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## Article

# The Influencing Factors on Choice Behavior Regarding Green Electronic Products: Based on the Green Perceived Value Model

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**Abstract:** Electronic/electrical waste (e-waste) has now become a global concern due to its negative impact on the environment and health. This negative effect of e-waste is increasing with the advancement in the electronics industry, especially in Pakistan, which is the leading e-waste disposal destination. Therefore, this study aims to find consumer choice behavior regarding green electronics in Pakistan. For this purpose, a multidimensional modified green perceived model (functional value quality, functional value price, social value identity, social value responsibility, emotional value, and conditional value) is used. Cross-sectional data is collected from 237 consumers through a self-administrative questionnaire. The results of variance-based structural equation modeling (SEM) (partial least squares (PLS)-SEM) suggested that functional value price, quality, social value identity, responsibility, emotional value, and conditional value positively and significantly influence the consumer choice behavior regarding green electronics. The possible reasons for the findings and the implications for managers and policymakers are discussed. Limitations of the study and future research directions are also suggested.

**Keywords:** Pakistan; green electronics; e-waste; green perceived value model

## 1. Introduction

Electronic/electrical waste (e-waste) has now become a major concern around the globe (Kumar et al. 2017). There is no exact definition but according to (Step Initiative 2014), “e-waste is a term used to cover items of all types of electrical and electronic equipment (EEE) and its parts that have been discarded by the owner as waste without the intention of re-use”, while according to the Organization for Economic Co-operation and Development, “any appliance using an electric power supply that has reached its end-of-life” is known as e-waste. Hence, it can be said that e-waste is generated by the electronic items that have come to the end of their life and need to be discarded or recycled. Some of the components of this e-waste contain precious metals like copper, silver, or gold, and some have a major amount of hazardous materials like organic pollutants, lead, mercury, flame retardants, and heavy metals (Robinson 2009). These kinds of materials require special handling, discarding, and recycling processes to minimize their impact on the ecosystem. Unfortunately, only 25% of the total e-waste generated in the European Union and 40% of the total e-waste generated in the United States are properly recycled, and the rest becomes untraceable (Perkins et al. 2014; Murugesan 2010). This e-waste is playing a significant role in environment deterioration (soil contamination, air pollution,

water pollution) and human health problems (effect on the digestive system, reproductive system, immune system, and asthma) (Imran et al. 2017; Weiss 2017). Because of its negative effect on the environment and human health, developed countries prefer to export their e-waste to a developing country over-treating it nationally (Ruan and Xu 2016). It is the fastest growing waste along with other waste streams (Singh et al. 2016).

In 2016, a total of 44.7 million metric tons (Mt) of e-waste was generated globally which is equivalent to 4500 Eiffel Towers. In this e-waste generation, Oceanian countries produced the lowest amount with 0.7 million Mt. In a similar way, African countries produced 2.2 million Mt. Moreover, American countries and European countries generated around 11.2 million Mt and 12.3 million Mt respectively. Further, the global e-waste monitor report 2017 placed Asian countries at the first position before other continents (e.g., Oceania, Africa, America, Europe) in e-waste generation with 18.2 million Mt. It contains a wide range of electrical products and is divided into the following categories: small and large electronic equipment, temperature exchange equipment, screens, small Information Technology (IT), and lamps. In this 44.7 million Mt e-waste generation, 58% of the e-waste is generated by small and large electronic equipment (washing machines, photocopying equipment, kettles, microwaves, and toasters); followed by temperature exchange equipment (e.g., refrigerators, air conditioners, heat pumps), 17%; screens (e.g., monitors, laptops, notebooks), 14.7%; small IT (e.g., mobile phones, pocket calculators, routers), 8.7%; and lamps (e.g., light emitting diode lamps, fluorescent lamps), 1.6%. This e-waste generation is expected to be 55.4 million Mt at a growth rate of 3%–5% per annum until 2021 (Balde et al. 2017). One of the reasons for this growth is the invention of new technologies in the electronics category and a reduction in its life cycle (Jayaraman et al. 2019). The new models of electronic products drive consumers to replace their existing items with a new one. As the consumer electronics market had a value of USD 1172 billion in 2017 and is expected to grow by 6% from 2018 to 2024 reaching USD 1782 billion in 2024 (Zion Market Research 2018). The above mentioned numbers clearly state a growing need to shift preferences from conventional electronic products to green electronic products to reduce their adverse effect (Tao et al. 2017).

Green electronics are the products that are made from flexible, renewable, organic and biodegradable materials which are sustainable and environmentally friendly (Tansel 2017; Tao et al. 2017). (Irimia-Vladu 2014) suggested that green technological innovation is not only for energy efficiency but also for the reduction of e-waste. The protection of the environment through green innovation has become necessary. As humans have a fixed amount of natural resources that have been damaged by electrical products in the form of water contamination and polluting soil, which also affects their health (Iravani et al. 2017). Therefore, the consumer has analyzed that materials used for electronic products are not only non-renewable and toxic but also have an adverse effect on human health and the environment, if not discarded properly. That is why consumers now prefer to buy green electronic products (Qader and Zainuddin 2014). These green electronic products are important for the reduction of e-waste, especially for developing countries which are facing the terrible issue of e-waste.

It is also expected that e-waste generation by developing countries will be twice as high as in developed countries by 2030 (Sthiannopkao and Wong 2013), which makes this issue more important for developing countries than developed countries. Like other developing countries, Pakistan is facing an adverse effect of e-waste. In 2015, almost 317 kilo Mt of e-waste were generated in Pakistan (Iqbal et al. 2017), which has become the leading e-waste disposal destination due to low-cost labor availability and non-implementation of strict environmental laws as compared to China and India (Imran et al. 2017; Sajid et al. 2019). Moreover, Pakistan has imported electrical equipment worth USD 4.7 billion, the third largest import of Pakistan, in 2017 (Workman 2018). Further, due to growth in the gross domestic product (GDP), consumer spending power on electronics and electrical products has increased, which ultimately contributed to e-waste generation (Iqbal et al. 2015). Therefore, to overcome the issue of e-waste in Pakistan, it becomes important to assess the choice behavior of the Pakistani consumer to purchase green electronics.

Choice behavior is the part of consumer behavior which includes two groups of options. The first group includes non-material choices, i.e., family, spouse, location of the home, and political decisions. The second group includes material things, like special brands, goods, products, and services, which have the attention of marketers. Therefore, consumer choice behavior is consumers' decisions regarding products and services, which determines which products needed to be available to buy over time. It is also said that the choice for green products is different from conventional products due to different motives behind the usage (Wier et al. 2008). This green choice behavior is explained by the green perceived values (GPV), which tell us why consumers buy or do not buy green products, and why consumers prefer a specific green brand over others. GPV was first introduced by (Chen and Chang 2012), and was defined as the "consumer's overall appraisal of the net benefit of a product or service between what is received and what is given based on the consumer's environmental desires, sustainable expectations, and green needs" (p. 505). It is basically the consumers' evaluation of green needs, expectations, and desires while choosing a product (Lin et al. 2017). Green consumers consider various values or benefits like utilitarian, situational, social, and psychological aspects that can hinder or advance the green consumption behavior, which explains why GPV cannot be considered a unidimensional construct.

However, different research suggested that GPV is a unidimensional construct (Chen et al. 2016; Chen 2016a, 2016b; Chen and Chang 2012) but the researchers did not explain the complex and multidimensional nature of the GPV (Sangroya and Kumar 2017; Woo and Kim 2019). That is why Sangroya and Kumar (Sangroya and Kumar 2017) developed a multidimensional GPV model having four sub-constructs, i.e., functional value, social value, emotional value, and conditional value. Woo and Kim (Woo and Kim 2019) found that this multidimensional GPV model can predict consumers green behavior more comprehensively. Therefore, this study used the GPV model to investigate consumer choice behavior of green electronics. Moreover, previous literature has suggested that the explanatory power of a theoretical model can be increased by modifying or extending a theory or model (Perugini and Bagozzi 2001). It is also observed that a modified model can better explain the variation in the dependent variable (Lee and Yun 2016; Moon et al. 2018). Therefore, this study is modifying the GPV model by using a bi-dimensional function value (i.e., functional value price and functional value quality) and social value (i.e., social value identity and social value responsibility) so that consumers' green intentions regarding green electronics can be better understand.

### *Literature Review and Hypothesis Development*

#### **Green Perceived Value Model**

Consumer perceived value is known as the overall evaluation of products or services by the consumer that he/she has given to purchase the products/services and what he/she received from these products and services (Zeithaml 1988). It is basically a subjective concept that depends on the various context which determines the distinctive properties of different products (Sangroya and Kumar 2017). In consumer behavior, it is discussed by two perspectives, i.e., economic perspective (utilitarian and price) and psychological perspective (cognitive and emotions) (Medeiros et al. 2016). These values are important to assess and predict which attributes/values consumer consider while consuming a product, especially in green products.

In environmental and green consumption behavior, Chen and Chang (Chen and Chang 2012) defined green perceived values as "consumer's overall appraisal of the net benefit of a product or service between what is received and what is given based on the consumer's environmental desires, sustainable expectations, and green needs". Chen and Chang (Chen and Chang 2012) found a positive and significant relationship with the purchase intentions of green products. However, this model could not explain the complex nature of the GPV depending on its different sub-constructs (Hur et al. 2012; Woo and Kim 2019; Sangroya and Kumar 2017). That is why Sangroya and Kumar (Sangroya and Kumar 2017) developed a multidimensional GPV construct based on Masini and Menichetti's (Masini and Menichetti 2012)

research that consumer behavior is driven by different utilitarian, social, and psychological benefits. Sangroya and Kumar (Sangroya and Kumar 2017) suggested that GPV has four sub-constructs, i.e., functional value, social value, emotional value, and conditional value. The current study used the theoretical foundation of the GPV model and modified it in the green electronics context. This study has used bi-dimensional functional value and social value. All values are explained further with literature support, and based on this literature, possible hypotheses are developed.

#### Functional Value (Price and Quality)

Functional value is an important factor in consumers' perceptions regarding utilitarian benefit, performance, reliability, durability, price, and quality in the decision-making process of consumption (Woo and Kim 2019). It is the basic value consumers seek from a product. (Suki 2013) suggested that consumers consider quality and price while choosing a product. Price is the most silent feature of the product, and consumers are willing to pay higher prices for green products due to their quality (Tsay 2009). In the context of a green product, functional value is the perceived utility achieved by the quality, price, and performance of the green products with respect to alternatives. (Finch 2006) suggested that consumer choice behavior for green products is influenced by the price. Consumers have known that eco-friendly products deserve to be expensive and that it is fair to be pay premium prices for these green products (Rahnama and Rajabpour 2017), while it was also indicated that consumers consider both price and quality in the green products (Ritter et al. 2015). (Tseng and Hung 2013) suggested that perceived quality influenced consumer green consumption behavior. Moreover, consumers search for special benefits in green products, like high quality, when they pay premium prices for products (Biswas and Roy 2015a). It was also found that green electronics' quality has a direct impact on customer loyalty towards purchase and price (Marakanon and Panjakajornsak 2017). Therefore, it can be said that consumers' green purchase behavior is influenced by both price and quality. Thus, it is hypothesized that

**H1a.** *Functional value price positively and significantly influences the consumer choice behavior of green electronics.*

**H1b.** *Functional value quality positively and significantly influences the consumer choice behavior of green electronics.*

#### Social Value

Social value for green products is the perceived utility obtained by the association of social group, pressure, and peer influence to consume green products (Biswas and Roy 2015a). Social affiliation motivates the consumer to behave in the same way that of their social class (Candan and Yildirim 2013). Consumers like to consume those brands that represent their social status (Lee et al. 2015). Consumers think their green purchase behavior is a modern way of life, and they like to consume it for their social identity in society (Kumar and Ghodeswar 2015). The research indicated that consumers like to be involved in green consumption due to personal preferences and/or social responsibility, which divides the social value into two dimensions, i.e., social identity value and social responsibility value. In the social identity value, consumers get involved in green consumption behavior when their environment-friendly behavior is appreciated (Kumar and Ghodeswar 2015). Decision making, social pressure, companion opinion, and peer influence are key factors for consuming products having green credentials (Solaiman et al. 2017). This pro-environmental identity with society provides a symbolic benefit for individuals, representing themselves as an environment-friendly person (Rahnama and Rajabpour 2017).

On the other hand, environmental deterioration has stimulated the environmental concern of society as a whole. Consumers are involved in green consumption to make society greener for every citizen and consider it their social responsibility and obligation. Due to the harmful effect of electronic products on the environment, consumer consciously shifts their preferences towards



green electronics as a social responsibility. Several studies have found a significant relationship between social value and green consumption behavior (Gonçalves et al. 2016; Solaiman et al. 2017; Rahnama and Rajabpour 2017; Biswas and Roy 2015a). Hence, from the past literature, it can be hypothesized that

**H2a.** *Social value identity positively and significantly influences the consumer choice behavior of green electronics.*

**H2b.** *Social value responsibility positively and significantly influences the consumer choice behavior of green electronics.*

### Emotional Value

In green regards to consumption, emotional value is known as the association of feelings and emotions with the consumption of green products (Lin and Huang 2012). It is the perceived value derived from the feeling of arousal or the affective state associated with the available alternative in green products (Sangroya and Kumar 2017). The consumption can arouse positive, negative, or mixed feelings, depending on their emotional experience and background (Suki and Suki 2015b). (Penz and Stöttinger 2012) suggested emotions as part of the attitude and key components in the consumption pattern of the consumer. These emotions cause a positive feeling of doing good, wellbeing, satisfaction, and joy, as they believe they are contributing to protecting the environment (Suki and Suki 2015a). In green consumption, consumers' emotions have a stronger effect than the functional benefits (Hartmann et al. 2005). Several researchers suggested that emotional value plays an important role in green consumption behavior (Beyzavi and Lotfizadeh 2014; Lin and Huang 2012; Gonçalves et al. 2016; Finch 2006; Woo and Kim 2019), while some researchers found an insignificant relationship of emotional value and green choice behavior (Wen and Noor 2015; Biswas and Roy 2015a; Suki and Suki 2015a, 2015b; Rahnama and Rajabpour 2017). Due to diverse results in the literature on green consumption behavior, it is hypothesized that

**H3.** *Emotional value positively and significantly influences the consumer choice behavior of green electronics.*

### Conditional Value

In regard to green products, the conditional value is the perceived utility derived from personal benefits obtained from green products over conventional products in different situations (Solaiman et al. 2017). It is basically the perceived utility attained by the different physical, economic, social, or environmental situations and circumstances faced by the choice maker (Sánchez-Fernández and Iniesta-Bonillo 2007). These situations can be extrinsic, like time, place, context, discounts, and cash rebates, which affects the consumer purchase behavior of different products (Belk 1974; Lin and Huang 2012). However, consumers' conditional value cannot be assessed generally until that situation emerges. Situations like cash rebates, discounts, and government subsidies might influence consumer behavior towards environmentally friendly products (Wen and Noor 2015). Saxena and Khandelwal (Saxena and Khandelwal 2010) suggested that changes in situations while purchasing can also affect green consumption behavior. In India, (Biswas and Roy 2015a) found the impact of conditional values on sustainable consumption, which has been validated by different previous studies in the green products context (Khan and Mohsin 2017; Rahnama 2017; Solaiman et al. 2017; Finch 2006; Woo and Kim 2019). Hence, based on past literature, the following hypothesis is developed:

**H4.** *Conditional value positively and significantly influences the consumer choice behavior of green electronics.*

## 2. Methodology

To test the proposed model, this study adopts a quantitative approach. The target population of the current study consisted of the citizens of two metropolitan cities (Sahiwal and Faisalabad) of the province of Punjab, Pakistan. Citizens of metropolitan cities were selected because the demand for green electric

products has surged in metropolitan cities (Prakash et al. 2018). Pakistan is a developing country with the upsurge of urbanization, and people are moving from rural towards urban areas (FDGP 2018). Moreover, in a recent study, metropolitan cities were selected for the investigation of green consumer behavior in Pakistan (Ali et al. 2019b). Probability sampling is employed in cases where the population is known or a sampling frame is available. In the present study, non-probability sampling was used because the target population was not known, a sample frame was not available, and data collection could be done more quickly in less time (Ali et al. 2019a; Saunders et al. 2007). Additionally, as per the findings of (Henry 2016), non-probability sampling is more suitable once the sample is larger than 50. In the case of non-probability sampling, purposive sampling has several advantages as it could be able to generate more reliable and consistent results (Sekaran and Bougie 2013). Therefore, judgmental sampling was employed in this existing study demonstrating middle-class citizens with an income level above PKR 50,000 (more than 300 USD). Data were collected by using the self-administered questionnaire. The objectives of this study were written on the cover letter accompanying the survey. Additionally, the assurance of the respondent's anonymity was also clearly mentioned in the cover letter. To ensure the reliability and validity of the questionnaire, a pre-test and a pilot test were performed in this research. The sample size was determined as per the recommendation of (Hair et al. 2011), i.e., to have five times as many observations as the number of variables to be examined. Employing this rule of thumb, the minimum number of sample size required was 175 ( $25 \times 7$ ). In addition, as per the recommendations of (Nulty 2008), the response rate of self-administrative questionnaires was expected to be 40–60%. Therefore, 425 questionnaires were distributed among the targeted population, of which 237 questionnaires were returned and found usable for the existing study, indicating a response rate of 55.76%.

### Questionnaire Development

The questionnaire consisted of two sections. In the first section, A, of the existing study, demographic information of the respondents was apprehended. The second section, B, of the study captured the measurement items of the exogenous and endogenous variables. A seven-point Likert scale ranging from “Strongly Agree = 1” to “Strongly Disagree = 7” was adopted in this research. The only endogenous construct of this study “consumer choice behavior” was measured by four items adapted from the prior study of (Lin and Huang 2012). The exogenous constructs of “functional value quality with four items” and “functional value price by four items” were adapted from (Lin and Huang 2012). Four items adapted from the (Rahnama and Rajabpour 2017) were used to measure the “conditional value”. Three items adapted from (Lin and Huang 2012) to measure the construct of “emotional values”. The “social value identity with three items” and the “social value responsibility by three items” were adapted from (Han et al. 2017). The item statements of these variables are given below in Appendix A. The demographic profile of respondents is presented in Table 1.

**Table 1.** Demographic profile.

	Characteristics	Frequency	Percentage%
Gender	Male	155	65.4
	Female	82	34.6
Age	16–24	24	10.1
	25–34	34	14.3
	35–44	85	35.9
	45–54	51	21.5
	55–64	33	13.9
	>65	10	4.2
Marital status	Single	39	16.5
	Married	198	83.5
Education	Intermediate or below	72	30.4
	Undergraduate	96	40.5

Table 1. Cont.

	Characteristics	Frequency	Percentage%
	Graduate	46	19.4
	Professional	23	9.7
Occupation	Government Sector	57	24.1
	Private Sector	90	38.0
	Self-Employed	36	15.2
	Student	18	7.6
	Retired	36	15.2
Income (PKR)	50,000–75,000	72	30.4
	75,001–100,000	96	40.5
	100,001–125,000	46	19.4
	125,001 and over	23	9.7

### 3. Analysis (PLS-SEM)

Structural equation modeling (SEM) is the most robust and influential second-generation multivariate analysis technique that is used to examine structured relationships (Hair et al. 2014). SEM includes a series of statistical methods, i.e., factor analysis, regression analysis or path analysis, and discriminant analysis, which allow researchers to examine the structural relationship between the observed variable and the latent variable (Chin and Marcoulides 1998). The SEM technique is beneficial as compared to first-generation multivariate analysis techniques in terms of accuracy, efficiency, and convenience (Malhotra et al. 2006; Richter et al. 2015; Ali et al. 2019a). This statistical analysis technique has gained wide-ranging popularity in behavioral and social science research (Cheah et al. 2019; Hair et al. 2016). It can be distinguished between covariance-based (CB-SEM), partial least squares (PLS-SEM), or variance-based (VB-SEM) SEM (Chin and Newsted 1999; Ali et al. 2019b). PLS-SEM is preferred over CB-SEM because it is a more appropriate tool for advanced research analysis. PLS-SEM is referred to as the Holy Grail or silver bullet because it allows for testing complex relationships in the model (Hair et al. 2011). Moreover, PLS-SEM contributes heavily to the exploratory approach and considers better means for prediction accuracy (Ramli et al. 2018). Hence, this study employed the PLS-SEM technique by using Smart PLS 3.0 software (Ringle et al. 2015) because these characteristics are in line with the objective of the study.

As suggested by (Anderson and Gerbing 1988) and (Hair et al. 2016), we followed the dual-stage approach that comprised first, measurement model evaluation and second, the structural model evaluation. According to (Schumacker and Lomax 2004), the two-stage analysis approach that consists of the measurement model and structural model evaluation is superior to the one-step evaluation. The measurement model defines the measurements of the constructs and the structural model is a part that relates the measured variable to the latent variable.

#### 3.1. Measurement Model

The measurement model examines the association between observed data and latent variables and defines the measurements of constructs. The superiority of the measurement model was evaluated based on the assessment of construct reliability and validity. Construct reliability refers to “the consistency of the questions in the questionnaires, meaning that the interpretation of the questions by the respondent is the same as intended” (Cheow et al. 2017). In addition, construct validity refers to “the degree to which a test measures what it claims, or purports, to be measuring” (Polit and Beck 2008). In order to evaluate construct reliability and validity, it is necessary to conduct the following sets of tests: internal consistency reliability, i.e., Cronbach’s  $\alpha$ , composite reliability, convergent validity, i.e., factor loading, average variance extracted (AVE), and discriminant validity. Heterotrait–Monotrait ratios (HTMT) were used to evaluate the measurement model.



Internal consistency reliability, i.e., Cronbach's  $\alpha$ , composite reliability, convergent validity, i.e., factor loading, average variance extracted (AVE), and discriminant validity were used to evaluate the measurement model. The results presented in Table 2 indicate that Cronbach's  $\alpha$  values for all constructs fell in between 0.78 and 0.92, which exceeds the suggested value of 0.6 (Robinson et al. 1991). Composite reliability (CR) values were greater than 0.7, which is in line with the required threshold value suggested by (Chin 2010). Convergent validity refers to the "extent to which a measure correlates positively with alternative measures of the same construct" (Hair et al. 2016), which can be evaluated by using outer loadings (the value must fall in between 0.4 and 0.70) (Hair et al. 2016) and average variance extracted (AVE) (the value must be greater than 0.5) (Fornell and Larcker 1981). As denoted in Table 2, outer loading values and average variance extracted (AVE) are greater than the required threshold values indicate meaningful convergent validity.

Table 2. Measurement model.

Construct	Item	Convergent Validity		Internal Consistency Reliability	
		Loadings	AVE	Cronbach's $\alpha$	CR
Functional Value quality	FVQ1	0.731	0.549	0.87	0.829
	FVQ2	0.741			
	FVQ3	0.772			
	FVQ4	0.718			
Functional value price	FVQ1	0.848	0.642	0.80	0.877
	FVQ2	0.857			
	FVQ3	0.732			
	FVQ4	0.760			
Social value Identity	SVI1	0.852	0.722	0.92	0.886
	SVI2	0.869			
	SVI3	0.827			
Social Value Responsibility	SV1	0.677	0.606	0.90	0.820
	SV2	0.850			
	SV3	0.798			
Emotional Value	EMV1	0.847	0.615	0.78	0.827
	EMV2	0.775			
	EMV3	0.726			
Conditional value	CDV1	0.702	0.595	0.86	0.854
	CDV2	0.790			
	CDV3	0.811			
	CDV4	0.779			
Consumer Choice Behavior	CCB1	0.813	0.723	0.84	0.912
	CCB2	0.858			
	CCB3	0.900			
	CCB4	0.828			

Heterotrait–Monotrait ratios (HTMT) are a current and the most robust tool for evaluating discriminant validity because Fornell–Larcker criteria for assessing discriminant validity tend to be subject to debate (Henseler et al. 2014). Hence, to access discriminant validity Heterotrait–Monotrait ratios (HTMT) were employed. According to the HTMT criterion, if an HTMT value is found to be above 0.85 (Kline 2015) or 0.90 (Gold et al. 2001), it creates certain issues in discriminant validity. As indicated in Table 3, all HTMT values are lower than 0.85. Hence, all constructs have satisfied discriminant validity. The HTMT results are presented in Table 3.

**Table 3.** Discriminant validity (Heterotrait–Monotrait (HTMT) criterion).

	CV	CCB	EMV	FVP	FVQ	SVI	SVR
CV							
CCB	0.394						
EMV	0.383	0.688					
FVP	0.479	0.620	0.614				
FVQ	0.352	0.512	0.570	0.473			
SVI	0.067	0.314	0.113	0.188	0.197		
SVR	0.457	0.771	0.887	0.661	0.597	0.133	

### 3.2. Structural Model

To examine the structural model, it is suggested to report the collinearity issue before testing hypothesized relationships for this study. According to (Hair et al. 2011), it is important to ensure that there is no collinearity issue between the constructs under investigation. Variance inflation factor (VIF) values for all constructs are below the threshold of 5, confirming the absence of a collinearity issue. To examine hypothesized relationships, a bootstrapping technique with 5000 resample was conducted. A  $t$ -value criterion of 1.645 ( $p < 0.05$ ) was employed to test the proposed hypotheses. Figure 1 indicates the effect of the independent variables on the dependent variable. The results in Table 4 depict that all proposed hypotheses are accepted. The results indicate that functional value quality ( $\beta = 0.071$ ,  $t = 1.875 > 1.64$ ,  $p < 0.05$ ), functional value price ( $\beta = 0.176$ ,  $t = 4.166 > 1.64$ ,  $p < 0.05$ ), social value identity ( $\beta = 0.200$ ,  $t = 5.302 > 1.64$ ,  $p < 0.05$ ), social value responsibility ( $\beta = 0.347$ ,  $t = 7.694 > 1.64$ ,  $p < 0.05$ ), emotional value ( $\beta = 0.203$ ,  $t = 4.486 > 1.64$ ,  $p < 0.05$ ), and conditional value ( $\beta = 0.067$ ,  $t = 1.838 > 1.64$ ,  $p < 0.05$ ) were significant influences on consumer choice behavior. According to (Hair et al. 2011), the value of  $R^2$  is considered too weak, moderate, or substantial if values are above 0.25, 0.50, or 0.75, respectively. The results indicate the  $R^2$  value for consumer choice behavior is 0.524, which is considered above moderate as suggested by (Hair et al. 2011). The effect size ( $f^2$ ) depicts the impact of a specific predictor variable on the endogenous construct (Hair et al. 2014). (Cohen 1988) described the  $f^2$  value as a small, medium, or large effect if its value is 0.02, 0.15, or 0.35, respectively, as shown in Table 4. For the predictive relevance  $Q^2$ , a value above 0 is suggested to have predictive relevance. Table 4 shows the  $Q^2$  value for choice behavior ( $Q^2 = 0.349$ ) is greater than 0, which means the model has a predictive relevance.

**Table 4.** Structural model analysis (hypothesis testing).

Hypothesis	Relationship	Path Coefficient	Std. Error	$t$ Value	$p$ -Value	Supported	R2	Q2	F2
H1	FVQ →	0.071	0.038	1.875	0.000	Yes	0.524	0.349	0.008
H2	FVP →	0.176	0.042	4.166	0.030	Yes			0.048
H3	SVI →	0.200	0.039	5.302	0.000	Yes			0.080
H4	SVR →	0.347	0.046	7.694	0.000	Yes			0.137
H5	EMV →	0.203	0.045	4.486	0.000	Yes			0.050
H6	CDV →	0.067	0.036	1.838	0.033	Yes			0.008

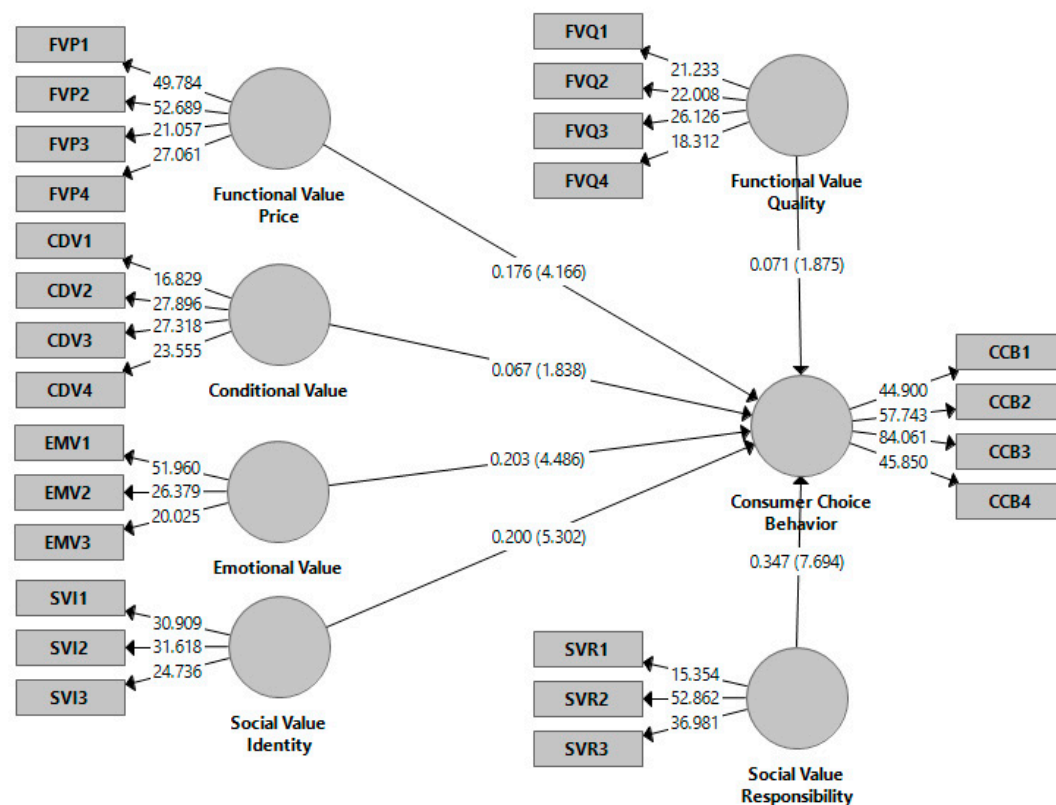


Figure 1. Structural model (bootstrap).

#### 4. Discussion

Environmental problems and deterioration have been extensively debated by academics and practitioners, including their solutions in the form of green products. In this regard, the aim of this study was to find consumers' choice behavior to use green electronic products in Pakistan. For this purpose, a multidimensional modified GPV model (having six sub-constructs) was used. We found that functional value price, functional value quality, social value identity, social value responsibility, emotional value, and conditional value have a positive and significant relationship with the choice behavior of consumers regarding green electronics.

Empirical results showed that functional value price had a significant, positive effect on consumer choice behavior of green electronics ( $\beta = 0.176$ ,  $t = 1.875 > 1.64$ ,  $p < 0.05$ ). The results are in line with previous studies (Rahnama and Rajabpour 2017; Khan and Mohsin 2017). The results can be due to the reason that, in Pakistan, consumers are more price conscious to buy green products (Khan and Mohsin 2017). Another reason can be that as the economy faces high inflation, stagflation, and depression increase, consumers are more concerned with the price than those who live in a stable economy (Rahnama and Rajabpour 2017). Therefore, an increase in green electronics prices will cause less purchasing of these products. That is why marketers should design pricing strategies that are competitive with the same product category available in the market. Moreover, the government can reduce import taxes for companies to reduce their cost, which may ultimately lead to low competitive pricing with conventional products.

Functional value quality was also found to have a significant effect on the choice behavior of consumers regarding green electronics ( $\beta = 0.071$ ,  $t = 4.166 > 1.64$ ,  $p < 0.05$ ). The results are in agreement with (Rahnama and Rajabpour 2017; Gonçalves et al. 2016). The effect might be due to the fact that functional quality is derived from the utilitarian benefits and functional performance of the green products (Sweeney and Soutar 2001). Consumers choose green products when they find more quality features in green products than in conventional products. These features can be in the form of

durability, functionality performance, energy-saving capacity, eco-friendliness, and most specifically in the electronics category, it's waste and recycling options. Hence, there should be a policy of mentioning hazardous material and dangerous components present in the product as well as a minimum level that should be used in green products. Moreover, financial assistance should be provided to the companies which formally recycle the e-waste. Furthermore, marketers can enhance the quality and performance of green electronics and can launch a return policy of old and used electronic products so that these products can be recycled or disposed of by proper methods.

The results suggest that social value identity has a positive and significant impact on consumer choice behavior ( $\beta = 0.200, t = 5.302 > 1.64, p < 0.05$ ). Consumers get involved in green consumption behavior due to social pressure, peer influence, and social identification. Consumers like to behave in the same way as their social group, which creates a social identity. The consumer gains symbolic value by this social identification which motivates them to get involved in green consumption for good impressions on others and social approval (Rahnama and Rajabpour 2017). In this regard, a social media campaign can be an initiative for consumers who are involved in green consumption to share their experiences. Individuals will get more involved in green consumption for social approval and social identification from their peer group or social class.

Social value responsibility was also found to have significant impact on consumer choice behavior ( $\beta = 0.347, t = 7.694 > 1.64, p < 0.05$ ). This means that Pakistani consumers like to buy green electronics by considering their obligation and responsibility to save society. The environmental impacts of conventional electronic products make them conscious to change their preferences for the improvement of society. They do not think that environmental preservation is only the responsibility of companies and/or the government. Therefore, marketers can stimulate consumers' behavior by shedding light on the consumption of green electronics. Moreover, the negative impacts of conventional products can be highlighted by the government to make consumers conscious about their responsibility towards society.

Emotional value refers to the ability to arouse feelings and affective states by alternative product capacity. H3 hypothesized the positive influence of emotional value on consumers' choice behavior regarding green products. The results reveal that emotional value is an important factor in the choice behavior of consumers regarding green electronics ( $\beta = 0.203, t = 4.486 > 1.64, p < 0.05$ ). The results are verified by previous research (Woo and Kim 2019; Wen and Noor 2015; Ali et al. 2019b). This strong association of emotional value with green product adoption has also verified the results of (Khan and Mohsin 2017) who said that Pakistani consumers rely on emotional values during the decision-making process. Emotions are a basic part of human life. These emotions are associated with consumption that arouses positive feelings (feeling good, satisfied, relaxed, pleasure, relief, hope, and love) or negative feelings (anxiety, anger, fear, and guilt) by consuming a product. Research has suggested that consuming green products arouse positive feelings like doing good, well-being, comfort, and satisfaction in consumers. The probable reason for this result is that Pakistani consumers engage in emotional decision making rather than rational decision making. Consumers who use green electronics should be encouraged by the government to give them a sense of satisfaction, comfort, and doing good.

Like other GPV values, the conditional value is also found to be significant in consumers' choice behavior regarding green electronics ( $\beta = 0.067, t = 1.838 > 1.64, p < 0.05$ ). The results are consistent with (Wang et al. 2018; Solaiman et al. 2017; Lin and Huang 2012; Biswas and Roy 2015a) but also contradict the results of (Biswas and Roy 2015b; Rahnama 2017; Rahnama and Rajabpour 2017) who said that different situations or conditions do not play a role in the decision-making process at the time of purchasing green products (Suki and Suki 2015a). However, findings of this study cannot be completely ignored because it is in line with previous research streams who found the positive association of conditional value and green product adoption (Wang et al. 2018). In Pakistan, it is found that different situations like time, place, discounts, and cash rebates positively affect consumer behavior regarding green electronics. Consumers may buy green electronics if they get any kind of discount, government subsidy, a promotion at the time of purchasing. Therefore, marketers can provide different promotional discounts, installation discounts, and any cash rebate at stores to involve consumers

in eco-friendly consumption. The government can also provide subsidies to green consumers to overcome or reduce the e-waste issue in Pakistan. The government can also start training and organize workshops for companies to encourage them in green production methods.

## 5. Conclusions

Technological innovation has urged growth in the consumption of electronic products which cause environmental issues like the generation of e-waste. To overcome the issue of e-waste, the adoption of electronic products is very much important. That is why the aim of the study was to find consumers' choice behavior regarding green electronics. For this purpose, the theoretical foundation was taken from GPV (functional value price, functional value quality, social value identity, social value responsibility, emotional value, conditional value), which explains why consumers get involved in green consumption behavior. Four hypotheses were developed based on the literature, and variance-based SEM was used to test the hypotheses. Results of PLS-SEM reveal that all hypotheses were accepted.

The findings provide interesting and useful insights about green consumers. The results suggested that functional value price, functional value quality, social value identity, social value responsibility, emotional value, and conditional value have a significant and positive effect on consumer choice behavior regarding green electronics. Due to differences in culture and product categories, these results have some agreements and disagreements with previous research. In Pakistan, consumers focus on both price and quality of green electronics. Therefore, marketers should focus on the quality of green electronic products and make them available at an affordable and competitive price. In this regard, the government agency can set standards to import only those products that are good in quality with reductions in taxes to make them available at low prices. Consumers do not only like to buy green products due to their functionality but also for the symbolic value and social approval. The adoption of green electronics can be increased by using marketing communication tools to motivate consumers for social identification and responsibility. A public awareness message with a platform for electronic word of mouth generation can be initiated by the government or waste management agency to educate consumers about negative impacts of conventional products or e-waste. Consumers experience positive emotions and feel satisfied when they chose green electronics for the improvement of the environment, instead of contributing to environmental deterioration. Moreover, practitioners should include promotional and discounts strategies at the store for green products because different conditions affect consumers' decision making while choosing these products. In this regard, the government can make it mandatory for companies to be ISO environmentally certified, like ISO 14000. ISO/TS 207/SC 3 environmental labelings should be mandatory for green products to meet those standards. The government should also develop a separate monitoring body for e-waste collection, recycling, management, and disposal due to its adverse effects on the environment.

### *Limitations and Future Direction*

Without doubt, this study has contributed theoretically and practically; nevertheless, this study is not without limitations. First, this study has taken only one category under discussion from electrical products that contributed to e-waste, i.e., electronic products. Future research can consider other electrical categories, like temperature exchange equipment, screens, small IT and telecommunication devices, and lamps. Second, the study has considered green electronic products in general. Future research can analyze consumer choice behavior regarding subcategorized electronic products. Third, this research has not checked the effect of personality traits of the consumer on consumer choice behavior, as consumers with different personalities may have diverse preferences. Finally, future researchers can extend the GPV model by using biospheric, altruistic, and egoistic values to predict the pro-environmental behavior of consumers. Hence, future research can explore the effect of personality on consumer choice behavior.



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## Appendix A

### Functional Value-Quality

FVQ1—The green electronic product has consistent quality.

FVQ2—The green electronic product is well made.

FVQ3—The green electronic product has an acceptable standard of quality.

FVQ4—The green electronic product would perform consistently.

### Functional value-price

FVP1—The green electronic product is reasonably priced.

FVP2—The green electronic product offers value for money.

FVP3—The green electronic product is a good product for the price.

FVP4—The green electronic product would be economical.

### Conditional Value

CDV1—I would buy the green electronic product instead of conventional electronic products under worsening environmental conditions.

CDV2—I would buy the green electronic product instead of conventional electronic products when there is a subsidy for green products.

CDV3—I would buy the green electronic product instead of conventional electronic products when there are discount rates for green products or promotional activity.

CDV4—I would buy the green electronic product instead of conventional electronic products when green products are available.

### Emotional Value

EMV1—Buying the green electronic product instead of conventional electronic products would feel like making a good personal contribution to something better.

EMV2—Buying the green electronic product instead of conventional electronic products would feel like the morally right thing.

EMV3—Buying the green electronic product instead of conventional electronic products would make me feel like a better person.

### Social Value Identity

SVI1—Buying the green electronic product would help me to feel acceptable.

SVI2—Buying the green electronic product would improve the way that I am perceived.

SVI3—Buying the green electronic product would make a good impression on other people.

### Social Value Responsibility

SVR1—Buying the green electronic product means I am making contributions to the reduction of carbon emission.

SVR2—Buying the green electronic product means I am taking care of our common living environment.

SVR3—Buying the green electronic product means I am responsible for society.

### Consumer Choice Behavior

CCB1—I make a special effort to buy green electronic products that are made from recycled materials.

CCB2—I have switched conventional electronic products for ecological reasons.

CCB3—When I have a choice between two equal products, I purchase the one less harmful to other people and the environment.

CCB4—I have avoided buying a conventional electronic product because it had potentially harmful environmental effects.

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