

Does Green Brand Positioning Limit Carbon Emissions in Egypt? New Evidence from PLS – SEM Method

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Abstract

Sustainability has now emerged as a critical priority for businesses. With consumers' increasing concern about the environment, many businesses are fast investigating and exploring new approaches, creating new ideas, and preparing different approaches to position their green brands in the minds of the customers as a solution for environmental problems. This study contributes to the literature by the being among the first to test the impact of green purchase intention on carbon emissions in Egypt. A new conceptual framework was formed by integrating three important theories: theory of planned behaviour (TPB), Cognition–affection–behavior theory of attitude (CAB) and Value Belief Norm (VBN) theory of environmentalism. The proposed model incorporates green brand positioning, consumer's green attitude, perceived environmental knowledge, green behaviour, green brand knowledge, and green purchase intention as main factors. A questionnaire was designed, and we obtain 231 eligible responses. We used PLS – SEM method to test the validity and reliability of the measurement model and then testing the hypotheses using structural equation model. The finding revealed that higher consumer's intention to purchase green brands (GPI) would lead to lower carbon emissions (CE) and thus improve the environmental quality. We found also a positive and significant effect of consumers' attitude (GA) towards green brands and green behaviour on consumers' intention to purchase green brands (GPI). On the other hand, green brand positioning (GBP), perceived environmental risks (PEK), and green brand knowledge (GBK) have insignificant impact on consumers' intention to purchase green brands in Egypt. Moreover, the results showed that perceived environmental knowledge (PEK) and green brand knowledge (GBK) have indirect effect on consumer's intention to purchase green products through their effect on consumers' attitude and thus CGA is said to play a significant intermediary role. Furthermore, GBK is said to mediate the relation between GBP and GPI.

Introduction

Global warming has been recognized by the international community since the 1970s, but the topic was reintroduced and became a concern in the 1990s (Iwan, 2013). Global warming is a type of ecological imbalance that occurs on Earth due to increase in the temperatures of the atmosphere, the oceans, and the earth, which is produced by an increase in gas emissions such as Carbon dioxide (CO₂), methane, and water vapour in the atmosphere (Utina, 2009). With the objective of overcoming environmental problems, the United Nations (UN) have set 17 sustainable development Goals (SDGs) to promote better life for all people. SDG goal number 13, which is based on climate change and environmental protection, is now capturing the interest of researchers, policymakers, government officials, international organizations, and practitioners due to rising sea levels, changing weather patterns and increasing levels of carbon emissions (Siyal et al. 2021). These climatic changes have made the Consumers increasingly aware of the critical situation of the environment to preserve nature. Such circumstances eventually result in an increase in green consumption behavior that has begun when consumers became aware that they have the right to buy a good, safe, and environmentally friendly product.

The openness of the global market, on the other hand, encourages a high degree of competition, which results in a high-quality product. Consumer behaviour has changed as the focus shifts from consumption of traditional products to environmentally friendly product. In other words, Consumers are

changing their lifestyle to be green or to enjoy "green" way of life. As a result, demand for green products and services provided by green businesses increases. Meanwhile, consumer preference for green products has become the driving force to encourage more companies to improve their environmental performance in the marketplace (Liu et al., 2012; Kumar, 2017). This environmental consciousness now compels businesses to upgrade their techniques, develop products to more environmentally friendly in accordance with the SDGs' principles. Numerous businesses are now communicating explicitly how they include sustainability into their business processes and marketing function (Raska & Shaw, 2012; Royne et al., 2011) by positioning their products as green brands. Green positioning can be defined as the set of features, advantages, and environmental aspect that persuade green customers to choose green products over other options (Hartmann and Apaolaza, 2006). Huang et al. (2014) suggested that along with green brand positioning (GBP) there are other factors that can influence the customers green purchase intentions such as the green brand knowledge (GBK), attitude toward green brands (GA), green behavior (GB) and perceived environmental knowledge (PEK). Thus, this study aims to assess the impact of Green Brand Knowledge, Attitude toward Green Brand, Green behavior on purchase intention and explain how green purchase intention can limit carbon emissions in Egypt.

The contribution of this paper has three-fold. First, to the best of our knowledge, this study is among the first that empirically tested and validated the significant relationship of green purchase intention and carbon emissions through the formation of a new conceptual framework. *Secondly*, this study added to the literature through examining the moderating effect of GBK on the relation between GBP and GPI in an emerging country. *Thirdly*, the new conceptual framework was based on the integration of three important theories in this discipline which are theory of planned behaviour (TPB), Cognition-affect-behavior theory of attitude (CAB) and Value Belief Norm (VBN) theory of environmentalism. Finally, this paper extends the research on the environment from the perspective of green purchase intention which makes it possible to excavate deeper into the relationship between green brand positioning and carbon emission and to draw more explicit policy implications for environmental sustainability.

Theoretical foundation and hypothesis development:

Theory of Planned Behaviour (TPB)

The Theory of Reasoned Action (TRA 1986) has been extensively used to explain behavioural beliefs that shape person's attitude and intention towards an objective (Fishbein & Ajzen, 1975). More recently, TRA has been used heavily to study consumers' green behaviour and their green purchase intention (Al-Swidi and Saleh, 2021; Wang et al. 2021; and Ramayah et al. 2012). However, the lack of measurement variables that can predict behaviours leads to the development of the theory of planned behaviour (TPB) as an extended model from TRA model that added new measurable variables such as perceived behavioural control variables (Ajzen, 1991). The TPB explains the impacts of behavioural factors such as attitudes, environmental psychology or environmental - friendly actions, social influence, subjective norms and other perceived behavioural control variables on consumers' intention and then draw an inference about the actual individual behaviour (Wang, 2020; Al-Swidi et al. 2014; Fielding et al. 2008; Collins and Carey, 2007; and Ajzen 1991). Thus, in the light of TPB, consumers' intention to make any buying decision is directly impacted by his behavioural attitudes and environmental psychology.

The addition of perceived behavioural control (PCB) strengthens the ability of the model to explain consumers' behavioural actions. Thus, TPB has been widely applied in the areas of green consuming, such as organic food, residents in green hotels, visiting green restaurant, green personal care products and eco-label food consumption (Ates, 2021; Wojnarowska et al. 2021; Liu et al. 2020; Jang et al. 2014; Han et al. 2011; and Kim and Chung, 2011). Moreover, TPB could be used to explain consumer environmental behaviours especially green behaviour and green purchase intention and how this could help in achieving environmental sustainability (Paul et al. 2016). Since the TPB permits the addition of other variables that can improve the model's explanatory power (Ajzen 1991), this study has incorporated few additional constructs for better explanation to consumer's green purchase behavior such as green consumer behavior (GB), green brand knowledge (GBK), and consumers' green attitude (CGA)

2.2 Cognition–affection–behavior theory of attitude

This study is also based on CAB theory of attitude (Lavidge and Steiner, 1961) that accounts for the effect of environmental knowledge and green purchase intention on the consumers' behavior. Thus, it's appropriate to integrate the CAB theory of attitude with its three physiological dimensions' cognition, affection, and actual behavior (Nguyen et al. 2019 and Aalderen-Smeets et al., 2012). Concerning cognition dimension, it refers to consumers' perception about attitude which is measured by their knowledge. On the other hand, the behavioural stage refers to consumer's behavioral reaction towards their attitudes which is measured by their intention. Finally, the affective stage refers to consumer's emotional reaction about their perceptions of attitude (Pan et al. 2021). In this study, CAB theory of attitude was extended by integrating new constructs. Concerning the cognitive dimension, research has shown that perceived environmental knowledge and attitude towards green brand are key determinates to consumer's green purchase intention (Zhao et al. 2021; Pan et al. 2021 and Liu et al. 2017). For the affective or emotional dimension, Pebrianti, & Aulia, 2021 argued that green brand positioning represents an environmentally friendly firm image. Thus, positioning the brand in the minds of consumers as green brand can affect brand image, consumer's attitude, brand attachment and purchase intention towards green products (Pan et al. 2021 and Chen, 2017). Moreover, as per the behavioral dimension, consumer's purchase intention was chosen as the construct that indicate consumer's intention to purchase green products to limit carbon emissions (Pan et al. 2021).

2.3 Value Belief Norm Theory (VBN)

The VBN theory has been used extensively to provide deep analysis of consumers' pro environmental behavior and then was extended to examine purchase intention to buy green products (Hein, 2022). More specifically, this theory is based on the values and beliefs that explain environmental protection norms that vary among consumers (van Riper and Kyle, 2014; and Steg et al., 2005). Furthermore, VBN theory suggests that the perceived environmental risks that arise due to climate change could motivate the adoption of a hazard-mitigation behavior, resulting in lower carbon emissions and thus better environment (Pan et al. 2021).

VBN theory has three integrated dimensions that explain how environmental behaviour is formed. Thus, people's environmental consciousness could be explained by the interactions among values, beliefs and norms (Stern et al. 1999). In line with this, VBN theory was chosen as a theoretical foundation for this study to integrate environmental attitude, purchase intention and carbon emissions (CE) in the context of green brand positioning. In green brand positioning, consumers` develop their own knowledge about environmental risks first and then create specific firm image through firm green brand positioning. This will lead to positive attitude towards the environment because of higher environmental responsibility and satisfaction with green brands. Finally, the integration of these environmental beliefs and norms, shape consumer's willingness to protect the environment and thus develop green purchase intention. Thus, this study used green attitude towards environment as an independent variable to predict consumer' purchase intention of green products to limit carbon emissions. In this context, synergizing the theories of the TPB, VBN and the CAB theory of attitude, we present the relevant hypotheses and the research model of this study.

Green Brand Positioning (GBP) & Green Purchase Intention (GPI)

Green brand positioning is related to all brand environmental attributes that customers pay attention to (Pebrianti & Aulis; 2021; Wang, 2016; Aaker and Joachimsthaler, 2002 and Rios et al. 2006). As perceived by the public, green brand positioning represents an environmentally friendly firm image (Pebrianti and Aulia, 2021). Saha and Darnton (2005) explained that green positioning is the element that represents the company's green image as perceived by the public". Thus, an important part of positioning a green brand is making sure that customers know about the brand and that it is different from other brands because of its environmentally friendly features (Rios et al., 2006). Green brand positioning can be thought of as a marketing effort to put the brand or product attributes in their place based on how they can help the environment and people's health (Booi-Chen, 2011 and Hartmann et al. 2005). Wang (2016) discovered that many researchers focused on green brand positioning in order for the brand to match green consumers' expectations about important features. Therefore, green brand positioning is critical for

building a brand image in the minds of consumers for a company to succeed in the green market and to achieve green sustainability (Gwin & Gwin, 2003). Moreover, businesses could leverage innovative marketing strategies and promotions to highlight the characteristics of their green brands to attract more green customers (Huang et al. 2014). In the context of green product purchase intention, green brand positioning is an important factor in identifying the factors that affects green purchase intention (Suki, 2016; Huang et al., 2014; and Mostafa, 2007). Thus, in the light of the preceding literature, the following can be hypothesized:

Hypothesis 1 (H₁): Green brand positioning has a significant impact on green purchase intention

Attitude towards Green Brand (CGA) & Green purchase Intention (GPI)

Brand attitude refers to consumer's preference for evaluating the brand itself (Teng, 2009). Attitude refers to a consumer's preferences and dislikes (Solomon, 2022) that are influenced by consumer's environmental attitude (Mostafa, 2007). According to Chen and Deng (2016) consumers' attitudes towards green products indicate to what extent the decision to buy a green product is valued by consumers, whether in a negative or positive way. More specifically, consumer's attitude towards green products is shaped by their awareness about environmental risks where green consumers usually have positive attitude towards green products, resulting in higher green purchase intention (Bryla, 2019; and Yadav and Pathak, 2016). Paul et al. (2016) concluded that intention to purchase green products could be strongly predicted by consumer's positive attitude towards green products. This result was found in many different studies that proved that consumer's green attitude has a statistically significant impact on green purchase intention (Kamalanon et al. 2022; Jan et al. 2022; Siyal et al. 2021; Al Mamun et al. 2018; Yadav and Pathak, 2016; Paul et al. 2016; Barber et al. 2009; and Teng, 2009). Another important study by Mostafa (2007) concluded that consumers with positive attitudes toward green products are more willing to purchase green products that are defined as green brands and use green brand positioning as their strategy. Thus, according to the previous literature review, the following hypothesis is postulated:

Hypothesis 2 (H₂): Consumer's attitude towards green brands has a significant impact on green purchase intention

Perceived Environmental Knowledge (PEK) and Green Purchase Intention (GPI)

Environmental knowledge has no universal definition; however, many researchers define environmental knowledge as consumers' understanding of how products could negatively impact the environment through harmful chemicals, greenhouse gases, recycled packaging, and other ecological information that affects their attitude and intention to purchase such products (Thu and Huynh, 2022; Haryanto & Budiman, 2014; Chen, 2013; Ali et al. 2011). Previous studies have found that higher level of environmental knowledge led to higher purchase intention of green products (Thu and Huynh, 2022; Yadav et al. 2016, and Rokicka, 2002). Moreover, developing strong environmental knowledge among consumers will lead to higher positive attitude towards green products (Maichum et al. 2016). On the other hand, few studies found that perceived environmental knowledge have no significant impact on consumers' attitude (Indriani et al. 2019 and Levine and Strube, 2012). This view was proposed by Miller (1991) who argued that although large percentage of consumers have enough information about environmental problems and show real concern about climate change, only few are willing to change to green brand as their prices are higher or they don't want to change their personal lifestyle. Hence, we hypothesized that:

Hypothesis 3 (H₃): Environmental knowledge is positively related to consumer's attitude towards green brands.

Hypothesis 4 (H₄): Environmental knowledge has a positive and significant effect on green purchase intention

Green Brand knowledge (GBK), Green Brand Positioning (GBP), Intention (GPI), and Attitude (CGA)

Rajesh (2020) defines green brand knowledge as the information available about how overall products' carbon footprint could be reduced whether in terms of products' components or through the production processes itself. Also, Suki (2016) defines green brand knowledge as the process through which a business conveys knowledge or information about the uniqueness of its product via the brand's qualities and their environmental benefits (Suki, 2016). As a result, firms must persuade customers about

the risks related to the use of chemical-based goods and the benefits of using eco-friendly healthy products so that customers perceive what the firm provides. Customers with a high degree of environmental knowledge show a higher environmental mentality and will be more likely to consume eco-friendly products (Huang et al. 2014). Therefore, companies must provide their consumers with reliable information about environmental changes to raise their green brand knowledge and thus their intention to purchase their green products for ecologically friendly purposes (Suki 2016; Ganapathy et al. 2014; Keller, 1993). More specifically, when customers lack information or awareness about green product or brand, their intention to buy a green product is severely impacted. This positive relation between environmental knowledge and consumers' green purchase intention have been highlighted in many previous studies. These studies proved that if consumers are well informed about how green product mitigate the effect of climate change, they will have strong intention to purchase it (Siyal et al. 2021; Sayed et al. 2021; Paul et al. 2016; Yadav and Pathak, 2016; Pagiaslis and Krontalis, 2014; and Mostafa 2009). Thus, green brand knowledge has positive impact on consumers' green purchase intention.

Moreover, many previous studies in the field of green marketing have asserted that consumers' information about climate change and the rising carbon emission will influence their attitude towards the use of green products and thus consumers' green brand knowledge and attitude are positively correlated (Suki, 2016; Chang and Wu, 2015). Consumers' who are fully aware with surrounding environmental problems have a positive attitude towards green brands and stronger intention to purchase green products to preserve the environment (Huang et al. 2014 and Rokicka, 2002). On the other hand, few empirical studies could not find any significant relation between green brand knowledge, attitude, and green purchase intention (Suki, 2016; Lim et al. 2016; and Connell, 2010)

Other scholars examined the rule of green brand knowledge (GBK) in moderating the relationship between green brand positioning (GBP) and green purchase intention (GPI). They concluded that firms that have succeeded in positioning their brands as environmentally friendly through delivering information to consumers concerning the benefits of purchasing green brands, will develop stronger intention among consumers to purchase green products to preserve the environment (Siyal et al. 2021; Suki, 2016; Huang et al. 2014; and Ganapathy et al. 2014; Chen). Accordingly, the following three hypotheses have been hypothesized:

Hypothesis 5 (H₅): *Green brand knowledge moderates the relation between green brand positioning and green purchase intention*

Hypothesis 6 (H₆): *Green brand knowledge has significant effect on consumer's green purchase intention*

Hypothesis 7 (H₇): *Green brand knowledge has significant effect on consumer's attitude towards green brands*

Green Behaviour (GB) & Green purchase Intention (GPI)

Green behavior referred to a set of actions that minimizes harm to the environment through minimizing use of energy, reducing waste, conserving water, and refusing to buy goods perceived to be harmful to the environment (Mishal et al, 2017 and Steg and Vlek, 2009). According to Chen (2010) consumers who care about the environment and the world give greater attention to environmental protection. They are willing to pay a premium price for a green product to help clean up the contaminated environment. Ogiemwonyi et al. 2019, defined green customers as those who exert much effort to change their behaviour and buy green products to help in protecting the environment. Similarly, Kumar & Ghodeswar (2015) defined green consumers as those who purchase environmentally friendly products from environmentally friendly businesses. Laroche et al. 2001 discovered that consumers seek information and educate themselves about the ingredients in green products prior to purchasing them. Consumers would share the information and knowledge they have gleaned with their peers, and they would learn from each other about the green product's composition prior to consumption. Indeed, green buyers are eager to pay a premium price for any green goods (Barber, Taylor, & Strick 2009). Green consumers usually buy green products that either preserve the environment or at least minimize environmental pollution. Purchasing green products decision are based on green consumers' recognition of social awareness that develop positive attitude towards green products that are directly linked with green behaviour (Ogiemwonyi et al. 2019)

Hypothesis 8 (H₈): *Green behavior of customers has a positive influence on green purchase intention*

Hypothesis 9 (H₉): *Green behavior of customers has a positive influence on carbon emissions*

Green Purchase Intention (GPI) & Carbon Emissions (CO₂)

Green purchasing can be defined as buying environmentally friendly products and evading those that cause environmental degradation (Soomro et al., 2020). Those green products either use environmental safer materials, recyclable materials or less packaging (Chen and Chai, 2010). Thus, green product purchase intention shows consumers' willingness and desire to buy products that help in preserving the environment compared to traditional ones (Li et al. 2021 and Esmailpour & Bahmiary, 2017; and Paul et al. 2016). Suki (2016) also claimed that people intend to acquire a green product that is less hazardous to the environment and society. Global warming has been attributed to an increase in the average air temperature, which has resulted in a series of changes to the earth's climatological systems. These rapid changes are occurring as a result of human activity's continued emission of high - temperature greenhouse gases (GHG) into the atmosphere. Thus, due to the rising anxieties about climate change and rising carbon emissions, examining the impact of green purchase intention on carbon emissions is now a worldwide demand. Few empirical studies have discussed the impact of green products in some sectors such as vehicle and transportation (Wijekoon and Sabri, 2021) and construction sector (Saleh and Al - Swidi, 2018) on environmental quality. Similarly, Pan et al (2021) argued that the extent through which packaging harm the environment through increasing carbon emissions, can be used as a measure of the environmental friendliness of packaging. Against this background, the following hypothesis has been developed.

Hypothesis 10 (H₁₀): *Green purchase intention has a positive impact on CO₂ emissions*

The proposed model is shown in figure 1:

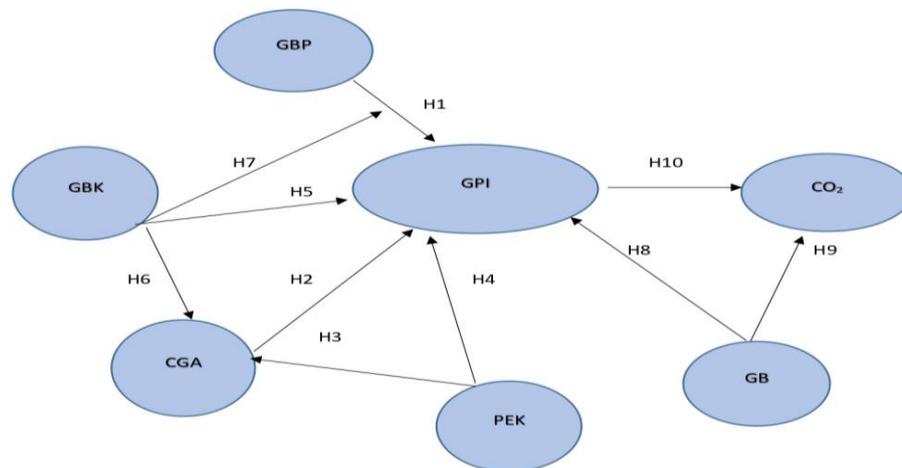


Figure (1)

Research Conceptual Model

3. Methodology

3.1 Data Collection & sample design

The main objective of this study is to identify the factors affecting consumers' behavioral intention to buy green products and to test its effect on carbon emission reductions. Thus, non -probabilistic convenience sampling method was used in this research which is coherent with several previous studies analyzing consumers' green purchase intention (shoukat et al. 2021; Keni et al. 2020; Ahmed and Zhang, 2020; and Jaini et al. 2019). This method indicates that not all brand users have equal chances to be selected where the researchers target consumers who are easily accessible (Shoukat et al. 2021; Ahmed and Zhang, 2020; and Bell et al. 2018). Data collection was carried through distributing an online questionnaire designed using google forms which has superior advantage of being cost efficient and has shorter time frame compared to hand - to - hand questionnaires. This is applicable since the only

requirement for participating such study is to have access to the internet (Celik, 2008). Different social media tools such as Facebook, Twitter, WhatsApp and LinkedIn were used to distribute the questionnaire's URL so as to ensure that the sample is representative.

Nunnally (1967 cited in Mishal et al. 2017) suggested a rule of thumb used in most of the empirical studies using structural equational model (SEM). The proposed rule defined an appropriate sample size to be at least ten times the number of variables used by the researchers in their study. However, a sample size of 200 valid questionnaires is claimed by many researchers to be adequate for SEM analysis if the number of variables vary between 15 to 20 (Mishal et al. 2017; Punyatoya, 2015 and Rahbar and Wahid, 2011). In similar vein, Hair et al.2010 and Bagozzi and Yi, 2012 proposed a sample size above 100 to be reasonable and if it is above 200 it will be highly adequate for statistical analysis. Since there are 7 constructs used in this study a sample size of 229 is appropriate and adequate to employ SEM model. Thus, a total of 254 questionnaires were distributed and only 229 questionnaires were used for the analysis after screening and deleting invalid questionnaires. Table 1 shows an overview of the demographics of the respondents.

Demographic Variable and category		Frequency	Percentage
Gender	Male	78	34.1
	Female	151	65.9
Age	18 – 25	139	60.7
	26 – 35	48	21.0
	36 – 45	25	11.0
	46 – 55	12	5.2
	56 or greater	5	2.1
Employ Status	Employed in private sector	87	40.0
	undergraduate	100	43.7
	Employed in public sector	37	16.1
	Unemployed	5	2.1
Education	University Student	102	44.5
	Bachelor	48	21.0
	Master/MBA or higher degree	95	41.5
Income	Less than 3000	80	35.0
	3000 – 6000	68	29.6
	6000 – 10,000	38	16.6
	More than 10,000	43	18.7

Table 1: Respondent's profile

As shown in table 1, 66% of the respondents were female, most of the respondents (60.7%) lie in the age group 18 – 25 and 44.5% of the respondents were university students. The analysis of the respondents' profile indicates that an average age of twentieth are aware with the risks of climate change and the benefits of green brands in limiting carbon emissions.

3.2 Instrument Measures

All constructs used in this study were adapted from previous literature where a total of 7 constructs were used. Green brand positioning was measured using five items adapted from Patrick et al. 2005 and Suki, 2016 while green brand knowledge was measured using four item scale adapted from Suki, 2016. Moreover, perceived environmental knowledge and consumers' attitude towards green products were both measured based on six items scale where the first was adapted from Mostafa (2007), and Jiang & Kim, 2014 while the later was adapted from Al – Swidi & Saleh, 2021, Ogiemwonyi, et al. 2020, Suki, 2016. Finally, green behaviour and green purchase intention were measured using seven, five and two items scale adapted from Sudbury Riley et al. 2012, Wang, et al., 2020 & Suki, 2016, respectively. Table 2 shows the measurement items.

Before official data collection, a pilot study of 50 respondents was conducted to test the validity and reliability of the measurement variables, to ensure that the questionnaire is solved in reasonable time, and the questions are easily understood. The respondents' comments and feedback were used to modify the questionnaire and thus few questions were omitted, and others were modified. All measurement items

were designed on a five - point Likert scale where 1 indicates “strongly disagree” while 5 “strongly agree”. Table 2 shows the measurement variables and its source.

Latent Variables	Measurement Items	Sources
Green brand positioning	Quality and price are important when consumers purchase green products	Patrick et al. 2005 and Suki, 2016
	I get to know about green branding through advertisement	
	Green products have matched my personal wants and needs	
	Green product always overpriced	
Green brand knowledge	I prefer to purchase environmentally green products	Suki, 2016
	(Green brands) environmental performance meets my expectations	
	Lack of availability of access is a major reason for low popularity and demand of green products	
	I purchase green product because it is environmentally friendly	
Perceived environmental knowledge	I purchase green product because it has more environmental benefit than other products	Mostafa, M. (2007), Jiang & Kim, 2014
	I am familiar with green brands	
	I can explain to other people the meaning of eco-labels	
	I know how to select products and packages that reduce the amount of waste	
	I understand the environmental phrases and symbols on product package)	
	I consider myself to be an environmentally conscious person.	
Green consumer's attitude	Green brands help preserve the environment	Al - Swidi & Saleh, 2021, Ogiemwonyi, et al., 2020, Suki, 2016
	I prefer green brands because they satisfy my values	
	I prefer green brands because they are environmentally friendly	
	I feel green product help to decrease pollution.	
	If I have a choice, I will prefer a green product to non-green product.	
	Green products have responsibilities for environmental protection	
Green behaviour	I feel that green product's environmental claims are generally trustworthy	Sudbury-Riley, L., & Hofmeister, A. (2012)
	When there is a choice, I always choose the product that contributes to the least amount of environmental damage.	
	I have switched products for environmental reasons.	
	If I understand the potential damage to the environment that some products can cause, I do not purchase those products.	
	I do not buy household products that harm the environment.	
	Whenever possible, I buy products packaged in reusable or recyclable containers	
Carbon emissions	I make every effort to buy paper products (toilet paper, tissues, etc.) made from recycled paper.	Pan et al. (2021)
	I believe that co2 emissions will decrease when I purchase a green brand	
	Overall, Green brands enhance the environment	

Table 2: Measurement Instruments

4. Results

4.1 Measurement Model Assessment

The study employed the partial least squares (PLS) method for the analysis of structural equation modeling (SEM) to test research hypothesis by using SmartPLS software package. Following the two-step approach recommended by Hair et al. (2012) and Schumacker and Lomax (2004), we tested the validation of the measurement model, then the structural model was assessed. PLS - SEM method has many superior

advantages compared to other traditional techniques such as AMOs and LISREL where it can be used with small sample size, formative and reflective indicators and non - normal data (Hair et al. 2014) Moreover, PLS - SEM avoids multi - collinearity and measurement errors among latent variables (Fornell and Bookstein, 1982)

4.1.1 Reliability and Validity of measurement instruments

The measurement model could be assessed by testing reliability (convergent validity) and discriminant validity. The convergent validity (Reliability) measures the internal consistency of the measurement items based on three criteria: Individual Item Reliability, Composite Reliability (CR) and Average Variance Extracted (AVE) (Heir et al., 2010). Individual item's reliability is confirmed if the outer loadings are greater than 0.7. Moreover, convergent validity is assessed by composite reliability and Cronbach's alpha with values range between 0.7 and 0.9 (Heir et al., 2010; and Ursachi; 2015). High Cronbach's alpha indicates that the reliability of the variables under study is high and thus the responds are credible and reliable (Hair et al., 2014). Average variance extracted (AVE) - that is used to indicate whether the reflective indicator explain the latent construct - is confirmed if the AVE value is greater than 0.5 (Fornell & Larcker, 1981 and Byrne, 2001). Table 3, shows the factor loadings, composite reliability, Cronbach's alpha and AVE.

Constructs	Indicator	Factor Loadings	AVE	CR	Cronbach's Alpha
GBP	GBP1	0.751	0.527	0.815	0.723
	GBP2	0.765			
	GBP3	0.775			
	GBP4	0.800			
CGA	ATT1	0.791	0.675	0.871	0.815
	ATT2	0.784			
	ATT3	0.726			
	ATT4	0.790			
	ATT5	0.701			
PEK	PEK1	0.727	0.588	0.877	0.825
	PEK2	0.737			
	PEK3	0.800			
	PEK4	0.767			
	PEK5	0.798			
GB	GB1	0.712	0.711	0.880	0.896
	GB2	0.753			
	GB3	0.755			
	GB4	0.734			
	GB5	0.733			
	GB6	0.730			
	GB7	0.747			
GBK	GBK1	0.704	0.723	0.822	0.610
	GBK2	0.858			
	GBK3	0.825			
GPI	GPI1	0.829	0.609	0.886	0.839
	GPI2	0.705			
	GPI3	0.785			
	GPI4	0.820			
	GPI5	0.757			
CE	CE1	0.905	0.762	0.865	0.804
	CE2	0.840			

Table 3: Reliability and Validity Measures

As shown in table 3, outer loadings are all greater than 0.7, Composite Reliability and Cronbach's alpha are greater than 0.7 and AVE is greater than 0.5. These results indicate that the variables are valid, and the model is consistent.

Discriminant validity is the extent through which each construct is different than the other in the way that the measurement items of each variable is not correlated (Heir et al., 2014). It's assessed by Heterotrait-Monotrait ratio of correlations (HTMT), Fornell-Larcker criterion and cross loadings (Fornell

& Larcker, 1981 and Chin, 1998). Thus, if the value of diagonal elements – square roots of AVE – in the matrix is greater than other values, discriminant validity is confirmed (Hair et al. 2010). As shown in table 4, the square root of AVE is greater than the correlation of another latent variable which indicates that the discriminant validity of each variable is satisfactory.

Table 4: Discriminant validity of the constructs (Fornell & Larcker criteria)

	CGA	CE	GB	GBK	GBP	GPI	PEK
CGA	0.759						
CE	0.707	0.873					
GB	0.660	0.622	0.734				
GBK	0.695	0.575	0.698	0.781			
GBP	0.546	0.500	0.611	0.575	0.726		
GPI	0.629	0.632	0.647	0.617	0.460	0.787	
PEK	0.513	0.419	0.668	0.526	0.475	0.521	0.767

Since the recent literature has used new test to assess the discriminate validity of the latent variables, we used the heterotrait-monotrait ratio of correlations (HTMT) as it is now considered the main criterion for assessing discriminant validity. HTMT test is a newly technique developed for the PLS – SEM method to test model validation which has superior advantageous compared to both; Fornell-Larcker criterion and cross-loadings (Heir et al. 2014 and Henseler et al. 2016). The HTMT ratio is acceptable and satisfactory if its below 0.85 and values of confidence interval is below 1 (Henseler et al. 2016; and Voorhees et al. 2016). Table 5 shows that all values are less than 0.85, thus discriminant validity was confirmed for all constructs and the model is considered valid.

	CGA	CE	GB	GBK	GBP	GPI	PEK
CGA							
CE	0.837						
GB	0.771	0.793					
GBK	0.816	0.825	0.824				
GBP	0.706	0.720	0.775	0.838			
GPI	0.751	0.812	0.874	0.810	0.584		
PEK	0.611	0.530	0.797	0.700	0.593	0.656	

Table 5 : Discriminant Validity (Heterotrait-Monotrait Ratio (HTMT))

4.2 Structural Model Assessment

The second step after confirming for the reliability and validity of the measurement model, is to assess the hypothesized relationships within the structural model. Since PLS – SEM does not have a unified goodness of fit test, Hair et. (2014) proposed four tests to assess the structural model goodness of fit; Variance inflation factor (VIF) to test for collinearity, coefficient of determination (R^2) to examine the explanatory power of the model, Cross Validated Redundancy (Q^2) and Effect Size (F^2)

4.2.1 Variance Inflation Factor (VIF)

The VIF test is used to examine whether the constructs are collinear or not. A value smaller than or equal 3.3 is acceptable and thus the structural model is considered reliable (Hair et al. 2014). Table 6 shows that all VIF values are below 3.3, hence the model did not suffer from collinearity problem.

Construct's relation	VIF
CGA → GPI	2.246
GB → CE	2.259
GB → GPI	2.934
GBK → CGA	1.382
GBK → GBP	1.001
GBK → GPI	2.489
GBP → GPI	1.760
GPI → CE	2.259
PEK → CGA	1.382
PEK → GPI	1.854

Table 6: Variance Inflation Factor

4.2.2 Coefficient of determination (R^2):

The coefficient of determination (R^2) explains the explanatory power of the endogenous latent variables (Elliot & Woodward, 2007 and Hair et al, 2011). As a rule of thumb R^2 values of 0.25, 0.50, and 0.75 represent weak, moderate, and strong levels (Heir et al. 2011 and Henseler et al. 2009). However, in social sciences especially consumer behaviour studies, R^2 value of 0.2 is considered high and satisfactory (Heir et al; 2011; 2014). Table 7 shows the values of R^2 and adjusted R^2 are all acceptable and the model has moderate explanatory of 0.45 (Heir et al. 2011). This result indicates that 45% of the variation in carbon emissions is explained by all independent variables in the model

Variable	R^2	Adjusted R^2
Consumer Green Attitude	0.513	0.509
Carbon Emission	0.450	0.445
Green Brand Positioning	0.330	0.327
Green Brand Intention	0.600	0.591

Table 7: R^2 and adjusted R^2

4.2.2 The Effect Size f^2

The effect size measures the different effects of each independent variable have on the endogenous construct. Therefore, the higher the value of the f^2 , the higher the effect size. Cohen (2013) suggest that f^2 values of 0.02, 0.15, and 0.35 have small, medium, and large effects respectively. Table 8 shows that the values of the effect size f^2 . The result indicates that green brand knowledge (GBK) and Perceived environmental knowledge (PEK) have strong effect on consumer's attitude towards green brands while green purchase intention has a moderate effect on carbon emissions. Moreover, the results also show that all other variables have varied effect from small to medium on green purchase intention. Thus, the estimated model is acceptable.

Construct's relation	f^2
CGA → GPI	0.047
GB → CE	0.093
GBK → CGA	0.512
GBK → GBP	0.493
GBK → GPI	0.011
GBP → GPI	0.035
GPI → CE	0.161
PEK → CGA	0.365
PEK → GPI	0.008

Table 8: The Effect Size

4.2.3 Predictive Relevance (Q^2)

PLS requires a measure of predictive capability using blindfolding procedures in SmartPLS with omission distance of seven. Predictive Relevance (Q^2) is used to assess the structural model predictive relevance. According to Chin (1998), a value of Q^2 greater than zero indicates there is a predictive power

(Hier et al., 2011). Also, according to Heir et al. (2014) values of 0.02, 0.15, and 0.35 have small, medium, and large predictive power. Table 9 presents the Stone–Geisser’s Q^2 values. The results indicate that all Q^2 values are above zero.

Construct	Q^2
CGA	0.281
CE	0.323
GBP	0.164
GPI	0.351

Table 9: Predictive Relevance Assessment

4.3 Structural Equation Model & Hypothesis Testing

The assessment of the measurement model confirmed that results are reliable, and valid which indicates satisfactory results. Thus, we can continue our analysis by testing the structural Model (Hair et al., 2011). In consumer behavioral studies Structural Equation Model (SEM) is used extensively to examine relationships among different latent variables previously defined in the structural model (Ismael et al. 2021; Hu et al., 2019; and Bollen & Long, 1993). In our study, ten hypotheses were formulated, and the statistical significance level of the path coefficients were tested using bootstrapping resampling technique in smartPLS (Yi and Davis, 2003 and Hair et al. 2014). In other words, Bootstrapping procedure with 500 sub - sample is used to test the effect of exogenous latent variables on carbon emissions (CE) the endogenous variable. More specifically, we used bootstrapping procedure to estimate standard errors, t - value, and p value, to test the significance of the path coefficients. In general, if $t > 1.96$, the hypothesized test is significant at the $p < 0.05$ confidence level. Figure 2 shows the PLS bootstrapping for the proposed model in this study.

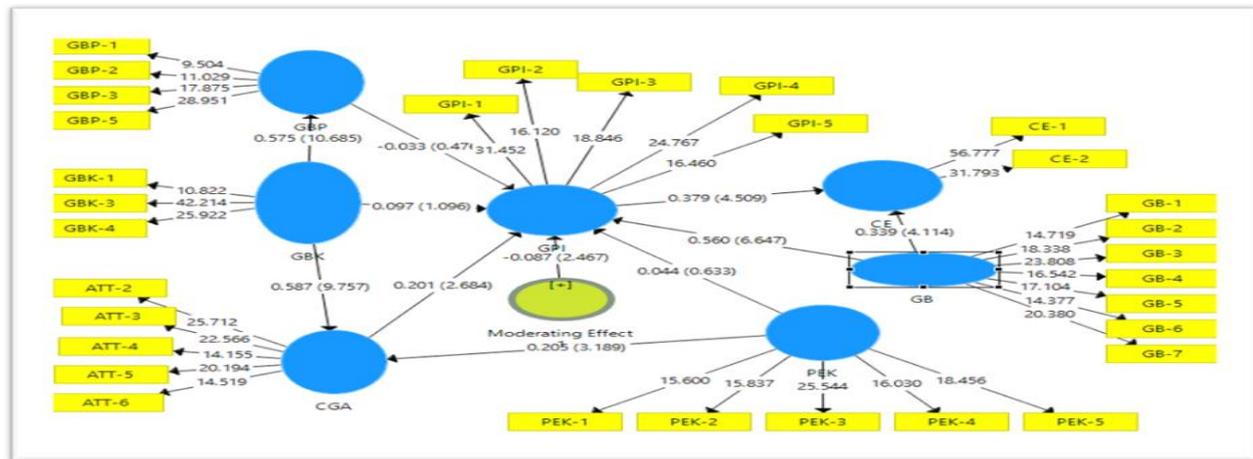


Figure (2)
PLS Bootstrapping for the Proposed Model

4.3.1 Direct & Indirect Results:

The results of the hypothesis testing are presented in table 10, where six hypotheses are supported, while four are rejected. The results revealed that consumers' attitude towards green products (CGA) has a positive significant effect on consumer's green purchase intention (GPI) which meets our expectations ($\beta_2 = 0.201$, t - value of 2.684). Hence, H_2 was supported. Similarly, green behavior (GB) has a significant and positive significant link with consumer's green purchase intention ($\beta_8 = 0.560$, t - value of 6.647), thus H_8 is also supported. The results also indicate that there is a significant positive correlation between consumers' intention to purchase green products (GPI) and carbon emission (CE) ($\beta_{10} = 0.379$, t - value of 4.509) and thus hypothesis H_{10} is also retained. Moreover, consumers' green behavior (GB) has a positive influence on carbon emissions (CE) where if consumers' behavior defined as green, i.e., favoring green products, carbon emissions will decrease ($\beta_9 = -0.339$, t - value of 4.114). Thus, hypothesis H_9 is reinforced. On the other hand, green brand positioning (GBP), perceived environmental knowledge (PEK), and green brand

knowledge (GBK) have no statistically significant impact on green purchase intention with t - values < 1.96 and thus H_1 , H_4 , and H_5 were rejected.

Although the results confirmed the insignificant direct impact of perceived environmental knowledge (PEK) and green brand knowledge (GBK) on green purchase intention (GPI), both variables have indirect effect on consumers' green purchase intention through attitude with t - values of 3.239 and 9.776 respectively and thus consumers' green attitude (CGA) is said to play a significant important intermediary role. Therefore, hypotheses H_3 and H_6 were also supported. Table 10 shows the direct and indirect results.

Hypothesis	Construct's Relationship	Original sample	Sample Mean	Standard deviation STDEV	T - statistic	P - value	Significance
Direct Results							
H1	GBP → GPI	-0.033	-0.027	0.070	0.476	0.634	Not - Significant
H2	CGA → GPI	0.201	0.192	0.075	2.684	0.007	Significant
H3	PEK → CGA	0.205	0.207	0.064	3.189	0.001	Significant
H4	PEK → GPI	0.044	0.044	0.069	0.633	0.527	Not - Significant
H5	GBK → GPI	0.097	0.100	0.089	1.096	0.273	Not - Significant
H6	GBK → CGA	0.587	0.587	0.060	9.757	0.000	Significant
H8	GB → GPI	0.560	0.560	0.084	6.647	0.000	Significant
H9	GB → CE	0.339	0.340	0.082	4.114	0.000	Significant
H10	GPI → CE	-0.380	-0.380	0.084	4.509	0.000	Significant
Moderating effect							
H1	GBP → GPI	-0.033	-0.027	0.070	0.476	0.634	Not - Significant
H5	GBK → GPI	0.097	0.100	0.089	1.096	0.273	Not - Significant
H7	GBP X GBK → GPI	0.575	0.577	0.054	10.685	0.014	Significant

Table 10: Significance testing results of the structural model path coefficients

4.3.2 The Results for Moderating Effects

We used the latent moderated effect model to examine the moderating effect of green brand knowledge (GBK) on the relation between green brand positioning (GBP) and green purchase intention (GPI). More specifically, we add the moderator variable to examine how GBK affects the relation between GBP and GPI in terms of direction or strength of the relationship. In this study, we added the interaction term green brand positioning X Green brand knowledge (GBP X GBK) into the model. In other words, we add the moderating variable (GBK) as an additional separate latent variable (construct) using the cross product of the independent variable (GBP) and the moderator (GBK) through a method known as "product indicator approach" (Dawson, 2014). Ping (1995) proposed a method that assess path models with latent variable interaction which is based on calculating the mean centered indicator values before the moderator variable multiplication (i.e., green brand knowledge) with the predictor variable (i.e., green brand positioning), to capture the moderating effect. Thus, an interaction term was introduced, and the hypothesis (H_7) was tested for the moderation analysis. The results revealed that GBK moderates the relation between green brand positioning (GBP) and green purchase intention (GPI) ($\beta = 0.575$, t - value = 10.685). Thus, H_7 was accepted. Table 10 shows the moderating statistical results.

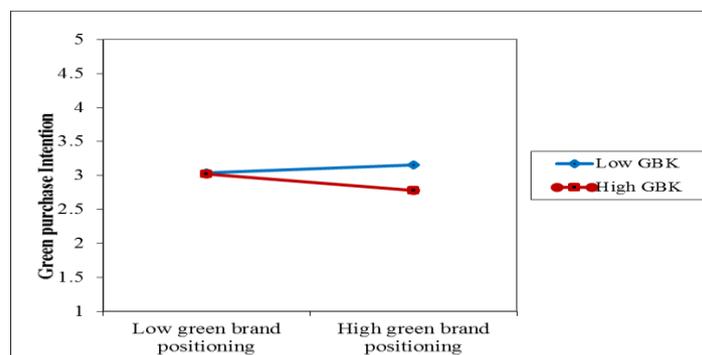


Figure (3)

Moderating effect of GBK on relation between GBP and GPI

5. Discussion

The main objective of this study is to examine the impact of green purchase intention on carbon emissions in Egypt. More specifically, this study analyzes the impact of green brand positioning, green brand knowledge, consumers' green attitude, perceived environmental knowledge, and green behavior on consumer's green purchase intention. In other words, it identifies the key factors that influence consumer's intention to purchase green products and analyzes how green purchase intention affects carbon emissions in Egypt. Moreover, the moderating role of green brand knowledge (GBK) on the relation between green brand positioning (GBP) and green purchase intention (GPI) was also examined.

Our findings revealed that green brand positioning (GBP), one of the main factors affecting green purchase intention, have insignificant effect on green purchase intention. Thus, H₁ is not supported. The finding revealed that brand positioning by the firm has no effect on green purchase intentions among Egyptian customers. Successful green brand positioning is supposed to develop higher purchase intention through the positioning of the brand as environmentally friendly in consumers' mind. Thus, green brand positioning can provide the firm with superior advantages over other competitors' and strength of the competitive position of the firm due to its role in promoting better environmental quality and thus motivate consumers to purchase green products (Situmorang et al. 2021; Suki, 2016; Huang et al. 2014). One possible explanation is that green brands in Egypt lack successful brand positioning strategies and thus consumers' do not know that the brand is environmentally friendly. This means that the positioning strategy conveyed through active communication campaigns for green brands cannot directly generate purchase intention since consumers need to change their attitude towards green brands first. Another plausible explanation is that environmental consciousness varies extensively among Egyptian consumers and thus the predisposition of successful GBP strategies employed by firms, may have no effect on their purchase intention of green products. The results came in line with previous studies (Pebrianti and Aulia; 2021 and Mehraj & Qureshi, 2022)

The study also examined the effect of consumers' attitude towards green products (CGA) on green purchase intention. The result reveals that green attitude is a key driving force of consumers' green purchase intention which suggests that consumers having positive attitude towards environment, will have higher intention to purchase environmentally friendly products (Jain et al. 2021). Thus, consumers' attitudes are shaped based on the firm image which induce them to purchase environmentally friendly products. The study findings are supported by previous studies (Kamalanon et al. 2022; Jan et al. 2022; Siyal et al. 2021). The study's findings revealed that consumers' positive attitude towards green products is derived from their environmental attitudes. In other words, they have high environmental consciousness to the extent that they feel committed to preserve the environment and perform pro-environmental activities such as purchasing green products to limit carbon emissions. This finding suggests that firms' marketers must build a positive green attitude among their consumers to encourage them to buy green products. These results are consistent with previous studies (Kumar et al. 2021; Channa et al. 2021; Kumar, 2019; Mostafa, 2009).

Similarly, a statistically significant link was found between perceived environmental knowledge and green attitude, where PEK is said to have indirect effects on consumer's intention to purchase green products through its positive impact on consumers' green attitude. Thus, H₃ is accepted. This result indicates that consumers who have a good knowledge about how green products are committed to reduce their ecological footprint, their attitude and behaviour towards environment and green brands will be positive. This finding came in line with many previous studies (Lim et al., 2016; Saichao, 2016; and Maichum et al. 2016). Moreover, Mostafa (2007) proved that environmental knowledge concerning environmental risks and climate change problems is a key influencing factor to consumers in Egypt to have environmentally friendly attitude.

Surprisingly, perceived environmental knowledge (PEK) has insignificant impact on consumer's green purchase intention. This result did not come in line with our expectations. According to the previous studies perceived environmental knowledge was expected to have positive significant effect on consumers' green purchase intention. In other words, consumers' understanding of how products could harm the environment through increasing carbon emissions, should positively influence them to purchase green products to limit carbon emissions. But surprisingly, PEK found to have no effect on consumers'

green purchase intention. This result was supported by few previous studies who found no relation between PEK and GPI (Thu and Huynh, 2022; Demiret et al., 2021; Maichum et al. 2016; and Ramayah et al. 2012). One possible explanation that PEK found to play an insignificant role in influencing consumer's green purchase intention in Egypt, is that consumer's environmental knowledge is not enough to develop an intention to buy green products. According to Schultz and Zelezny, (1999) consumers' awareness toward environmental risks differs heavily across countries and thus although consumers might have concerns about the environment, but they choose not to purchase green products as their awareness towards environmental risks is not strong enough to develop high purchase intention towards green products (Huddy, 2001). Therefore, the insignificant relation could be attributed to the fact that consumers in Egypt, as any developing country, either are not aware enough about the environmental risks or don't believe that their green practices would be beneficial for limiting carbon emissions. Another plausible explanation is that green brands still lack green marketing strategies that provide enough details about the efforts exerted by the firm to reduce its ecological footprint to limit carbon emissions (Indriani et al. 2019 and Mostafa, 2007)

Subsequently, this study further enhanced the current literature by examining the mediating impact of GBK on the relationship between GBP and GPI. Therefore, an interaction model was tested by creating an interaction term between green brand positioning, green brand knowledge and green product purchase intention. The results revealed that although GBK has no significant direct impact on GPI, it moderates the relation between GBP and GPI. Our findings indicate that the relationship between GBP and GPI would be more powerful and effective through GBK. More specifically, the positive relation between GBP and GPI was stronger for consumers that their green brand knowledge is higher and well informed about the efforts exerted by different firms to limit environmental pollution. It can be said that GBK strengthen the positive relation between GBP and GPI. The findings suggest that firms must position their brands as eco - friendly in consumers' mind through wide awareness campaigns on how green brands could enhance the environment by reducing carbon emissions. This will lead to higher purchase intention towards green products and hence better environment. This result contradicts with Suki, (2016) and Huang et al. (2014) but came in line with Siyal et al. (2021).

Although GBK has no direct impact on GPI, it was proved that it has an indirect impact on GPI through consumers' Green Attitude. This result indicates that GBK can influence consumers' attitude towards green brands. In other words, consumers who are well informed about how green brands can reduce products' carbon footprint, usually have positive attitude towards green brand. The results came in line with previous studies (Pebrianti and Aulia; 2021; Rajesh 2020; Aulina & Yuliati, 2017; Suki, 2016; and Huang et al., 2014). A plausible explanation why green brand knowledge (GBK) influence consumers' attitude towards green brands but not their intention to buy these green products is that consumers in Egypt have limited environmental knowledge as they are not aware about how their changing consumption patterns from traditional products to green products would enhance the environmental quality by limiting carbon emissions. This result suggests that extensive awareness campaigns that enrich consumers' green knowledge about how buying green products would minimize climatic problems is essential for increasing consumers' green purchasing intention.

As predicted, green behaviour (GB) found to have significant positive effect on consumers' green purchase intention (GPI). This result indicates that consumers who are ethically committed toward improving the quality of the environment, usually are concerned by reducing firm's ecological footprint by purchasing green products. More specifically, consumers with green behaviour attempts to use their purchasing power to buy green products that are environmentally friendly and thus contributing positively to the environment by reducing carbon emissions. This result is support by previous studies (Nguyen et al. 2022; Ogiemwonyi et al. 2019 and Chen and chai, 2010). Khan et al. (2020) concluded that green consumer's behaviour is one of the main factors affecting purchase intention to purchase green products.

Moreover, the study also investigated the relation between green consumer behaviour and carbon emission and a positive significant relation is found between the two variables. This result indicates that green consumer behaviour is derived from his environmental consciousness of environmental risks and his need to preserve the environment and thus green behaviour GB have significant impact on carbon

emissions (CE) (Khan et al. 2020). Moreover, people who participate in green behaviour are either highly educated and thus are more likely to be aware of the severe climatic problems and willing to engage in activities that can limit environmental pollution, or they are highly income groups so they can afford to pay higher premiums for green products and can bear the cost of protecting the environment (Khan et al. 2020). These segments represent small percentage of the Egyptian consumers which might explain the positive relation between GB and CE. This result suggests that consumers' green behaviour is not enough to reduce carbon emissions. In addition, this study makes a novel contribution to the literature by examining the relationship between GPI and CE. The study's findings revealed that consumers' intention to purchase green products can limit carbon emissions and thus improve the environmental quality.

Finally, the study findings suggest that green consumer's attitude (CGA) is found to be a crucial factor in shaping consumers' green purchase intention through its indirect effect on GBK and PEK. In other words, environmental knowledge has positive effect on consumers' ecological behaviour and thus they have positive attitude towards green products. Thus, well informed consumers' about how green brands can reduce the overall products' carbon footprint usually have positive attitude towards green brand and thus develop higher intention among consumers to purchase environmentally friendly products to preserve the environment (Joshi and Rahman, 2015)

6. Conclusion and recommendations

Considering growing attention towards climate change and rising carbon emissions, the current study attempted to examine the effect of green brand positioning on environmental quality. Although some studies identified the factors influencing consumers' intention to purchase green brands, there is no study took the attempt to test whether purchasing green brands can limit carbon emissions or not. This study fills in this gap. We integrated three important theories which are TBP, CAB and VBN to extend and develop a new extended model to relate green purchase intention with carbon emission through identifying the factors influencing consumers' purchase intention towards green brands in Egypt. The factors examined are green brand positioning (GBP), green brand knowledge (GBK), perceived environmental knowledge (PEK), consumers' attitude towards green brands (CGA), and consumers' green behaviour (GB).

The current study contributed to the literature by being the first to test the relation between GPI and CE. The finding revealed that higher GPI would lead to lower CE and thus improve the environmental quality. We found also a positive and significant effect of consumers' attitude towards green brands (CGB) and green behaviour (GB) on consumers' intention (GPI) to purchase green brands. On the other hand, green brand positioning (GBP), perceived environmental risks (PEK), and green brand knowledge (GBK) are proved to have insignificant impact on consumers' intention to purchase green brands in Egypt. The results indicate that green brand positioning in Egypt could not affect consumers' intention to purchase green products. Moreover, the results also show that perceived environmental knowledge (PEK) and green brand knowledge (GBK) have indirect effect on consumer's intention to purchase green products through their effect on consumers' attitude and thus CGA is said to play a significant intermediary role. Furthermore, green brand knowledge (GBK) is said to mediate the relation between GBP and GPI. Our findings indicate that the relationship between GBP and GPI would be more powerful and effective through GBK. More specifically, the positive relation between GBP and GPI was stronger for consumers that their green brand knowledge is higher and well informed about the efforts exerted by their firms to limit environmental pollution.

The study also identified a lack of green brand knowledge, weak perceived environmental knowledge, and poor green brand positioning strategies as key barriers for deriving higher consumers' intention to purchase green brands in Egypt. More specifically, although Egyptian consumers might have positive attitude towards green brands, this might not lead to low - carbon behaviors due to the green knowledge gap. The consumers' choices are not governed by their environmental consciousness or responsibility because they either have insufficient environmental information or the firm cannot position its brands as environmentally friendly. Thus, they based their choices on other criteria rather than the ecological ones such as convenience, price, and perceived value.

7. Theoretical and Practical Contributions

There are valuable insights and implications for the theory and practice that can be drawn from this study. The study had many theoretical implications. *Firstly*, this study is among the first that empirically tested and validated the significant relationship of green purchase intention and carbon emissions through the formation of a new conceptual framework. *Secondly*, this study added to the literature through examining the moderating effect of GBK on the relation between GBP and GPI in an emerging country, Egypt. *Thirdly*, the new conceptual framework was based on the integration of three important theories in this discipline which are theory of planned behaviour (TPB), CAB model and VBN theory of environmentalism. *Fourthly*, the study tested and validated both TBP and VBN theories in the green behaviour context and how it limits carbon emissions. Thus, it enhanced the empirical literature by integrating different factors influencing consumers' green purchase intention in Egypt and test its impact on carbon emissions. *Fifthly*, the study had provided empirical evidence on the importance of the moderating role of GBK on the relationship between GBP and GPI in Egypt.

In addition to the previous significant theoretical implication, this study has huge importance to policymakers and practitioners. *First*, the study found that Egyptian consumers still lack information about environmental risks and how green products could improve the environmental quality by minimizing harmful chemicals, reducing greenhouse gases, and increasing benefits of using recycled packaging, and other ecological information that affect their attitude and intention to purchase such products. Thus, the study recommends that marketers should focus on creating green awareness through advertising campaigns that educate the Egyptian consumers about the benefits of green products attributes to the environment, raise their environmental knowledge and induce them to have green behaviour which will raise their green purchase intention and hence limit carbon emissions. *Second*, to develop positive attitude towards green products, marketers should create a positive environmental image for the firm through highlighting their role in reducing carbon footprint to achieve environmental sustainability. Thus, it is suggested that marketers use integrated marketing communication strategies (IMC) to build positive attitude towards green brands through the combination of different tools such as advertising, sales promotions, internet marketing and social media marketing. These communication channels can easily reach consumers' and provide them with sufficient knowledge about green brands, which result in higher attention to buy the green products and services. *Third*, marketers should implement different brand positioning strategies that succeed in position the brands as environmentally friendly in consumers' mind through incorporating how green products save the environment. Thus, higher purchase intention among Egyptian consumers will be derived. *Fourth*, policymakers should address the environmental problems differently as they need to confront people with all climatic problems and the consequences of not dealing with these problems. Thus, short documentary films, government programs towards greening peoples' lifestyle, and TVs awareness ads should be made on different environmental risks that faces our world and provide them with relevant guidelines on how changing their usage and consumption patterns from conventional products to green products can limit greenhouse gases.

8. Study limitations and future research

The current study has some limitations that should be reviewed for future research. *Firstly*, although the sample size is considered adequate, however, the snowball sampling method produced sample that is not representative for the entire population as most of participants were young consumers of age range from 18 – 25 and thus, they don't have adequate purchasing power or sufficient information about green branding. Therefore, it is suggested to extend this study to include all consumer's types. *Secondly*, the questionnaire did not include any questions that could draw better picture about the respondents' profile and enrich our analysis and practical implications. These questions are, and not limited to, whether they are green consumers or not, the frequency of buying green products, and their source of information about the green attribute of the brand. Finally, although the study examined six factors influencing consumers' intention to purchase green brands, more variables were important to be examined. Thus, variables such as green government initiatives, perceived price, perceived values should be added and extend the current conceptual framework especially in an emerging middle-income country like Egypt where products prices are an important factor that consumers base their buying decision on.

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