

Consumer Perception of Planned Obsolescence: A Research on Smartphone Owners

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ABSTRACT

Keywords:

Planned Obsolescence
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WOM

Purpose- This study aims to reveal the effects of planned obsolescence application types perceived by consumers on consumer satisfaction and subsequent consumer behavior.

Design/methodology/approach –Research data were collected by online questionnaire method. The snowball sampling method was used in the research. Smart PLS structural equation modeling program was used to analyze the obtained data. The research model, created based on the literature research, was tested with structural equation modeling analysis.

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Findings- Structural equation modeling analysis results show that perceived technological obsolescence has a positive effect on satisfaction, while perceived psychological obsolescence has a negative effect on satisfaction. Perceived quality obsolescence did not have a significant effect on satisfaction. Satisfaction has a positive effect on repurchase intention and positive word of mouth. On the other hand, it was found that satisfaction had a negative effect on regret and negative word of mouth

Article Classification:
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Discussion- According to the research results, the significant effect of perceived technological obsolescence on satisfaction can be interpreted as consumers expecting technological innovation from smartphone manufacturers. The negative effect of perceived psychological obsolescence on satisfaction can be interpreted as supporting psychological obsolescence through advertising and marketing efforts, creating dissatisfaction in consumers. Therefore, businesses should be careful in advertising and marketing efforts to avoid consumer dissatisfaction. In this sense, it should not be forgotten that satisfaction will negative impact regret and negative word-of-mouth communication.

1. INTRODUCTION

Before mass production became commonplace in the 1950s, American manufacturers were concerned about overproduction and how to prevent it. The products produced in this period were long-lasting, and businesses were producing more products (Pineda, 2017). As a result, businesses had to sell their products quickly or encourage consumers to buy again. The planned obsolescence strategy is a business strategy that emerged in the 19th century and was developed in response to durable products. This strategy shortens product lifespan, ensuring consumers replace their products faster.

Businesses can implement a planned obsolescence strategy by changing the quality of products, updating technology or software, or obsolete products in the consumer's mind. While increasing the product supply of the enterprises, the planned obsolescence strategy can increase the environmental waste rate, resource use, and environmental pollution. While some consumers prefer to use new products and have the latest technology, others may be uncomfortable due to their environmental sensitivity.

The planned obsolescence strategy is a discussed and controversial concept from both favorable and unfavorable perspectives (Umar & Beyaz, 2021). Some businesses can avoid planned obsolescence by producing highly durable products (Agrawal et al., 2016). Today, with the circular economy gaining importance, interest in policies that encourage businesses to produce durable products has increased (Maitre-Ekern & Dalhammar, 2016).

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Planned obsolescence refers to a strategy in which companies deliberately design short-lived goods to encourage consumers to purchase newer models (Malinauskaite & Erdem, 2021) and increase sales (Malinauskaite & Erdem, 2021). Planned obsolescence is a widely used strategy for consumer goods with far-reaching environmental, legal, social, and economic implications (Bisschop & Hendlin, 2022). Implementation of the strategy can lead to environmental pollution, consumer exploitation, waste of resources, and increased electronic waste (Umar & Beyaz, 2021; Barros & Dimla, 2021). However, some businesses avoid planned obsolescence and bring highly durable products to market. This shows that this practice is not the only way to succeed in the market (Agrawal et al., 2016). While proponents of planned obsolescence assert that it lowers repair and maintenance expenses, making products more accessible to lower-income groups, those holding contrasting perspectives deem this strategy as unethical and inconsistent with the principles of sustainable development (Umar & Beyaz, 2021; Sielska, 2019). Still, consumers believe that planned obsolescence is a reality that has applications in the market (Proske et al., 2016).

When the literature on planned obsolescence is examined, it is seen that the subject has been investigated from different aspects. In one of these studies, Adrion and Woidasky (2019) aimed to verify and measure planned obsolescence's effects on laptops and determine the role of user expectations. In the qualitative research conducted by Aydın (2008), consumers' level of knowledge and awareness about planned obsolescence was investigated. In the research conducted by Cooper (2004), more than 800 households were reached, and consumer attitudes and consumer behaviors related to the lifespan of the devices they owned were investigated. In the study by Çerçi (2019), the attitudes of consumers using iPhones towards planned obsolescence were investigated comparatively using experiments and control groups. In the study conducted by Echegaray (2016) in Brazil, consumers' product life experience, their tendency to change their devices after a malfunction, and their perceptions of product performance were investigated. Hennies and Stamminger (2016) conducted an extensive survey based on the history of maintenance and disposal of five different household appliances over the life cycle of these products in Germany. In the study conducted by Iizuka (2006), the decision of manufacturers of durable goods to launch new products was discussed.

On the other hand, Kuppelwieser et al. (2019) investigated the consumer responses to the planned obsolescence strategy applied by the enterprises to the customers' perception of value and, ultimately, their willingness to pay. Lyberg and Bomboma (2010) investigated how products are made or made obsolete for their users and whether attitudes toward product value influence consumers' decisions to switch. On the other hand, Proske et al. (2016) investigated the underlying causes of product obsolescence by addressing the use and lifetime of smartphones. In the study conducted by Satyro et al. (2018), the effect of the short life of existing products on sustainability was discussed.

When the above studies are examined, it is seen that the effects of planned obsolescence on consumer satisfaction and satisfaction on repurchase intention, regret, positive word of mouth (positive WOM), and negative word of mouth (negative WOM) are not addressed. This study aims to examine the effects of planned obsolescence, which are divided into sub-types as consumers' perceived quality obsolescence, perceived technological obsolescence, and perceived psychological obsolescence, on consumer satisfaction and satisfaction on consumer behaviors such as repurchase intention, regret, positive WOM and negative WOM, with research done on phone owners. In recent years, consumers have faced planned obsolescence applications in the use of many products, especially smartphones, and there needs to be a study on this subject in the literature. Hence, the study fills an essential practical and theoretical gap.

In the study, the concept of planned obsolescence and its types are explained in the conceptual framework. Then, a research model was created by scanning the relevant literature, and the research hypotheses were presented. Afterward, the method of the research carried out was explained, and the research findings were presented. The study was concluded by associating the research findings with the relevant literature and practical suggestions.

2. CONCEPTUAL FRAMEWORK

The concept of planned obsolescence was first used by Bernard London. Bernard London suggested that planned obsolescence could solve the great economic depression of 1929 (London, 1932). Planned obsolescence can be defined from different angles. Definitions of planned obsolescence made by different authors are given below:

- Planned obsolescence is a strategy to wait for sales of existing products to decline and not bring improvements to market, and then make sufficient improvements to new models to encourage consumers to replace their old models (Stewart, 1959, p. 15).
- Planned obsolescence is the deliberate shortening of the product life cycle. This definition is handled through the concepts of function, quality and desirability (Packard, 1960: 80).
- Planned obsolescence is a strategy where fewer durable products are produced in competitive markets (Swan, 1972, p. 576).
- Planned obsolescence is the manufacture of products with a short life span to force consumers to repurchase (Bulow, 1986: 730).
- Planned obsolescence is a strategy in which consumers are often forced to repurchase uneconomical and short-lived products (Fishman et al., 1993, p. 362).
- Planned obsolescence is a situation that affects social welfare as businesses under-invest in product durability (Waldman, 1996, p. 274).
- Planned obsolescence is a strategy that leads consumers to believe that the economic usefulness of products is decreasing (White, 2013, p. 171).
- Planned obsolescence is a strategy that instills in consumers the desire to have a better, newer, and earlier-than-expected product (Adamson et al., 2003, p. 12).
- Planned obsolescence is when consumers are persuaded to replace a functional and working product or component when they feel that a product is unfashionable or unsuitable for them (Amankwah-Amoah, 2017: 6).
- Planned obsolescence is the production of products by pre-designing their useful life and usage time, and at the end of this period, the loss of their use value (Smeels and Stevels, 2003: 267).

Based on the definitions provided, we can define planned obsolescence as *"a strategy in which the lifespan of the products is designed and produced in advance, and at the end of the use period, consumers are persuaded or compelled to change the product as a result of functional, technological and/or psychological obsolescence, deliberately shortening the life of the products and encouraging consumers to constantly buy new products."*

Planned obsolescence is a strategy implemented by businesses using different methods, all serving the same purpose, to stimulate demand flow (Pineda, 2017). According to Packard, types of planned obsolescence include functional obsolescence, quality obsolescence, and psychological obsolescence (Packard, 1960). Van Nes et al. divided planned obsolescence into six different dimensions. These dimensions include aesthetic, economic, feature, environmental, technical, and psychological obsolescence (Van Nes et al., 1999). Smeels and Stevels suggested that the six factors affecting the decision to change products are technical, design, economic, visual, technological, and environmental (Smeels & Stevels, 2003). Cooper, on the other hand, focused on a type of planned obsolescence called relative obsolescence. He divided relative obsolescence into three classes: psychological, economic, and technological obsolescence (Cooper, 2004).

Considering the studies in the literature, planned obsolescence was examined in this study by focusing on quality obsolescence, technological obsolescence, and psychological obsolescence.

2.1. Quality Obsolescence

Quality obsolescence means that manufacturers shorten the lifespan of products, leading the consumer to purchase products more often (Keeble, 2013). If the manufacturer provides brand loyalty, consumers may prefer the same brand, if brand loyalty cannot be achieved, the manufacturer may lose customers due to quality obsolescence (Keeble, 2013). Quality obsolescence is when the product becomes unusable after the specified period (Packard, 1960). This aging is accomplished by means of shortening the life span of the product or reducing its quality (Kadioğlu, 2014). According to Guiltinan, quality aging is implemented in three ways. These are shortening of life, non-repairability or high repair cost, and deterioration of external appearance (Guiltinan, 2009). According to Keeble, quality aging is divided into forced and natural aging (Keeble, 2013). Printers are among the products that can be an example of quality obsolescence. Although the printers have all the hardware capabilities to print, they can be stopped by the software when they reach a certain number of pages (Dannoritzer, 2010).

2.2. *Technological Obsolescence*

When consumers buy certain products, they may not be able to control what they do. Electronic devices are complicated to prevent consumers from accessing their inner workings (Bodek, 2022). Businesses can reinforce technological obsolescence by introducing new products frequently. Businesses can complicate repair services, limit technical assistance, cut off the supply of spare parts or accessories and stop production, thereby causing technological obsolescence (Pineda, 2017).

Pope (2017) divided technological obsolescence into two categories: postponed obsolescence and systemic obsolescence. Postponed obsolescence is when businesses extend the lifecycle of existing products and avoid bringing new products to market, even when they can bring more advanced products to market. In this way, consumers may not have access to a more useful or improved product. Systemic obsolescence, on the other hand, is when businesses render devices obsolete through methods such as software updates or hardware incompatibilities (Pope, 2017). This type of obsolescence makes old versions difficult to use and drives consumers towards new products (Maycroft, 2009).

2.3. *Psychological Obsolescence*

The planned obsolescence strategy takes advantage of consumers' sense that their product is outdated or unusable. Psychological obsolescence occurs due to changes in the user's perceptions of the product and features, such as fashion and design (Packard, 1960). Advertising and media are important factors that lead consumers to replace obsolete products with new ones (Schreiber et al., 2022). Fashion accelerates obsolescence by directing consumers to new styles and products (Pineda, 2017; Guiltinan, 2009). Increasing competition in the market is one of the reasons for businesses to justify obsolescence. Periodically introducing new product models enables businesses to create dissonance among consumers and introduce changes related to old products (Pineda, 2017). In some cases, technological obsolescence can be confused with psychological obsolescence. Although the product's functionality is increased or improved, a psychological obsolescence effect may occur in the consumer group (Guiltinan, 2009).

3. LITERATURE REVIEW AND RESEARCH HYPOTHESES

The literature investigated the effects of quality obsolescence, technological obsolescence, and psychological obsolescence, which are the types of planned obsolescence, on consumer satisfaction levels. The effects of consumers' satisfaction on factors such as repurchase intention, regret, and WOM are examined in this section.

3.1. *The Relationship Between Quality Obsolescence and Satisfaction*

Upon reviewing the literature, there are a limited number of studies on quality obsolescence and consumer satisfaction. Hennies and Stamminger (2016) examined the lifetime maintenance and disposal history of five household appliances in Germany. According to the results of the research, it has been found that branded products generally last longer, and being repaired does not extend the product's life. Technical devices such as TVs and laptops are more subject to quality obsolescence. Consumers perceive obsolescence positively when the life expectancy is met, as they consider life span, economic life, and environmental factors.

Consumers' satisfaction is derived from their positive opinion of businesses and depends on the businesses' long-term consistent behavior (Delgado-Ballester & Munuera-Alemán, 2001). Quality, on the other hand, refers to meeting the expectations of consumers from the product or service, and this ensures consumer satisfaction. However, one study observed that durable goods have decreased durability over time (Echegaray, 2016). As a result of not meeting consumer expectations, dissatisfaction arises, and this negatively affects the environment because of the rapid product change cycle (Cooper, 2004; Guiltinan, 2009). In some studies, it is seen that the product life expectancy of the consumers is not reached (Hennies & Stamminger, 2016). Findings from a limited number of studies on quality obsolescence and consumer satisfaction show that consumers' product life expectancy and perceptions of obsolescence affect their satisfaction levels. Sometimes, consumer expectations may not be met, resulting in dissatisfaction.

After the literature review, the H₁ hypothesis was formulated according to the purpose of the study and is given below.

H₁: Perceived quality obsolescence has a significant and negative effect on satisfaction.

3.2. The Relationship Between Technological Obsolescence and Satisfaction

According to research by Kuppelwieser et al. (2019), consumers are reluctant to buy new products after short replacement cycles. Cooper's research revealed that products that adhere to technological innovation have a shorter lifespan than those that do not and that dissatisfaction with these products is higher. In this study, consumers expressed dissatisfaction with frequently replacing devices (Cooper, 2004).

Consumer opinions are divided into two technological obsolescence and satisfaction. While some consumers expect innovation and new product development from businesses, other consumers think that businesses should focus on increasing product life span and product change decisions belong to the consumer (Aydın, 2018). In Aydın Kanlıtepe and Özgül's study, it was determined that some consumers approached the planned obsolescence strategy positively, and this had a positive effect on the economy (Aydın Kanlıtepe & Özgül, 2021). On the other hand, Echegaray's study shows that product life is shortened over time. However, according to Echegaray, consumers perceive technological obsolescence positively and as a natural process by adjusting their product life expectancy downwards despite accepting the role of businesses in product replacement (Echegaray, 2016).

After the literature review, the H₂ hypothesis was formulated according to the purpose of the study and is given below.

H₂: Perceived technological obsolescence has a significant and positive effect on satisfaction.

3.3. The Relationship Between Psychological Obsolescence and Satisfaction

Planned obsolescence can lead to the rapid deterioration of a product, even though it could potentially serve for many years. However, even if the product is subjected to the planned obsolescence strategy, it has been found that consumers feel satisfied with planned obsolescence when their wishes are fulfilled. The consumer is bored with using the product (Umar & Beyaz, 2021). However, this situation represents a psychological conflict situation in the inner world of the consumer. If the consumer's old mobile phone is still working, replacing it, even though the consumer wants something new, can make the consumer feel prodigal (Priester et al., 2007). While technological progress leads to replacing devices with new ones, economic factors prefer replacement instead of repair, and especially the peer group pressure of young people, fashion and marketing activities that support psychological obsolescence create dissatisfaction among consumers (Cooper, 2004).

After the literature review, the H₃ hypothesis was formulated according to the purpose of the study and is given below.

H₃: Perceived psychological obsolescence has a significant and negative effect on satisfaction.

3.4. The Relationship Between Satisfaction and Repurchase Intent

The concept of repurchase intention, which is defined as the tendency of consumers to repurchase the product they purchased from the same brand or business based on their positive impressions and experiences (Hellier et al., 2003), is one of the main goals for businesses (Mittal & Kamakura, 2001). Research in both the products and services sectors demonstrates a strong and positive relationship between consumer satisfaction and their intention to repurchase (Fornell, 1992; Hellier et al., 2003; Selnes, 1998).

Research among smartphone users has shown that smartphone satisfaction increases consumers' intention to repurchase the same brand at the next mobile phone need (Armağan and Gider, 2017; Adekunle and Ejechi, 2018).

After the literature review, the H₄ hypothesis was formulated according to the purpose of the study and is given below.

H₄: Satisfaction has a significant and positive effect on repurchase intention.

3.5. The Relationship Between Satisfaction and Regret

Regret occurs when a purchased product outperforms the current product compared to a different alternative (Tsiros & Mittal, 2000). Some researchers state that there are significant conceptual differences between regret and dissatisfaction (Inman et al., 1997; Tang, 2008). Regret is the feeling after a decision that it was wrong and that another alternative would be better. Regret is a psychological reaction to a situation where expectations are unmet (Salkeld et al., 2000).

Studies show a direct and negative relationship between satisfaction and regret. Regret can negatively affect satisfaction and reduce the consumer's repurchase intention (Inman et al., 1997; Pieters & Zeelenberg, 2005).

After the literature review, the H₅ hypothesis was formulated according to the purpose of the study and is given below.

H₅: Satisfaction has a significant and negative effect on regret.

3.6. The Relationship Between Satisfaction and Word of Mouth

WOM is an informal mode of communication among consumers. This communication includes information that consumers who have information about the product passed on to other consumers (Carpenter, 2008). WOM significantly impacts consumers' purchasing decisions and repurchasing behaviors (Grewal et al., 2003). Therefore, the interaction between current and potential consumers is essential for businesses. Negative WOM is when dissatisfied consumers convey negative information about the product to their environment (Leonard-Barton, 1985). This is particularly common among consumers whose problems have not been resolved and can be detrimental to businesses (Alire, 2007). Especially conscious consumers frequently use negative WOM to warn about their surroundings. It is a necessity for businesses to continue their sales by taking action to prevent negative WOM from their customers (Şimşek, 2017).

Positive WOM occurs when consumers think the product is valuable or of good quality. Consumer satisfaction with the product encourages positive WOM (Derbaix & Vanhamme, 2003). The impact of satisfaction on WOM has been thoroughly examined in the marketing literature. Studies show that satisfaction positively affects positive communication, while negative communication negatively affects it. While consumers perform positive WOM activities about the businesses they are satisfied with, they prefer negative communication in case of dissatisfaction (Carpenter & Fairhurst, 2005; Carpenter, 2008; Dick & Basu, 1994). As a result, it is seen that satisfaction encourages positive communication among consumers, while dissatisfaction increases negative communication (Carpenter, 2008; Derbaix & Vanhamme, 2003; Dick & Basu, 1994; Şimşek, 2017).

Following the literature review, H₆ and H₇ hypotheses were formulated according to the purpose of the study and are listed below.

H₆: Satisfaction has a significant and negative effect on negative word of mouth.

H₇: Satisfaction has a significant and positive effect on positive word of mouth.

Following the literature review, the research has formulated hypotheses aligned with the study's objectives. According to these hypotheses, Figure 1 shows the research model.

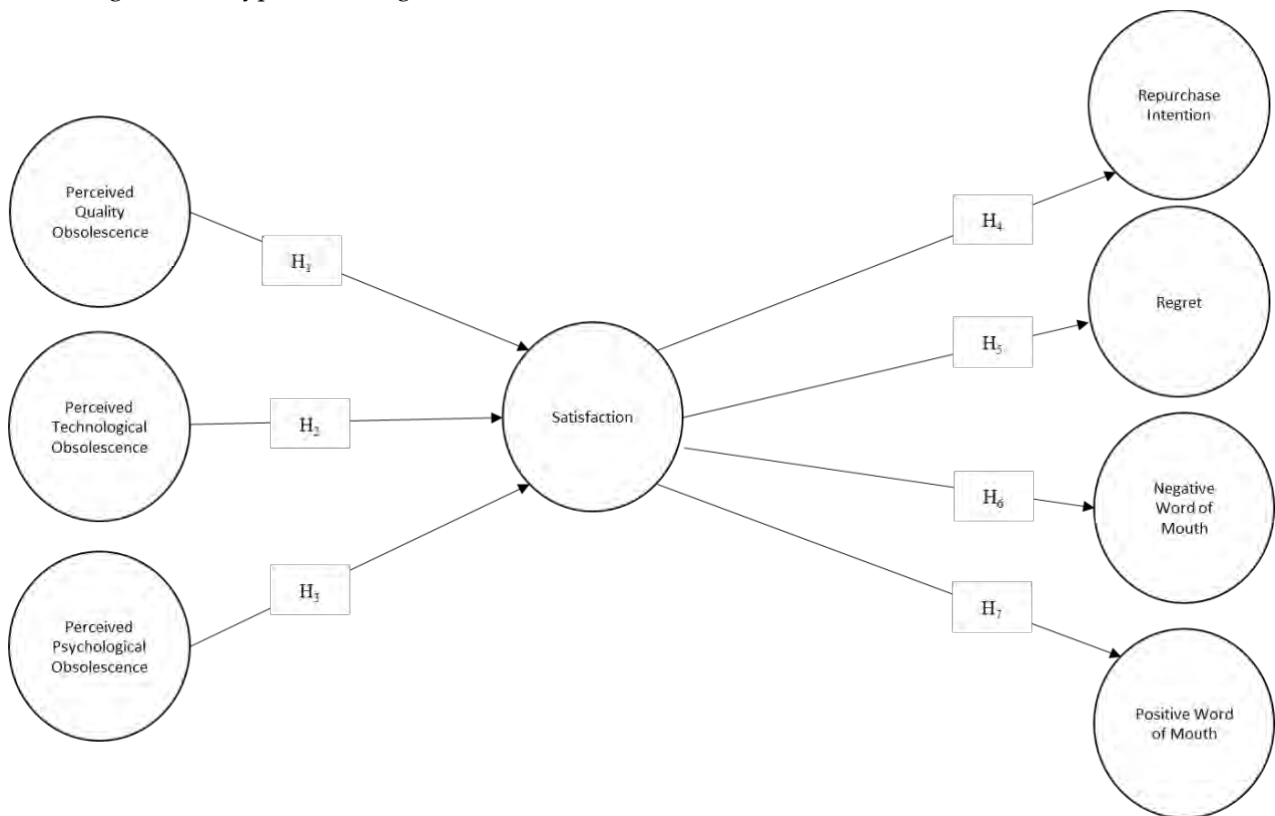


Figure 1: Research Model

2. METHODOLOGY

The research aims to present the effects of planned obsolescence, which is divided into sub-types as perceived quality obsolescence, perceived technological obsolescence, and perceived psychological obsolescence, on consumer satisfaction and satisfaction on consumer behaviors such as repurchase intention, regret, positive WOM and negative WOM within the framework of the suggested research model. The study was executed using an online survey approach, wherein participation was voluntary. The participants were consumers aged 18 years or older, possessing smartphones, and located in Turkey. The online survey was shared with consumers with social media accounts and sent to the participants via Whatsapp, the most widely used messaging application. In addition, the participants were asked to share the survey link with their close circles. Therefore, the snowball sampling method was used in the research. The snowball sampling method is a convenient sampling method that helps the researcher reach important information sources (Patton, 1987). Consumers living in Turkey and using smartphones constitute the main population of the research. According to the 2022 report of the Turkish Statistical Institute, the internet usage rate of people aged 16-74 is 85% (TÜİK, 2022). The population in Turkey is 84.78 million people, and the number of households is stated as 25.32 million. According to the 2021 report of TÜİK, it is stated that 99.3% of the households have a smartphone, and 94.1% of them have internet access (TÜİK, 2021). Reaching this population can be challenging in terms of both time and money. Therefore, a sample size that could represent the main population was chosen. According to Sekaran and Bougie (2016), at least 384 samples are needed to represent this population.

The questionnaire form contains categorical and 5-point Likert type scale questions. Categorical questions consist of questions that aim to reveal information such as demographic characteristics of the participants, smartphone usage time and smartphone brand. Likert questions consist of 46 scale items belonging to perceived quality obsolescence, perceived technological obsolescence, perceived psychological obsolescence, satisfaction, regret, repurchase intention, positive and negative WOM dimensions. The items in the perceived quality obsolescence dimension in the questionnaire were adapted from the studies conducted by Öztürk (2021), Echegaray (2016), and Çerçi (2019), items in perceived technological obsolescence were adapted from the studies conducted by Öztürk (2021) and Echegaray (2016), and items in the dimension of perceived psychological obsolescence were adapted from the studies conducted by Öztürk (2021), Echegaray (2016), Çerçi (2019) and Lyberg and Bomboma (2010). For the satisfaction dimension, the scale items in the studies conducted by Westbrook and Oliver (1981) and Echegaray (2016); for the repurchase intention dimension, the studies conducted by Tsai and Huang (2007); for the dimension of regret, the studies conducted by Lee and Cotte (2009); for the negative WOM dimension, studies by Goyette et al. (2010); for the positive WOM dimension studies conducted by Henning-Thurau et al. (2004) and Hung and Li (2007) were adapted and used.

Ethics Committee Approval was obtained from Bursa Uludağ University Scientific Research and Publication Ethics Committee on 25 November 2022 (decision 54 taken in session numbered 2022-10) for the questionnaire used in the study. The surveys were collected between 01.12.2022 and 09.12.2022 by sending a link to the participants via Google Forms using the online survey method. After the data collection process, 421 questionnaires suitable for analysis were analyzed.

3. Findings

In the analysis of the data, the SPSS 21.0 package program was used to determine the demographic characteristics of the participants, and the Smart PLS 4.0 package program (Ringle et al., 2022) was used in the measurement model and structural equation modeling analysis.

3.1. Findings Regarding the Participants

The demographic characteristics of the participants are given in Table 1.

Table 1: Demographic characteristics

Characteristics		N	%
Gender	Female	256	60,81
	Male	165	39,19
Marital Status	Married	213	50,59
	Singel	208	49,41

Age	≤ 20	63	14,96
	21-30	94	22,33
	31-40	159	37,77
	41-50	72	17,10
	51-60	27	6,41
	≥ 61	6	1,43
Education	Primary Education	4	0,95
	Secondary Education	8	1,90
	High School	41	9,74
	Associate degree	109	25,89
	Bachelor's degree	153	36,34
	Master's degree	74	17,58
Income (Turkish Lira / TL)	Doctoral Degree	32	7,60
	≤ 5000	101	23,99
	5001 - 10.000	92	21,85
	10.001 – 15.000	88	20,90
	15.001 – 20.000	64	15,20
	20.001 – 25.000	28	6,65
	25.001 – 30.000	15	3,56
Job	≥ 30.001	33	7,84
	The Private Industry	142	33,73
	The Public Sector	114	27,08
	Student	99	23,52
	Retired	11	2,61
	Housewife	29	6,89
Total	Other	26	6,18
		421	100

As seen in Table 1, female participants are more than male participants, the highest participation in terms of education level is in undergraduate students (36.34%), and the highest participation in terms of age is 31-40 years with 37.77%. In terms of the income of the participants, it is seen that the highest participation is by those with an income of less than 15000 TL (66.74%), and private sector employees (33.73%) have the highest participation in the study in terms of the professions of the participants.

3.2. Measurement Model Analysis

The proposed research model within the scope of the study was tested using structural equation modeling (SEM). SEM is a quantitative analysis method widely used in marketing today (Henseler, 2017). This research used a variance-based method known as the PLS-Structural Equation Modeling (PLS-SEM) to test the research model. PLS-SEM is preferred because of its non-parametric structure, statistical power, ability to handle complex models, work with small sample sizes, and not require goodness of fit values (Sarstedt et al., 2017).

Before proceeding to the research model analysis, reliability and validity analyses of the dimensions were carried out. In this context, divergent and convergent validity and internal consistency reliability were analyzed. Cronbach's Alpha is a widely used internal consistency reliability measure and is used to show the suitability of the scales for their purposes. Cronbach's Alpha coefficient is at an acceptable level when it is 0.60 and above (Taber, 2018: 1278). To evaluate the internal consistency reliability, the Composite Reliability-CR coefficient of the scale is also calculated. For the validity evaluation, Average Variance Extracted - AVE by the factor weights of the expressions was calculated. To meet the validity and reliability conditions, the factor weights of each statement should be 0.50 and above, the CR value should be 0.70 and above, the AVE value should be 0.50 and above, and the Cronbach's Alpha value should be 0.60 and above (Fornell & Larcker, 1981; Hair et al., 2014, Taber, 2018). Measurement model analysis results are presented in Table 2.

Table 2: Measurement Model Analysis Results

Dimensions and Items	Codes of Items	Factor Loadings
Perceived Quality Obsolescence: CR Value: 0,832; Cronbach's Alpha Value: 0,716; AVE Value: 0,770		
If the frequency of my smartphone breaking down or malfunctioning increases, that phone is now obsolete for me.	KalEsk2	0,817
If some of the basic functions of the smartphone I use are not working as before, that phone is now obsolete for me.	KalEsk3	0,934
Satisfaction: CR Value: 0,947; Cronbach's Alpha Value: 0,931; AVE Value: 0,653		
The smartphone I bought is the best phone I can buy among the preferences.	Memn1	0,586
The smartphone I bought is exactly the smartphone I need.	Memn2	0,779
I am satisfied with my decision on the smartphone I purchased.	Memn3	0,856
It was a wise decision for me to choose the smartphone I bought.	Memn4	0,898
I really enjoy using the smartphone that I bought.	Memn5	0,919
I am confident that buying the smartphone I bought was the right decision.	Memn6	0,902
In general, I am satisfied with the smartphone that I am currently using.	Memn7	0,875
I feel satisfaction with the lifespan and durability of the smartphone I use.	Memn8	0,732
I've had very few performance or operational issues since I started using my current smartphone.	Memn9	0,658
Negative Word of Mouth: CR Value: 0,871; Cronbach's Alpha Value: 0,767; AVE Value: 0,690		
I tell other people the bad things about the smartphone I use.	NegWom1	0,582
I use negative statements to other people about the smartphone I use.	NegWom2	0,938
I speak negatively about the smartphone I use to others.	NegWom3	0,923
Regret: CR Value: 0,887; Cronbach's Alpha Value: 0,878; AVE Value: 0,735		
I think that I am not careful enough in the process of purchasing the products of the smartphone brand I use.	Pism2	0,755
I should have preferred another branded product instead of the products of the smartphone brand I use.	Pism3	0,862
I wish I hadn't bought the product of the smartphone brand I am currently using because it no longer meets my needs.	Pism4	0,901
I regret my smartphone choice.	Pism5	0,903
Positive Word of Mouth: CR Value: 0,903; Cronbach's Alpha Value: 0,774; AVE Value: 0,674		
I want other people to know that I am the user of the smartphone I am using.	PozWom1	0,767
I constantly give positive information to other people about the smartphone I use.	PozWom2	0,795
I would recommend the smartphone I use to other people.	PozWom3	0,897
Perceived Psychological Obsolescence : CR Value: 0,860; Cronbach's Alpha Value: 0,857; AVE Value: 0,586		
I need to buy a new smartphone frequently.	PsEsk1	0,714
The release of a newer model of the smartphone I am using makes the smartphone I am using obsolete in my eyes.	PsEsk2	0,815
I prefer my cell phone to be fashionable and a product that I can proudly display. My smartphone, which I think is out of fashion, is now obsolete for me.	PsEsk3	0,820
The advertisements of smartphone manufacturer brands for their newly developed smartphones cause my smartphone to become obsolete in my eyes.	PsEsk4	0,817
Even if it is in working condition, I renew my smartphone that I think is old.	PsEsk5	0,735
I feel like I change my smartphones more often than I should.	PsEsk6	0,680
Perceived Technological Obsolescence: CR Value: 0,759; Cronbach's Alpha Value: 0,640; AVE Value: 0,724		
Smartphone manufacturers launch new phone models too early, forcing people to dispose of models that were released long ago.	TekEsk1	0,770
Some companies operating in the smartphone industry avoid introducing all technical innovations in their products, considering future product launches.	TekEsk2	0,925
Repurchase Intention: CR Value: 0,897; Cronbach's Alpha Value: 0,841; AVE Value: 0,679		
I consider myself a loyal customer of the smartphone brand I use.	TekrStn1	0,739
In the near future I will be shopping from this smartphone brand again.	TekrStn2	0,679
When a need arises, this smartphone brand is my first choice when I make a purchase.	TekrStn3	0,934
I intend to engage with this smartphone brand in the next 1 year.	TekrStn4	0,916

As a result of the measurement model analysis, the factor loading values of the items varied between 0.582 and 0.938, as seen in Table 2. Hair et al. (2021) recommends that the factor loading of each item be above 0.50, ideally above 0.70. In order to reach validity and reliability values above the required threshold values during the analysis process, KalEsk1, KalEsk4, KalEsk5, KalEsk6, PsEsk7, TekEsk3, TekEsk4, TekEsk5, TekEsk6, TekEsk7, TekEsk8, TekEsk9 and Pism1 coded items with a factor loading below 0.50 were dropped from the analysis.

The Cronbach's Alpha coefficients of the dimensions in Table 2 vary between 0.640 and 0.931. The lowest value (0.640) is in the perceived technological obsolescence dimension, above the acceptable level of 0.60. Since Cronbach's Alpha values of the other dimensions are above 0.70, it can be stated that the dimensions are reliable (Hinton et al., 2014). The dimensions' CR values range from 0.759 to 0.947. These values are above the CR threshold of 0.70. Therefore, internal consistency and reliability are ensured. The dimensions' AVE values ranged from 0.586 to 0.770. These values are above 0.50, which is considered the lowest. In this case, it can also be stated that convergent validity is achieved (Hair et al., 2011; Sarstedt et al., 2017).

Fornell and Larcker criterion (Fornell & Larcker, 1981) and Heterotrait-Monotrait Ratio of Correlations (HTMT) criterion proposed by Henseler et al. (2015) were used to determine discriminant validity. Discriminant validity refers to the degree to which a dimension differs from others. For the Fornell and Larcker criterion, the square root of the AVE values of the dimensions included in the analysis should be higher than the correlations between the dimensions used (Fornell & Larcker, 1981). Table 3 shows discriminant validity analysis results according to Fornell and Larcker criteria.

Table 3: Discriminant Validity (Fornell - Larcker Criteria)

DIMENSION	(PQO)	(S)	(NWOM)	(R)	(PWOM)	(PPO)	(PTO)	(RI)
Perceived Quality Obsolescence (PQO)	0,878							
Satisfaction (S)	0,061	0,808						
Negative Word of Mouth (NWOM)	0,092	-0,481	0,831					
Regret (R)	0,003	-0,673	0,511	0,858				
Positive Word of Mouth (PWOM)	-0,015	0,547	-0,446	-0,456	0,821			
Perceived Psychological Obsolescence(PPO)	0,195	-0,292	0,211	0,314	-0,088	0,766		
Perceived Technological Obsolescence(PTO)	0,147	0,233	-0,070	-0,180	0,111	-0,218	0,851	
Repurchase Intention (RI)	0,053	0,619	-0,404	-0,603	0,496	-0,076	0,127	0,824

When the values in Table 3 are examined, it is seen that the square root value of the AVE (bold font values) of each dimension is higher than the correlation between the other dimensions. Therefore, it can be stated that Fornell and Larcker's discriminant validity is ensured.

The HTMT criterion proposed by Henseler et al. (2015:127) expresses the ratio of the correlations of the variables in the analysis to the geometric average. It is recommended that the HTMT value be below 0.85 for different dimensions. The discriminant validity analysis results according to the HTMT criterion are shown in Table 4.

Table 4: Discriminant Validity (HTMT Criteria)

DIMENSION	(PQO)	(S)	(NWOM)	(R)	(PWOM)	(PPO)	(PTO)	(RI)
Perceived Quality Obsolescence (PQO)								
Satisfaction (S)	0,080							
Negative Word of Mouth (NWOM)	0,131	0,542						
Regret (R)	0,015	0,735	0,588					
Positive Word of Mouth (PWOM)	0,078	0,585	0,496	0,489				
Perceived Psychological Obsolescence (PPO)	0,249	0,320	0,260	0,359	0,116			
Perceived Technological Obsolescence (PTO)	0,239	0,287	0,094	0,220	0,150	0,281		
Repurchase Intention (RI)	0,077	0,668	0,478	0,664	0,561	0,135	0,142	

When Table 4 is examined, it can be stated that the values of the dimensions are well below 0.85 according to the HTMT criterion, and the necessary conditions are met. As a result of the measurement model analysis, the

dimensions in the model meet the reliability and validity criteria, and the scale dimensions are suitable for structural equation modeling (SEM) analysis.

3.3. Structural Equation Modeling Analysis

PLS-SEM was used to test the hypotheses of the research model. In the research model, perceived quality obsolescence, perceived technological obsolescence, and perceived psychological obsolescence are exogenous variables; satisfaction, regret, repurchase intention, negative WOM, and positive WOM are endogenous variables. In the model, t values ($t > 1.96$), path coefficients (β), p values ($p < 0.05$), multicollinearity (VIF value), effect size (f^2), coefficient of determination (R^2) and predictive relevance (Q^2) values were examined. PLSpredict analysis was used for the predictive relevance (Q^2) value in the Smart PLS 4.0 program. To assess the significance of the PLS path coefficients, t-values were recalculated using the Bootstrapping technique with 5000 sub-samples. The outcomes of the PLS-SEM analysis are displayed in Figure 2.

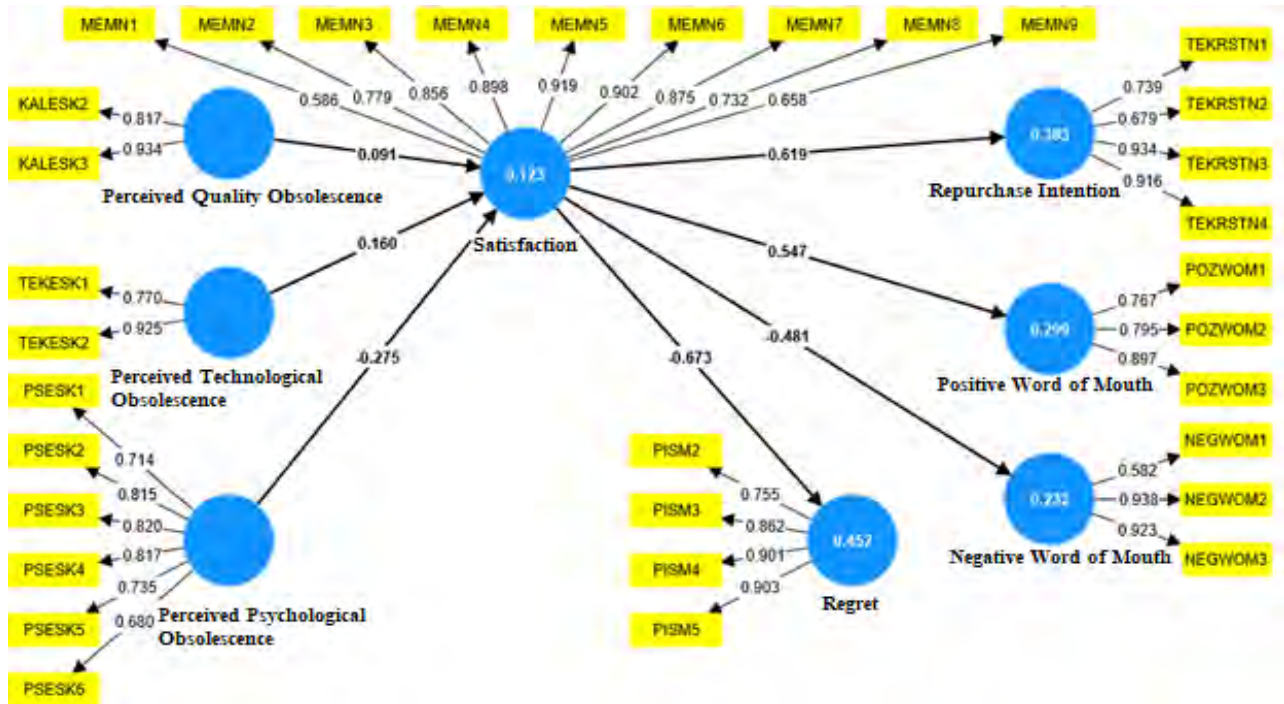


Figure 2: PLS-SEM Analysis Results

In Table 5 presents the detailed results of the PLS-SEM analysis:

Table 5: PLS-SEM Analysis Results

Hypotheses and Paths	Standardized Beta Coefficient	Standard Deviation	t Statistics	P Value	Results
H ₁ : Perceived Quality Obsolescence → Satisfaction	0,092	0,063	1,435	0,151	Not Supported
H ₂ : Perceived Technological Obsolescence → Satisfaction	0,162	0,053	2,995	0,003	Supported
H ₃ : Perceived Psychological Obsolescence → Satisfaction	-0,279	0,057	4,871	0,000	Supported
H ₄ : Satisfaction → Repurchase Intention	0,619	0,035	17,499	0,000	Supported
H ₅ : Satisfaction → Regret	-0,675	0,044	15,272	0,000	Supported
H ₆ : Satisfaction → Negative Word of Mouth	-0,484	0,053	9,084	0,000	Supported
H ₇ : Satisfaction → Positive Word of Mouth	0,551	0,044	12,328	0,000	Supported

When Table 5 is examined, since the p values of the hypotheses other than the H₁ hypothesis (H₂, H₃, H₄, H₅, H₆, H₇) were less than the 0.05 threshold value, these proposed hypotheses were supported. When the path coefficients between each dimension were examined, the H₁ hypothesis ($\beta=0.092$) regarding the effect of perceived quality obsolescence on satisfaction was not found significant ($p=0.151$, $p > 0.05$). Therefore, the H₁

hypothesis was not supported. It can be stated that perceived quality obsolescence does not have a significant effect on satisfaction. When the standardized beta coefficient of the H₂ hypothesis regarding the effect of perceived technological obsolescence on satisfaction is examined, the effect of perceived technological obsolescence on satisfaction is at the level of $\beta=0.162$. This result shows that consumers perceive technological obsolescence positively. When the standardized beta coefficient of the H₃ hypothesis regarding the effect of perceived psychological obsolescence on satisfaction is examined, the effect of perceived psychological obsolescence on satisfaction is at the level of $\beta=-0.279$. This result shows that consumers perceive obsolescence methods that cause psychological changes negatively. When the standardized beta coefficient of the H₄ hypothesis regarding the effect of satisfaction on repurchase intention is examined, it can be stated that the effect of satisfaction on repurchase intention has a significant effect at the level of $\beta=0.619$. This result shows that satisfaction has a strong effect on repurchase intention. When the standardized beta coefficient of the H₅ hypothesis regarding the effect of satisfaction on regret is examined, it can be stated that the effect of satisfaction on regret has a negative and strong effect at the level of $\beta=-0.675$. This result shows that satisfaction reduces the feeling of regret. When the standardized beta coefficient of the H₆ hypothesis regarding the effect of satisfaction on negative WOM is examined, it can be stated that the effect of satisfaction on negative WOM has a negative and significant effect at the level of $\beta=-0.484$. When the standardized beta coefficient of the H₇ hypothesis regarding the effect of satisfaction on positive WOM is examined, it can be stated that the effect of satisfaction on positive WOM has a significant effect at the level of $\beta=0.551$. This result shows that satisfied consumers strongly prefer positive WOM.

Table 6 shows the R², Q², f², and VIF values of the dimensions obtained from the structural equation modeling analysis.

Table 6: R², Q², f² and VIF Values

Paths	R ²	f ²	Q ²	VIF
Perceived Quality Obsolescence-> Satisfaction	0,123	0,009	0,099	1,082
Perceived Psychological Obsolescence ->Satisfaction		0,078		1,111
Perceived Technological Obsolescence -> Satisfaction		0,027		1,092
Satisfaction->Repurchase Intention	0,383	0,620	0,001	1,000
Satisfaction->Regret	0,452	0,826	0,087	1,000
Satisfaction->Negative Word of Mouth	0,232	0,302	0,021	1,000
Satisfaction->Positive Word of Mouth	0,299	0,427	-0,001	1,000

It is important to pay attention to the multicollinearity between the latent variables while evaluating the structural model (Hair et al., 2021). The value of VIF is used to determine the multicollinearity. VIF value must be less than 5 (Hair et al., 2011, pp. 146-147). Table 6 shows that all values in the VIF value column are less than 5.

R² values of exogenous latent variables are an important criterion showing the explained variance of each variable (Hair et al., 2021). When the R² values are 0.25, 0.50, and 0.75, they are considered weak, moderate, and substantial, respectively (Hair et al., 2011; Hair et al., 2021). Table 6 shows that the perceived quality obsolescence, perceived technological obsolescence, and perceived psychological obsolescence exogenous variables according to R² values explain the satisfaction by approximately 12%. Satisfaction explains 38% of repurchase intention, 45% of regret, 23% of negative WOM, and 30% of positive WOM. According to Table 6, the R² values obtained show that the endogenous variables are explained weakly and moderately.

Hair et al. (2021) state that f² and Q² values should also be analyzed in evaluating the reflective inner model. The f² value calculates the increase in R² based on the variance ratio of the unexplained part in the exogenous latent variable. In cases where the analysis yields f² values ranging from 0.02 to 0.15, it indicates a low effect; values falling between 0.15 and 0.35 signify a moderate effect; and those surpassing 0.35 suggest a high effect (Cohen, 1988: 413-414). It can be stated that the effects of perceived quality obsolescence, perceived psychological obsolescence, and perceived technological obsolescence that can be seen in Table 6 on satisfaction is low. The effect of satisfaction on negative WOM (f²=0.302) is moderate. The effect of satisfaction on repurchase intention (f²=0.620), regret (f²=0.826), and positive WOM (f²=0.427) is high.

In Smart PLS version 4.0, the Q^2 value calculated from the PLSpredict module is used instead of the Blindfolding analysis in previous versions to evaluate the predictive power. For the model to be considered a predictive model, the Q^2 values must be greater than 0 ($Q^2 > 0$). The Q^2 values obtained from the analysis show that exogenous structures have predictive relevance for an endogenous structure (Hair et al., 2011 p. 147). The Q^2 value of perceived quality obsolescence, perceived psychological obsolescence, and perceived technological obsolescence on satisfaction was found to be 0.099, 0.001 for repurchase intention, 0.087 for regret, 0.021 for negative WOM, and -0.001 for positive WOM. Except for positive WOM, all other endogenous variables had Q^2 values greater than 0. Therefore, the model has predictive relevance for the related variables.

4. CONCLUSION

In the context of planned obsolescence, various types of obsolescence have been studied, including quality obsolescence, technological obsolescence, and psychological obsolescence. Quality obsolescence refers to the diminishing quality of a product over time, leading to its obsolescence (Sorensen & Stuart, 2000). Technological obsolescence is related to the obsolescence of technology over time, often occurring at the end of a product's life or after a significant period of usage (Zaabar et al., 2021). Psychological obsolescence, on the other hand, is defined as a sense of falling out of time or not being able to keep up with the pace of the world around oneself (Hösch et al., 2023). Studies have shown that these different forms of obsolescence can impact consumer behavior and decision-making.

Businesses are gaining awareness of consumers' perceptions and responses to planned obsolescence. For this reason, it can be stated that there has been an increasing interest in planned obsolescence in academic studies in recent years (Aydın, 2021; Barros & Dimla, 2021; Echegaray, 2016; Hennies & Stamminger, 2016). In addition, the fact that consumers are faced with planned obsolescence applications in the use of many products, especially smartphones, in recent years increases consumer awareness of this issue daily. Therefore, in this study, by addressing this topical issue encountered in both theoretical and practical life in recent years, the effects of planned obsolescence types on the satisfaction of smartphone users in Turkey and the effects of satisfaction on repurchase intention, regret, positive WOM and negative WOM were investigated.

According to the research results, the effect of perceived quality obsolescence on satisfaction was not found. Perceived technological obsolescence has a positive effect on satisfaction. There are different opinions on this issue among consumers. Consumers have a positive attitude in the context of perceived technological obsolescence. This result is similar to the results of the research conducted by Echegaray (2016) and Aydın (2021). This result can be evaluated as consumers think that planned obsolescence has positive economic effects, normalizing aging by reducing product life expectancy and expecting innovation from businesses.

Perceived psychological obsolescence has a significant and negative effect on satisfaction. Perceived product creativity and mental contrast have been found to influence consumers' product replacement decisions, indicating the role of psychological factors in obsolescence (Sohn et al., 2018). Consumer-oriented advertising and fashion efforts create dissatisfaction in consumers by supporting psychological obsolescence. In the consumer context, psychological obsolescence has been linked to consumer dissatisfaction and the continual re-qualification of products, contributing to consumer demand and environmental implications. The thought that design changes are made to make the product obsolete is also negatively received by consumers. This result is compatible with the results of previous studies (Cooper, 2004; Granberg, 1997).

Satisfaction has a strong effect on repurchase intention. The research results support the results of previous studies (Fornell, 1992; Hellier et al., 2003; Selnes, 1998). The effect of satisfaction on regret was found to be significant and negative. Consumers do not regret the products they are satisfied with, and they even reduce regret. This result is compatible with the results of previous studies (Inman et al., 1997; Pieters & Zeelenberg, 2005; Tang, 2008).

The effect of satisfaction on negative WOM was found to be significant and negative, while the effect on positive WOM was found to be significant and positive. Consumers communicate positively about the smartphones they are satisfied with. This increases the product's reputation and can positively affect the purchasing decision of potential customers. However, negative WOM can be common among consumers in case of dissatisfaction. In this case, the reputation of the product or brand and the purchasing decision of potential customers may be adversely affected. The results of negative and positive WOM are consistent with

the results of previous studies (Dick & Basu, 1994; Derbaix & Vanhamme, 2003; Alire, 2007; Carpenter, 2008; Şimşek, 2017).

If the contributions of the research to practice are summarized:

One of the prominent findings of the research is that perceived quality obsolescence does not affect consumer satisfaction. This result shows that it may be appropriate for businesses to focus less on quality obsolescence. On the other hand, the research revealed that psychological obsolescence significantly and negatively impacts consumer satisfaction. Companies can make efforts to increase satisfaction by improving consumer experiences. Additionally, it has been determined that perceived technological obsolescence has a positive effect on satisfaction. Businesses can develop innovation and increase consumer satisfaction by investing in technological innovations and R&D.

According to the research results, a solid and positive relationship exists between consumer satisfaction and repurchase intention. Therefore, businesses can increase repurchase intention and sales by increasing satisfaction. Additionally, the study highlighted the negative relationship between consumer satisfaction and regret. By increasing satisfaction, businesses can reduce consumers' regret and strengthen customer loyalty. Research results show that consumer satisfaction has a negative impact on negative WOM but a positive impact on positive WOM. By ensuring consumer satisfaction, businesses can encourage positive word-of-mouth marketing while protecting their brand image by preventing the spread of negative reviews.

As a result of the research, the effects of psychological and technological obsolescence on dimensions such as satisfaction, repurchase intention, regret, and WOM were found. Understanding these effects can help businesses shape their marketing strategies and better respond to consumers' demands. In this context, the following suggestions can be offered to businesses and policymakers based on the research results:

- Businesses can ensure the correct perception of planned obsolescence by providing consumers with information and awareness about the causes of the deterioration of their products and their repairs. In this context, a wide variety of training programs can be organized through online and offline channels on planned obsolescence. In addition, pieces of training can be given to increase consumer awareness on the correct use of products, their longevity, and correct waste management.
- Businesses can announce a calendar for the old plans of the products, in other words, for the durability of their products. In this sense, consumers can be made to shop consciously.
- By using sustainable materials, businesses can recycle the product materials that become waste as a result of obsolescence, introduce new technologies to the market, and meet the necessary needs better with new technologies, both in practice and in the outward marketing-oriented public relations of the business.
- Businesses can get feedback on planned obsolescence by collaborating with consumers. By tracking consumption time, they can have more accurate data on product life.
- Planned obsolescence can drift businesses and consumers into a harmful cycle. It can lead businesses to more profit but to produce more waste, and consumers to waste. All these will cause damage to our world as well as our country. For this reason, it is also necessary that planned obsolescence be handled and discussed by legal authorities, and regulations should be made in this regard. In this regard, public authorities, sectoral associations, and unions are obliged to provide incentives for stakeholders such as recycling programs, repair services, production of durable and environmentally friendly products, and encouraging studies to encourage R&D studies on these issues.

It should be an important priority for sectoral associations and unions to conduct various studies to direct businesses in their sectors to behave ethically in this regard.

Although this research was conducted throughout Turkey, the use of a non-random sampling method limits the generalization of the research results to the population. Therefore, it may be suggested to researchers who will work on this subject to carry out studies that will cover the whole country by using random sampling methods in future research and to make comparisons between countries by applying the researchers in different countries. In addition, researchers to be adapted to different sectors, such as consumer durables, furniture, automobiles, etc., can also be carried out. From a methodological point of view, it is advisable to conduct qualitative research as well as quantitative research in various sectors.

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