly concerned is supported.
- Product benefits influence the relationship between low concern and conditional purchase. Statistical test factorial ANOVA results show that product benefits do influence the relationship between low concern and conditional purchase supporting the proposed hypothesis that consumers with low concern will indulge in green purchase because of product benefits.
- Product benefits influence the relationship between low concern and accidental purchase. Product benefits do influence the relationship between low concern and accidental purchase supporting the proposed hypothesis that consumers with low concern also indulge in green purchase though accidentally as the product benefits influence purchase decision.

Overall, the authors' hypothesis that both product attributes and degree of concern influence the type of purchase is statistically proved with the given set of data. All three contentions are statistically proven:

- (1) consumers with high concern about not being affected by product risks associated with green products are likely to make unconditional purchase;
- (2) consumers with low concern are influenced with product benefits and will make conditional purchase only if benefits are accrued from the purchase; and
- (3) consumers with low concern are influenced with product benefits and will indulge into accidental purchase because of benefits and parity with non-green products.

5. Conclusion, contributions and implications

The model has confirmed the main assumption of the study that consumers who indulge into green purchase are influenced by product attributes for their purchase decision. Mainly product benefits influence the type of purchase made. The proposition that consumers with low concern also buy green products provided the product benefits are attached is also supported by the path. Thus, it confirms that conditional purchases take place irrespective of environmental concern. Also, the influence of product attributes with regard to accidental purchase has been confirmed by the study. The three behavioral dimensions related to purchase that emerged out of the propositions are confirmed as unconditional purchase, conditional purchase and accidental purchase.

The purpose of the study is to understand and identify variables that affect the relationship between a green purchase intent and actual behavior. Many authors have concluded earlier that purchase intent does not translate into behavior for many reasons, but the interplay of product attributes along with degree of concern was not explored so far. In this model, the authors do not propose to study behavioral intent but the behavior itself. The authors also propose three types of purchase behavior for the study which have been conceptualized, namely, unconditional purchase, conditional purchase and accidental

purchase. Overall, research findings have shown that the type of purchase is an outcome of the influence of concern and presence of certain product attributes at the time of purchase. Furthermore, the insignificant effect of environmental attitude on purchase intention is confirmed in the study, and similarly to previous studies, relationships between environmental knowledge and purchase intentions have been established, as well as the relationship between PCE and purchase intentions.

Multiple theoretical implications are drawn for this study. First, the proposed concept of conditional purchase is supported by statistical analysis; the proposition that consumers with low concern indulge in conditional purchase is also established. Second, accidental purchase as another type of purchase is supported by statistical analysis, and the proposition that consumers with low or no concern also make green purchases due to product benefits is established. Third, unconditional purchase – which describes no influence of product risks on consumer's decision – is partially supported. The inference is that product benefits will always be an important purchase parameter as consumers are rational in their approach. Similar to earlier studies, environmental concern is not the only reason for customers to purchase an environmentally friendly product, and consumers do not agree to tradeoff other product attributes for a better environment. Therefore, green products must perform competitively based on other important characteristics, like quality, price, convenience and durability also, as stated earlier by Diamantopoulos *et al.* (2003).

The TPB has been used and expanded in order to determine different types of purchases. Overall, the proposed model and associated relationships have shown adequate statistical support with 8 paths out of 11 paths being statistically supported. The authors decline model re-specification and suggest further reinvestigation with another sets of data to reconfirm these as the model has strong theoretical antecedents. In addition, given these variable relationships have been explored for the first time, further research is needed for theory building purposes.

The study overall reveals the importance of product attributes while making green purchase decisions, conforming the proposition that consumers may be concerned about the environment but majority of them would indulge in rational purchases only. Consumers are willing to solve environmental problems and may be willing to buy green products provided green products function equally with non-green products in terms of quality, price, durability and ease of use. Wherever green products are at par with non-green products, consumers have indulged into conditional purchases and sometimes into accidental purchases as well. Consumers who are highly concerned indulge into unconditional purchase and are ready to forgo comfort and convenience associated with green products. But product benefits mainly cost effectiveness/energy efficiency remain the main purchase criteria for green products apart from other parameters of quality, durability, brand and price which are common in both green and non-green products belonging to appliances and white goods category. These insights from our study emphasize product attributes that should be used in communication and promotion of green products.

5.1 Implications for circular economy

Worldwide, consumers are buying more and more green products, and our findings have led to a better understanding of the decision-making process of consumers' green products. Overall, our study reveals the importance of product attributes in the decision-making process of green purchasers. Consequently, stakeholders involved in circular economy – from new product development to marketing and supply chain management – should consider green product attributes in a detailed manner. This is one of numerous challenges in transitioning to a circular economy, which requires a new way of thinking and managing (Esposito *et al.*, 2018). Overall, as indicated by Hopkinson *et al.* (2018), both managers and practitioners are

required to develop competencies and capabilities in order to manage a complex global circular economy business model, and the ability to take into account green product attributes both effectively and efficiently appears to be one of these abilities to acquire and apply.

6. Limitations and directions for future research

The first limitation is the use of a convenience sample. Therefore, the generalizability of the findings is limited to samples in which the study was conducted. The positive association between environmental behavior, purchase in this case, and the determinant variables (knowledge, attitudes, PCE and concern, affected by product attributes) contradicts the results of some studies in the literature. Therefore, additional studies should replicate this research within other population segments. Moreover, this study relates to the environmental behavior in general, and further research should be conducted in order to get fresh insights which could be obtained if a specific behavior or product was examined, as indicated by Cherian and Jacob (2012). For instance, regarding health-related green products, research findings could be different depending on the type of purchase made. Moreover, relationships established between variables in this study are explored for the first time. This study consists of an exploratory research based on psychological motives associated with environmental behavior, and research findings may vary with another set of respondents. The model needs to be retested with different set of responses. Indeed, bias on the part of respondents, due to pressure of social desirability, even though their identity is kept confidential cannot be ruled out. Study covers comparatively a short time period and hence does not provide the longitudinal perspective of research.

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Appendix

Green product attributes

S. No.	Path	Hypothesis
1	EA→PI	Environmental attitude predicts purchase intentions
2	EK→PI	Environmental knowledge predicts purchase intentions
3	PCE→PI	Perceived consumer effectiveness predicts purchase intentions
4	PI→HC	Purchase intention predicts high concern
5	PI→LC	Purchase intention predicts low concern
6	PI→UP	Purchase intention predicts unconditional purchase
7	PI→CP	Purchase intention predicts conditional purchase
8	LC→AP	Low concern predicts accidental purchase
9	PB→CP	Products benefits predict conditional purchase
10	HC→UP	High concern predicts unconditional purchase
11	HC→CP	High concern is a significant negative predictor of conditional purchase

Note: Paths numbered 12, 13 and 14 indicate the moderating effects and are investigated using ANOVA

Table AI.
Proposed model

<i>City</i>		<i>Occupation</i>	
Nasik	47%	Private employee	21%
Aurangabad	16%	Government employee	20%
Pune	13%	Professional	27%
Others	24%	Self-employed	16%
<i>Age</i>		Unemployed	4%
18–24	10%	Retired	3%
25–34	39%	Others	1%
35–44	19%	<i>Gender</i>	
45–54	19%	Male	71%
55–64	12%	Female	25%
Above 65	2%	Missing	3%
<i>Education</i>		<i>Income</i>	
Undergraduate	13%	< 600,000	44%
Graduate	29%	600,000–800,000	23%
Post-graduate	46%	800,000–1,000,000	15%
PhD	13%	1,000,000–1,200,000	7%
		Above 1,200,000	11%

Table AII.
Demographic profile of respondents from Maharashtra, India

Table AIII.
Demographic
influence

<i>Purchase parameters</i>									
Variable	χ^2	df	F	Df1	Df2	Bartlett's test Likelihood	Sig	Box's M Likelihood	Sig
Age	40.807	5	2.205	30	3,135,595	0.000	0.000	71.103	0.000
Income	40.922	5	2.316	24	71,682,346	0.000	0.000	57.033	0.000
Occupation	40.352	5	1.520	36	14,680,626	0.000	0.000	57.483	0.024
Education	36.974	5	2.506	18	116,048,776	0.000	0.000	46.002	0.000
Gender	38.905	5	1.445	6	202,674,895	0.000	0.000	8.778	0.193
Location	44.579	5	4.982	18	130,702,615	0.000	0.000	91.444	0.000
<i>Type of purchase made</i>									
Hypothesis	Value	df	F	Error	Sig	Result			
G Age does not influence type of purchase	0.050	15	1.325	1,170	0.179	Accepted			
H Income does not influence type of purchase	0.031	12	1.009	1,152	0.437	Accepted			
I Occupation does not influence type of purchase	0.071	18	1.563	1,164	0.062	Accepted			
J Education does not influence type of purchase	0.060	9	2.643	1,173	0.005	Rejected			
K Gender does not influence type of purchase	0.007	3	0.950	388	0.416	Accepted			
L Location does not influence type of purchase	0.057	9	2.545	1,185,000	0.007	Rejected			

Path. No.	Path	Standardized regression weight	p-value	Result	Conclusions
1	EA→PI	0.089	0.06	Not supported	Environmental attitude is not a significant predictor of purchase intentions
2	EK→PI	0.190	0.005	Supported	Environmental knowledge is a significant predictor of predicts purchase intentions
3	PCE→PI	0.433	0.005	Supported	Perceived consumer effectiveness is a significant predictor of purchase intentions
4	PI→HC	0.523	0.000	Supported	Purchase intention is a significant predictor of high concern
5	PI→LC	0.094	0.045	Not supported	Purchase intention is a significant predictor of low concern
6	PI→UP	0.548	0.000	Supported	Purchase intentions is a significant predictor of conditional purchase
7	PI→CP	0.062	0.215	Not supported	Purchase intentions is not a significant predictor of conditional purchase
8	LC→AP	0.316	0.000	Supported	Low concern is a significant predictor of accidental purchase
9	LC→CP	-0.167	0.000	Supported	Low concern is a significant negative predictor of conditional purchase
10	HC→UP	0.289	0.029	Supported	High concern is a significant predictor of unconditional purchase
11	HC→CP	-0.136	0.007	Supported	High concern is a significant negative predictor of conditional purchase

Table AIV.
Demographic influence on purchase parameters

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