IJCEAS

International Journal of Contemporary Economics and Administrative Sciences
ISSN: 1925 – 4423
Volume: XIV, Issue: 2, Year: 2024, pp.697-730

Examining the Relationship between Online Store Atmosphere, Perceived Interactivity, Flow Experience and Purchase Intention in Electronic Commerce: A Research within the Stimulus-Organism-Response (S-O-R) Paradigm*

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Received: 19.01.2023, Accepted: 11.12.2024
10.5281/zenodo.14611035

Abstract

The upward trend towards e-commerce is perceived through the booming e-commerce volume worldwide. At this point, it is crucial to know the factors affecting consumers' intentions to purchase. This research aims to determine the role of online store atmosphere, perceived interactivity, and flow experience on purchase intention using the Stimulus-Organism-Response (S-O-R) theory. For this purpose, empirical data was obtained through an online questionnaire from 437 consumers who had priorly shopped from e-commerce sites. Partial least squares structural equation modeling (PLS-SEM) was used to validate the relationships proposed in the research model. The results have revealed that visual cues positively affect purchase intention through the flow experience; perceived personalization positively influences purchase intention through the flow experience. These results provide a better understanding of purchase intention. Thus, it contributes to online store managers and e-commerce researchers.

Keywords: E-commerce, Online Store Atmosphere, Perceived Interactivity, Flow Experience, Purchase Intention

JEL Code: L80, L81, M31

1. Introduction

With the rise in internet access around the world, the number of digital consumers is increasing every year. In 2020, more than 2 billion people purchased

* This article was produced from the doctoral thesis prepared by Utku Tevfik GÜLEÇ under the supervision of Prof. PhD Çağatay ÜNÜSAN.

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products or services online. However, in 2020, worldwide electronic retail sales exceeded 4.2 trillion dollars. With the COVID-19 pandemic worldwide, global retail e-commerce sales have increased by more than 25%. The COVID-19 pandemic has had a substantial effect on e-commerce and online consumer behavior around the world. At the beginning of the pandemic, digital channels became more popular as people stayed at home to prevent the spread of the virus. As of June 2020, global retail e-commerce traffic reached a record 22 billion monthly visits. (Statista, 2021). It is predicted that the global e-commerce volume will have reached 4.4 trillion dollars by 2025. Turkey's e-commerce size reached 226 billion TL in 2020 with the effect of the pandemic period. In other words, e-commerce in Turkey has grown by 66% compared to the previous year. Based on global e-commerce growth forecasts for 2020-2024, e-commerce in Turkey is predicted to grow at an average rate of 23.7% per year and at the same time, the volume of e-commerce is foreseen to increase 2.3 times in 4 years (Deloitte, 2021).

A website is a platform where the consumer and the business operators carry out their activities, as well as an environment that allows the business to find customers, sell products/services and retain customers (Fazlollahi, 2002). Research on online retailing has revealed that virtual retail store layout has an impact on the time customers spend navigating the website. The virtual/online store atmosphere is constituted via the shopping interface on the website and is a significant factor influencing consumer behavior (Pradhan, 2011). Numerous studies have conventionally determined the cues of a store atmosphere and established crucial atmospheric cues in different store environments. However, less research has been conducted on an atmosphere within the context of online stores (Koo and Park, 2017). The online store atmosphere is defined as "the sum of all the cues that the online shopper can see and hear" (Eroglu et al., 2001). According to Koo and Park (2017), in previous online store atmosphere research, cues such as visual, information, and navigation were examined respectively, but in their own research, social cues were added to these three cues. Despite the importance of online interactivity, few studies have investigated the role of interactivity in the context of online shopping. The perceived benefits of interactivity differ between customers, even if they purchase the same product from the same e-retailer (Park and Park, 2009). Perceived interactivity is described as "a psychological state experienced by a website visitor during interactivity with a website". It was explained that perceived interactivity consists of three dimensions: perceived control, perceived responsiveness, and perceived personalization (Wu, 2006). Facilitating the flow experience via the online store atmosphere provides an interactive web environment that connects the company and the consumer. This should be a focus area of research for internet researchers (Gao and Bai, 2014). The flow experience is defined as "a situation in which people immerse themselves in an activity as if nothing else matters". At the same time, it has been revealed that people can even bear a great cost in order to have this experience (Csikszentmihalyi, 2008). Lee et al. (2019) examined the flow experience in five dimensions: enjoyment, goal clarity, feedback, telepresence, and concentration. Flow is an optimal state of

experience that is studied in a variety of situations, including online environments. Furthermore, flow experience in online environments was found to be positively related to purchase intention (Guo and Poole, 2009). At the same time, flow experience increases the use of online applications. Therefore, flow experience is used in research to determine customer behavior and to identify interactions between businesses and consumers in virtual environments. It has been found that customers who experience flow experience in an online e-commerce environment concentrate and enjoy themselves without losing track of time (Ruangkanjanases et al., 2024). Furthermore, the more effective the flow experience, the higher the customer's intention to stay on the shopping site and the higher the level of activity in the online application. (Nguyen and Thi Dao, 2024).

The S-O-R (Stimulus-Organism-Response) model was used to design this research. This model helps to understand the process from stimulus to consumer behavioral response by examining how stimuli affect the internal psychological state of the organism and guides its behavioral responses. Various researches have shown that this model is an ideal model for effectively describing and identifying consumer behavior in online environments and for analyzing various elements of online shopping (Lin et al., 2024). This research aims to empirically analyze the relationship between online store atmosphere, perceived interactivity, flow experience, and purchase intention within the framework of the Stimulus-Organism-Response (S-O-R) paradigm. Thus, we have aimed to contribute to the literature by developing a new research model that addresses the relationships between the relevant variables.

2. Theoretical Background

The theoretical background of this research is based on the Stimulus-Organism-Response (S-O-R) theory. The S-O-R (Stimulus-Organism-Response) model developed by Mehrabian and Russell (1974) examines the effects of the environment on consumer behaviors. The S-O-R model assumes that people's reactions to the environment take place in three stages. These are expressed as environmental stimuli, emotional states, and behavioral responses. In this model, the letter (S) denotes the stimulus, i.e., the environmental stimulus; the letter (O) denotes the organism, i.e., both the cognitive and emotional internal states of consumers; and the letter (R) refers to the response, i.e., approach and avoidance behavior. This model underlines that the environment influences people's emotional states, which in turn reveals behaviors toward the environment (Manthiou et al., 2016). Emotional states act as a mediating variable and round out the S-O-R model's sequence. (Floh and Madlberger, 2013). In other words, the organism refers to the internal process that occurs between the stimulus and the consumer's response. It is the process through which a consumer converts stimulus into meaningful information and uses it to understand his or her surroundings before making any judgments or drawing conclusions. It induces an alteration in the consumer's emotional state (Koo and Ju, 2010). The S-O-R model has constituted a framework

to explain human behavior by evaluating people's cognitive and emotional states as they are influenced by environmental stimuli (Shah et al., 2020). This model aims to integrate people's perceptions and feelings about external stimuli, as well as individual responses to explain the subsequent positive or negative behaviors. When studying consumer behavior, using the S-O-R model helps to distinguish between environmental stimuli and consumers' internal and external behavior (Chen and Yao, 2018).

In recent years, the S-O-R model has been used more frequently in consumer behavior research (Guo et al., 2022). Because the S-O-R model is well-known, previous research has used it to explain consumer loyalty, purchase intention, purchase behavior, engagement, co-creation, and so on (Zhu et al., 2020a). This model has been used in numerous studies to investigate how the characteristics of online shopping websites influence consumer behavior (Chen and Yao, 2018). According to several researchers studying online consumer behavior in relation to the S-O-R model, companies use various stimuli to create a positive effect on a consumer and believe that the positive effect will encourage the relevant consumer to use the company's website or products/services (Gatautis et al., 2016). Stimuli in the context of the virtual environment, according to Gatautis and Vaiciukynaite (2013), are related to different elements of websites such as website design, website communication elements, website content, and navigation (Gatautis et al., 2016). Park & Lennon (2009) tested their research within the framework of the S-O-R model consisting of brand name and promotion (Stimulus), perceived value and store image (Organism), and purchase intention (Response). Yu et al. (2021) tested their research within the framework of a S-O-R model consisting of brand involvement (Stimulus), brand familiarity (Organism) and brand loyalty (Response). Zhu et al. (2020b) tested their research within the framework of an S-O-R model including website appearance, website security, online promotion (Stimulus), online trust (Organism), and online repurchase intention (Response). Kim and Lennon (2013) tested their research within an S-O-R model framework consisting of reputation and website quality (Stimulus), emotion and perceived risk (Organism), and purchase intention (Response). Kühn and Petzer (2018) tested their research within the framework of a S-O-R model consisting of visual appeal and perceived usability (Stimulus), website trust and flow (Organism), and purchase intention (Response). Shiu et al. (2023) tested their research within the framework of an S-O-R model consisting of perceived interactivity, dynamic characteristics and atmospheric cues (Stimulus), immersive experience and social interaction (Organism) and purchase intention (Response). This research tested an S-O-R model consisting of online store atmosphere and perceived interactivity (Stimulus), flow experience (Organism), and purchase intention (Response).

3. Literature Review

3.1. Online Store Atmosphere

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According to Turley and Milliman (2000), there are more than 60 studies on the relationship between a store's atmosphere and consumer behavior (Richard, 2005). Baker et al. (1994) asserted that store environment and atmosphere are more efficient than other marketing inputs not available at the point of purchase (Gao and Bai, 2014). Given the proven effect of store environment on shopper behavior and consequences in a traditional retailing context, it is also likely that atmospheric cues play a part in the context of online shopping (Eroglu et al., 2001). Since online shopping emerged as the fastest-growing form of retailing, researchers have begun to focus on various aspects of this new medium. Different research questions began to arise as the atmospheric qualities of the online store emerged as a particularly interesting and important topic (Eroglu et al., 2003). Store atmosphere has been defined as "the effort to design purchasing environments to constitute specific emotional effects in the consumer that increase the likelihood of purchase" (Kotler, 1973). Web atmosphere or online store atmosphere is defined as "the deliberate design of web environments to increase positive consumer reactions and create positive effects on users" (Dailey, 2004). In other words, an online store atmosphere is defined as "the sum of all the elements that an online shopper can see and hear" (Eroglu et al., 2001).

Chang and Chen (2008) classified online store atmosphere cues into two categories: website quality (tangible) and website brand (intangible). Website quality (tangible) was divided into four dimensions: website technical adequacy, content quality, specific content, and visual appearance. Furthermore, they clarified that website brand (intangible) has two dimensions: website awareness and website image (Chang and Chen, 2008). Eroglu et al. (2001) classified online store atmosphere cues into two categories: high task-related cues and low task-related cues. High task-related cues comprise product photos and descriptions, price, terms of sale, delivery, return policies, website navigation, etc. Low task-related cues contain such as colors of the website unrelated to shopping, background patterns, fonts, animations, sounds, entertainment elements (e.g., games, etc.), amount of white space, indicators of secure links, etc. (Eroglu et al., 2001). According to Koo an Ju (2010), online store atmosphere cues have four dimensions: graphics, colors, links, and menus. Koo and Park (2017) asserted that in previous online store atmosphere studies, cues such as visual, information and navigation were examined, but in their research, social cues were added to these three cues. Visual cues in the context of online stores are associated with the overall aesthetic quality of online stores (e.g., colors, image display, web page design). Information cues in the context of online stores; it includes information (e.g., in the form of text, audio and video) such as products (e.g., dimensions, prices, materials, etc.), companies, and upcoming events in online stores. Navigation cues in the context of online stores include functions such as navigation bars, search options, and so on. In the context of online stores, social cues include a variety of interactive features such as live chat with salespeople, customer product reviews, in-store communities where consumers can interact with other consumers who share similar interests, and social media connectivity where consumers can easily share some specific products via social media (Koo and Park, 2017). Loureiro and Roschk (2014) assume that

physical and virtual/online atmospheres have the same number of components. These are graphic design and information design. Floh and Madlberger (2013) divided atmospheric cues in the context of online stores into three categories: (1) online store content, (2) online store design, and (3) online store navigation. Prashar et al. (2017) classified online store atmosphere cues as web informativeness, web entertainment, and effectiveness of information content. Tang and Zhang (2020) classified online store atmosphere cues into three types: task, aesthetic, and social. Loureiro and Ribeiro (2014) sorted out online store atmosphere cues into three categories: design, layout, and information. Shi et al. (2023) categorised online store atmosphere cues as information, navigation, design and interactive cues.

3.2. Perceived Interactivity

Interactivity has been widely debated in recent years in areas such as advertising, marketing, communication, information science, computer science, and education (McMillan and Hwang, 2002). While previous research has attempted to conceptualize the factors that contribute to the interactivity, there have been relatively few experimental studies that systematically investigate the outcomes of the interactivity (Cyr et al., 2009). Interactivity is stated as "the degree to which users of a medium can influence the form or content of the mediated medium" (Steuer, 1992). Interactivity is described as "the extent to which two or more communication parties can act on each other, based on the communication medium and on messages, and the degree to which these effects are synchronized" (Liu and Shrum, 2002). Perceived interactivity is identified as "a psychological state experienced by a website visitor during interaction with a website" (Wu, 2006). Website interactivity has the potential to significantly improve consumer perceptions, attitudes, and responses to retail websites (Islam et al., 2019). Because interactivity is a significant feature of marketing communication, website interactivity is essential for attracting customer attention to online purchasing. Hence, one of the most important characteristics associated with this medium is customer perception in website interactivity (Marzuki et al., 2016).

According to Wu (2006), perceived interactivity has three dimensions: perceived control, perceived responsiveness, and perceived personalization. Perceived control arises via website navigation, the speed of interaction and the content accessed. Perceived responsiveness emerges from the website owner, navigation features and cues, and real people online. Perceived personalization comprises perceiving the website as if it was a person, perceiving the website visitor as if it knew the website visitor, and perceiving the website visitor as if it understood the website visitor (Wu, 2006). Tsai (2011) investigated perceived interactivity in two dimensions: human-message interactivity and human-human interactivity. According to this study, a high level of perceived interactivity supports a high level of understanding of the website; it will also strengthen the user's persuasion to feel the comfort, usefulness, and pleasure of visiting the website (Tsai, 2011). Kang et al. (2021) examined perceived interactivity in two dimensions: responsiveness and

personalization. According to Liu (2003), interaction has three dimensions: active control, two-way communication, and synchronicity. Lee and Korea (2005) examined interactivity in four dimensions; (1) user control, (2) responsiveness, (3) personalization and (4) connectedness. Park and Yoo (2020) investigated interactivity in three dimensions: controllability, responsiveness, and playfulness. Abdullah et al. (2016) proposed a six-dimensional model for perceived website interactivity: two-way communication, responsiveness, user control, sociability, customizability, and demonstrability. Yang et al. (2024) investigated perceived interactivity in two dimensions: human-human interaction and human-information interaction. Despite the numerous dimensions of interactivity, a common theme is that the website successfully provides information to the user, is perceived as responsive and usually allows a sense of connection with other users (Cyr et al., 2009).

3.3. Flow Experience

Flow experience dates to Maslow's peak experience studies in the 1960s. Csikszentmihalyi developed and conceptualized the flow experience in the 1970s. Flow experience is currently a research area within positive psychology. This kind of research has been addressed in many areas of human life since 1975, ranging from sports to the arts, education to business, and working life. It is also known as optimal experience or autotelic experience. Although flow experience has been studied in applied research as a dependent and independent variable on an international and national scale, it is noteworthy that there is an ambiguity regarding its definition (Turan, 2019). The relevant literature in different disciplines, including information systems, e-commerce, marketing, digital gaming, user interface, management, and cultural contexts, has presented an overview of flow theory. Flow can have a substantial impact on any user experience. It can influence user interaction with a site, computing device or application. One could regard that it would be beneficial to investigate the effects of the flow experience on users and incorporate these findings into the design of engaging user experiences and interfaces for both websites and mobile apps (Mahfouz et al., 2020). Nowadays, flow experience is considered to have a key role in explaining the behavioral patterns of consumers in their interactions with information systems (Özkara and Özmen, 2016).

Experience is described as "a state of perception after a time or an event has occurred and processes have developed" (Liu and Stoel, 2013). In other words, experience is defined as "doing, seeing, feeling certain things or something that affects our knowledge and skills". In addition, experience is stated to have a complex and layered structure. (Same and Larimo, 2012). A central concept in positive psychology is the subjective experience called “flow”. Csikszentmihalyi's extensive research has shown that when people are engaged in a challenging, controllable, and intrinsically motivating activity, they experience a distinct psychological state known as flow (Kawabata et al., 2008). Flow experience is described as "a state in which people are immersed in an activity as if nothing else

matters". It is stated that people even bear a great cost to experience the flow (Csikszentmihalyi, 2008). In other words, flow experience is defined as "the holistic emotion that people feel when they act with full participation" (Csikszentmihalyi, 1975). Thus, flow experience is also defined as "a state of consciousness in which people are completely immersed in an activity and enjoy it intensely" (Bakker, 2008).

Using the web, like mountain climbing or chess, is an excellent example of a potential flow activity that enables these sequences of actions providing people with the best experience possible. Nowadays, Web users frequently state important flow symptoms such as "focused attention," "sense of discovery," "immersive pleasure," and "time flies". Interactivity, engagement, and separation from everyday activities can all provide a way for Web users to experience flow (Chen et al., 2000). Novak et al. (2000) stated that consumers who experience flow on the website concentrate purely on the current interactivity by focusing on the online navigation activity, and this is perceived as a positive experience by the consumer. The dimensions of flow experience are classified as clear goals, immediate feedback, balance of challenge and skill, merging of action and awareness, concentration, sense of control, loss of self-consciousness, transformation of time, and autotelic experience (Csikszentmihalyi and Csikszentmihalyi, 1988; Csikszentmihalyi, 1990).

Huang (2006) investigated flow experience in four dimensions: control, enjoyment, curiosity, and interest. Chen et al, (2018b) divided it into two dimensions: concentration and enjoyment. Lee et al. (2019) handled it in five dimensions: enjoyment, goal clarity, feedback, telepresence, and concentration. Wang et al. (2022) sorted out the relevant experience in three dimensions: playfulness, concentration, and exploratory behavior. In contrast to other research, Nguyen and Thi Dao (2024) analyzed the flow experience in a single dimension.

In the literature, there are studies that have found a positive relationship between online store atmosphere and flow experience (Ettis, 2017; Gao and Bai, 2014; Wu et al., 2021; Lee and Jeong, 2012; Huang et al., 2017). Based on the previous research, the following hypotheses have been proposed respectively:

H_{1a}: There is a positive and significant relationship between visual cues and flow experience in electronic commerce.
H_{1b}: There is a positive and significant relationship between information cues and flow experience in electronic commerce.
H_{1c}: There is a positive and significant relationship between navigation cues and flow experience in electronic commerce.
H_{1d}: There is a positive and significant relationship between social cues and flow experience in electronic commerce.

On the other hand, some studies have come up with a positive relationship between perceived interactivity and flow experience (Rodríguez-Ardura and Meseguer-Artola, 2016; Arghashi and Yuksel, 2022; Broekhuizen and Hoffmann, 2012; Nandi et al., 2021; Liu and Shiue, 2014; Jeon et al., 2017; Huang and Huang, 2014; Catalán et al., 2019). Based on the research studies, the following hypotheses are proposed:

H_{2a}: There is a positive and significant relationship between perceived control and flow experience in electronic commerce.

H_{2b}: There is a positive and significant relationship between perceived responsiveness and flow experience in electronic commerce.

H_{2c}: There is a positive and significant relationship between perceived personalization and flow experience in electronic commerce.

3.4. Purchase Intention

According to Ajzen & Fishbein (1977), “intention” is defined as "a function of a person's attitude and subjective norm towards performing the behavior". Customers put forth an effort, time, and money to purchase products, therefore the purchase intention is extremely important in their lives (Saleem et al., 2015). Purchase intention emerges from the assumption of an expected transaction and is frequently a substantial indicator of purchase (Chang and Wildt, 1994). Bergeron & Laroche (2009) defined purchase intention as "the customer's perceptual level of conviction to purchase a particular product/service". In other words, purchase intention is explained as "the likelihood that consumers plan to buy or are likely to purchase a particular product or service in the future" (Wu et al., 2011). Purchase intention is a type of decision that identifies why a customer purchases a specific brand (Shah et al., 2012). Online purchase intention is considered as "the likelihood of consumers to purchase products/services from the website." For an e-commerce customer, online purchase intention is the outcome of a range of factors (Ganguly et al., 2009). Purchase intention data is routinely used by marketing managers to make strategic decisions related to new and existing products, as well as the marketing programs that support such items (Barber et al., 2012).

Shaouf et al. (2016) stated that online purchase rates of a product or service are higher among consumers with positive intentions to purchase a specific product than the consumers with weak intentions. The level of performance and effort that a consumer expects from electronic transaction influences online purchase intention as well. However, the more innovative an individual is in the field of information technology, the greater their online purchase intention (San Martín and Herrero, 2012). In the literature, there are research studies that have revealed a positive relationship between flow experience and purchase intention (Martins et al., 2019; Liu and Shiue, 2014; Hsu et al., 2012b; Ali, 2016; Huang, 2012; Hossain et al., 2018; Hossain and Zhou, 2018; Chen et al., 2018a; Gao and Bai, 2014; Kim and Han, 2014; Liu et al., 2016; Tuncer, 2021). Based on such studies, the following hypothesis has been proposed:

H_3: There is a positive and significant relationship between flow experience and purchase intention in electronic commerce.

Besides, previous research points to the mediating role of flow experience (Liu et al., 2022; Hsu et al., 2016; Wang et al., 2015; Yuan et al., 2021; Wu et al., 2016; García-Jurado et al., 2019). Therefore, the following hypotheses are proposed:

H_{4a}: Flow experience mediates the relationship between visual cues and purchase intention.

H_{4b}: Flow experience mediates the relationship between information cues and purchase intention.

H_{4c}: Flow experience mediates the relationship between navigation cues and purchase intention.

H_{4d}: Flow experience mediates the relationship between social cues and purchase intention.

H_{4e}: Flow experience mediates the relationship between perceived control and purchase intention.

H_{4f}: Flow experience mediates the relationship between perceived responsiveness and purchase intention.

H_{4g}: Flow experience mediates the relationship between perceived personalization and purchase intention.

4. Methodology

4.1. Research Instrument

This research aims to test the hypothetical relationships between independent, mediator, and dependent variables such as online store atmosphere, perceived interactivity, flow experience, and purchase intention. A comprehensive literature review has been conducted to prepare the questionnaire. The scales used in previous research studies on these variables (Floh and Madlberger, 2013; Koo and Park, 2017; Wu, 2006; Song and Zinkhan, 2008; Lyu and Kim, 2020; Zhang et al., 2014; Cuevas et al., 2021; Chen et al., 2017) were then adapted to the context of this research with some modifications. A five-point Likert-type scale (1=strongly disagree, 2=disagree, 3=neither agree nor disagree, 4=agree, 5=strongly agree) was used to measure all statements. Three academics were consulted for the design of the questionnaire and the clarity of the statements. Thus, necessary changes have been performed in the questionnaire within the framework of the suggestions by the academicians. The questionnaire consists of 4 variables and 47 items. The research model is shown in Figure 1.

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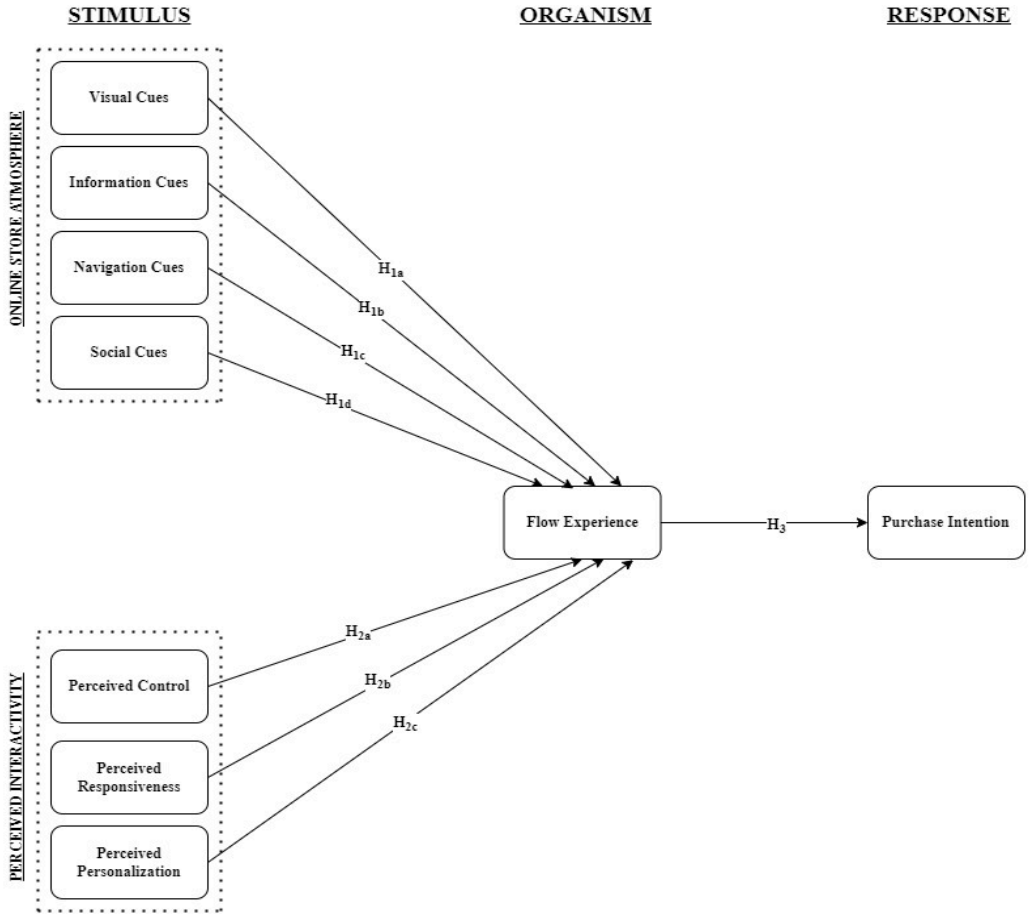
Figure 1. Research Model



4.2. Sampling and Data Collection

The population of the research consists of people over the age of 18 who have shopped from any e-commerce site in Turkey within 6 months. The e-commerce report published by Gooinn in 2021 stated that 37 million people shopped online in Turkey as of 2020-2021. Since it was not possible to reach the entire population, we opted for the convenience sampling method. It is a non-random sampling method in which a sample segment is chosen from the population based on a researcher's judgments. This sampling method helps one to collect data in the quickest, easiest, and most cost-effective manner (Haşıloğlu et al., 2015). Sekaran (2003) underlined that 384 samples at a 95% confidence level may be sufficient for research populations of 1.000.000 and higher. Hair et al. (2019a) stated that a sample size greater than 100 should be preferred for partial least squares structural equation modeling.

The data for this research were collected online through Google Forms. One's condition of shopping from any e-commerce site in the last 6 months was

added as participation status in the survey. The rest of the respondents were excluded from the assessment process. As a result, 437 questionnaires were involved as relevant data. Demographic profiles of participants were collected and analyzed to ensure reliable results. Of the 437 participants, 66.6% were female (n=291) and 33.4% were male (n=146). Regarding the age range of the sample, 42.8% of the participants were between 25-34 years old (n=187), 29.7% were 18-24 years old (n=130) and the rest were over 35 years old (n=120). A total of 64.1% of the respondents were single (n=280) and 35.9% were married (n=157). Regarding the educational status of the sample, 48.5% of the participants were postgraduate (n=212), 46% were undergraduate (n=201), and 5.5% of the remaining participants were associate, high school, and primary school graduates (n=24). The majority of the participants (n=142; 32.5%) had an average monthly income of TL8501 and above. Most of the participants (n=190; 43.5%) reported to have shopped from e-commerce sites 2-3 times every month. Most participants (n=317; 72.5%) shopped in the ready-to-wear and textile products category.

In this research, partial least squares structural equation modeling (PLS-SEM) was utilized to test the hypotheses and analyze the model. The advantage of partial least squares structural equation modeling is that it can be used with small samples and accommodates accurate estimates for complex models (Hair et al., 2011). The measurement model and the structural model were analyzed by applying partial least squares structural equation modeling through SmartPLS software.

4.3. Measurement Model

The relationship between latent variables and observed variables is specified via the measurement model (external model) (Wong, 2013). In other words, a measurement model is required to detect such relationships. The measurement model analyzes the reliability and validity of hypothesis tests that include structural relationships between latent variables. Thus, obtaining reliable and valid results from hypothesis testing is dependent on the measurement model results (Hair et al., 2017). Validity and reliability of constructions are shown in Table 1.

Table 1. Validity and reliability of constructions

Constructs/(Sources)	Measurement Items	Factor Loadings	Cronbach Alpha	CR	AVE
Online Store Atmosphere Floh and Madlberger (2013) Koo and Park (2017)	This e-commerce site has an attractive layout (VC1).	0.790	0.851	0.893	0.625
	This e-commerce site uses attractive colors (VC2).	0.727			
	This e-commerce site has a visually pleasing design (VC3).	0.841			
	The way this e-commerce site displays its products is attractive (VC4).	0.800			
	This e-commerce site uses attractive visuals (VC5).	0.791			
	This e-commerce site provides accurate information (IC2).	0.694			

	The information on this e-commerce site provides convenience (IC3).	0.850	0.817	0.878	0.645
	This e-commerce site is informative (IC4).	0.837			
	There is enough information on this e-commerce site (IC5).	0.821			
	This e-commerce site is easy to navigate (NC1).	0.770	0.705	0.819	0.532
	This e-commerce site has valid links (NC2).	0.696			
	It is easy to compare products on this e-commerce site (NC3).	0.672			
	Information is easily accessible on this e-commerce site (NC4).	0.774			
	This e-commerce site provides many areas where users can present their opinions (SC1).	0.825	0.856	0.902	0.698
	This e-commerce site offers customer reviews about products (SC2).	0.825			
	On this e-commerce site, it is easy to see what other users think about the products (SC3).	0.885			
	This e-commerce site accurately shows the number of reviews or ratings (SC4).	0.805			
Perceived Interactivity Wu (2006) Song and Zinkhan (2008) Lyu and Kim (2020)	I am in control while navigating this e-commerce site (PC1).	0.864	0.670	0.858	0.752
	I have complete control over the speed of my visit to this e-commerce website (PC3).	0.870			
	On this e-commerce site, I can contact the store owner directly if I want to ask more questions about the store or products (PR1).	0.766	0.721	0.841	0.639
	This e-commerce site is capable of responding quickly and effectively to my specific questions (PR2).	0.828			
	When I clicked on links on this e-commerce site, I felt that I received instant information (PR3).	0.803			
	During my visit to this e-commerce site, I felt like I was talking to a kind, knowledgeable, sincere representative (PP1).	0.814	0.705	0.835	0.629
	This e-commerce site seemed to talk to me when I clicked on the site (PP2).	0.846			
	I perceived the product information on this e-commerce site as sensitive to my needs (PP3).	0.714			
Flow Experience Bilgihan et al. (2014) Zhang et al. (2014) Cuevas et al. (2021)	I immersed myself in interactivity when using this e-commerce site (FE2).	0.677	0.858	0.893	0.583
	Time seemed to pass quickly when using this e-commerce site (FE3).	0.717			
	The interactivity on this e-commerce site is interesting (FE4).	0.767			
	Using this e-commerce site aroused my curiosity (FE5).	0.836			
	Using this e-commerce site stimulated my imagination (FE6).	0.778			
	Using this e-commerce site was fun (FE7).	0.797			
Purchase Intention Chen et al. (2017)	I will consider this e-commerce site as my first choice for product purchases (PI1).	0.859	0.813	0.888	0.726
	I plan to buy products from this e-commerce site (PI2).	0.886			
	I anticipate that I will buy products from this e-commerce site (PI3).	0.808			

Factor loadings should be 0.708 or higher. However, one should consider the AVE and CR threshold values of the statements with factor loadings between

0.40 and 0.70. If these statements are below the threshold values, they should be removed from the measurement model. Thus, AVE and CR values are expected to increase when these statements are removed from the scale. On the other hand, statements with factor loadings below 0.40 are always recommended to be removed from the measurement model (Hair et al., 2017). Perceived Control2 was removed from the measurement model since its factor loading was lower than 0.40. The cross-loadings of the other statements were examined, and those with overlapping items were removed from the measurement model. Looking at the values in the table, we determined that the factor loadings were realized between 0.672 and 0.886. In addition, AVE and CR values of factor loadings lower than 0.708 in the table were not excluded from the measurement model as they were above the threshold value. Hair et al. (2019a) stated that Cronbach Alpha coefficient varies between 0 and 1 as a measure of reliability and that the acceptable values of this coefficient should be between 0.60 and 0.70. Taber (2018) stated that the acceptable values of this coefficient should be between 0.67 and 0.87.

Table 2. Discriminant Validity Results (Fornell-Larcker Criterion)

	Flow Experience	**Perceived Responsiveness**	**Perceived Personalization**	**Perceived Control**	**Information Cues**	**Navigation Cues**	**Visual Cues**	**Purchase Intention**	**Social Cues**
Flow Experience (FE)	**0.764**								
Perceived Responsiveness (PR)	0.381	**0.799**							
Perceived Personalization (PP)	0.457	0.587	**0.793**						
Perceived Control (PC)	0.254	0.311	0.333	**0.867**					
Information Cues (IC)	0.269	0.321	0.371	0.376	**0.803**				
Navigation Cues (NC)	0.279	0.440	0.351	0.420	0.623	**0.729**			
Visual Cues (VC)	0.478	0.298	0.337	0.270	0.350	0.425	**0.791**		
Purchase Intention (PI)	0.409	0.369	0.367	0.315	0.431	0.406	0.371	**0.852**	
Social Cues (SC)	0.278	0.471	0.361	0.356	0.464	0.565	0.287	0.417	**0.836**

Thus, the Cronbach Alpha coefficients were determined to have been between 0.670 and 0.858. Furthermore, CR (Composite Reliability) is a measure of

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International Journal of Contemporary Economics and Administrative Sciences
ISSN: 1925 – 4423
Volume: XIV, Issue: 2, Year: 2024, pp.697-730

internal consistency reliability. This coefficient is expected to be above 0.70, and 0.60 to 0.70 is acceptable in exploratory research (Hair et al., 2021). Looking at the values in the table, we found the CR coefficients were between 0.819 and 0.902. Bagozzi and Yi (1988) stated that AVE (Average Variance Extracted) should be greater than 0.5. The values in the table revealed that the AVE coefficients were between 0.532 and 0.752. Therefore, since the Cronbach Alpha coefficients and CR coefficients were above the threshold values, we may claim that internal consistency reliability, i.e., the reliability of the scale, was ensured in the end. However, as the factor loadings and AVE coefficients were above the threshold values, convergent validity was ensured. Fornell-Larcker criterion and Heterotrait-Monotrait Coefficients (HTMT Coefficients) were used to enable the discriminant validity of the constructs. Discriminate validity results are shown in Tables 2 and 3.

The Fornell-Larcker criterion was developed in 1981 to assess discriminant validity (Fornell & Larcker, 1981). The Fornell-Larcker criterion emphasizes that the square root of the AVE values of each construct in the research should be higher than the correlation coefficients with other constructs (latent variables) in the research (Hair et al., 2017). Looking at the values in the table, the square root of the AVE values of each construct (the values in bold font in the table) was found to be higher than the correlation coefficients with the other constructs. Thus, discriminant validity was ensured as well.

Table 3. Discriminant Validity Results (HTMT Coefficients)

	Flow Experience	**Perceived Responsiveness**	**Perceived Personalization**	**Perceived Control**	**Information Cues**	**Navigation Cues**	**Visual Cues**	**Purchase Intention**	**Social Cues**
Flow Experience									
Perceived Responsiveness	0.471								
Perceived Personalization	0.582	0.815							
Perceived Control	0.319	0.444	0.496						
Information Cues	0.293	0.404	0.509	0.506					
Navigation Cues	0.343	0.612	0.520	0.613	0.815				
Visual Cues	0.533	0.373	0.430	0.348	0.402	0.539			
Purchase Intention	0.456	0.473	0.499	0.432	0.536	0.542	0.441		

Social Cues	0.309	0.595	0.468	0.466	0.535	0.723	0.327	0.506	

The HTMT (Heterotrait-Monotrait) coefficient has been proposed as a new method for assessing discriminant validity (Henseler et al., 2015). According to Henseler et al. (2015), HTMT coefficients are explained as the ratios of the mean of the correlations of the statements of all variables in the research to the geometric means of the correlations of the statements of the same variable. However, it was stated that the HTMT coefficient should theoretically remain below 0.90 for structures close to each other and below 0.85 for structures far from each other (Yıldız, 2020). When the HTMT coefficients in the table are examined, we determined that the coefficients were below the threshold value. Thus, discriminant validity was ensured.

4.4. Structural Model

The structural model is a conceptual reflection of the relationships between constructs; in other words, it is a process model that shows how constructs affect each other (Hair et al., 2019a). In addition, the structural model or internal model represents the conceptual element of the path model. This model indicates the latent variables (constructs) and the path relationships between them. Path models are defined as diagrams that visually reflect the hypotheses investigated in structural equation modeling and the relationships between variables. Path models consist of two components: a structural model and a measurement model (Hair et al., 2017). Research model coefficients (VIF, R^2, f^2, Q^2) are shown in Table 4.

Table 4. Research Model Coefficients

Hypotheses	VIF	R^2	f^2	Q^2
Perceived Responsiveness → Flow Experience	1.794	0.339	0.011	0.188
Perceived Personalization → Flow Experience	1.688		0.059	
Perceived Control → Flow Experience	1.313		0.002	
Information Cues → Flow Experience	1.783		0.000	
Navigation Cues → Flow Experience	2.185		0.003	
Visual Cues → Flow Experience	1.297		0.148	
Social Cues → Flow Experience	1.676		0.002	
Flow Experience → Purchase Intention	1.000	0.168	0.202	0.117

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ISSN: 1925 – 4423
Volume: XIV, Issue: 2, Year: 2024, pp.697-730

VIF (Variance Inflation Factor) value is used to establish linearity between variables. One is supposed to consider that the VIF value should be less than 5 (Hair et al., 2017). The table indicates that the values are less than 5 and thus there is no linearity issue between the variables. According to Avkiran (2018), the R^2 value (explanation ratio) is defined as a coefficient indicating the extent to which the exogenous (independent) variable(s) explain the endogenous (dependent) variable. It is stated that an R^2 value equal to or higher than 0.10 is sufficient (Falk & Miller, 1992). When we looked at the R^2 values in the table, we observed that flow experience was explained by 34% and purchase intention by 17%. These findings indicate that we have a substantial model as both dependent variables ("flow experience" and "purchase intention") have R^2 values higher than the threshold of 0.10 (Sharma et al., 2019). The f^2 value (effect size) underlines the change in the R^2 value when a particular exogenous variable is excluded from the model. That is, this value is used to determine whether there is an important effect on endogenous variables by removing the exogenous variable from the structural model (Hair et al., 2019a). The f^2 value defines a low effect when it is equal to or above 0.02, a medium effect when it is equal to or above 0.15, and a high effect when it is equal to or above 0.35 (Cohen, 1988).

Table 5. Structural Model Results (Hypothesis Testing Results)

Hypotheses	Standardized β	Standard Deviation	t-value	p-value	95% Confidence Intervals
H_{1a}: Visual Cues → Flow Experience	0.355	0.042	8.462	0.000*	0.270; 0.436
H_{1b}: Information Cues→Flow Experience	0.018	0.058	0.304	0.761	-0.092; 0.136
H_{1c}: Navigation Cues → Flow Experience	-0.065	0.063	1.028	0.304	-0.196; 0.053
H_{1d}: Social Cues → Flow Experience	0.043	0.058	0.735	0.462	-0.069; 0.159
H_{2a}: Perceived Control → Flow Experience	0.043	0.046	0.916	0.360	-0.046; 0.135
H_{2b}: Perceived Responsiveness→ Flow Experience	0.113	0.061	1.862	0.063	-0.004; 0.232
H_{2c}: Perceived Personalization → Flow Experience	0.257	0.054	4.741	0.000*	0.149; 0.360
H_3: Flow Experience →Purchase Intention	0.410	0.039	10.468	0.000*	0.324; 0.479

*: $p<0.001$

According to Sarstedt et al. (2022), there is no effect when f^2 is smaller than 0.02. The f^2 values in the table refer to the fact that perceived personalization and

visual cues have a low effect size on flow experience, while flow experience has a medium effect size on purchase intention. The Q^2 value is provided through Blindfolding analysis. This value is calculated for the endogenous variable. It is suggested that the value should be greater than zero for the prediction accuracy of the structural model (Hair et al., 2019b). In our study, the Q^2 values in the table were greater than zero, therefore we may claim that the flow experience and purchase intention variables have predictive power in the research model. Structural model results (hypothesis testing results) are presented in Table 5.

To assess whether the hypotheses are statistically significant, we have investigated β, t, and p values. According to the findings in the table, visual cues have positive effects on the flow experience (β=0.355; t=8.462; p<0.001); perceived personalization has positive effects on the flow experience (β=0.257; t=4.741; p<0.001) and flow experience has positive effects on purchase intention (β=0.410; t=10.468; p<0.001). Within the framework of these results, H_{1a}, H_{2c}, H_3 hypotheses of the research were found to be supported respectively. However, the other hypotheses were not supported. Structural model results (mediating analysis results) are illustrated in Table 6.

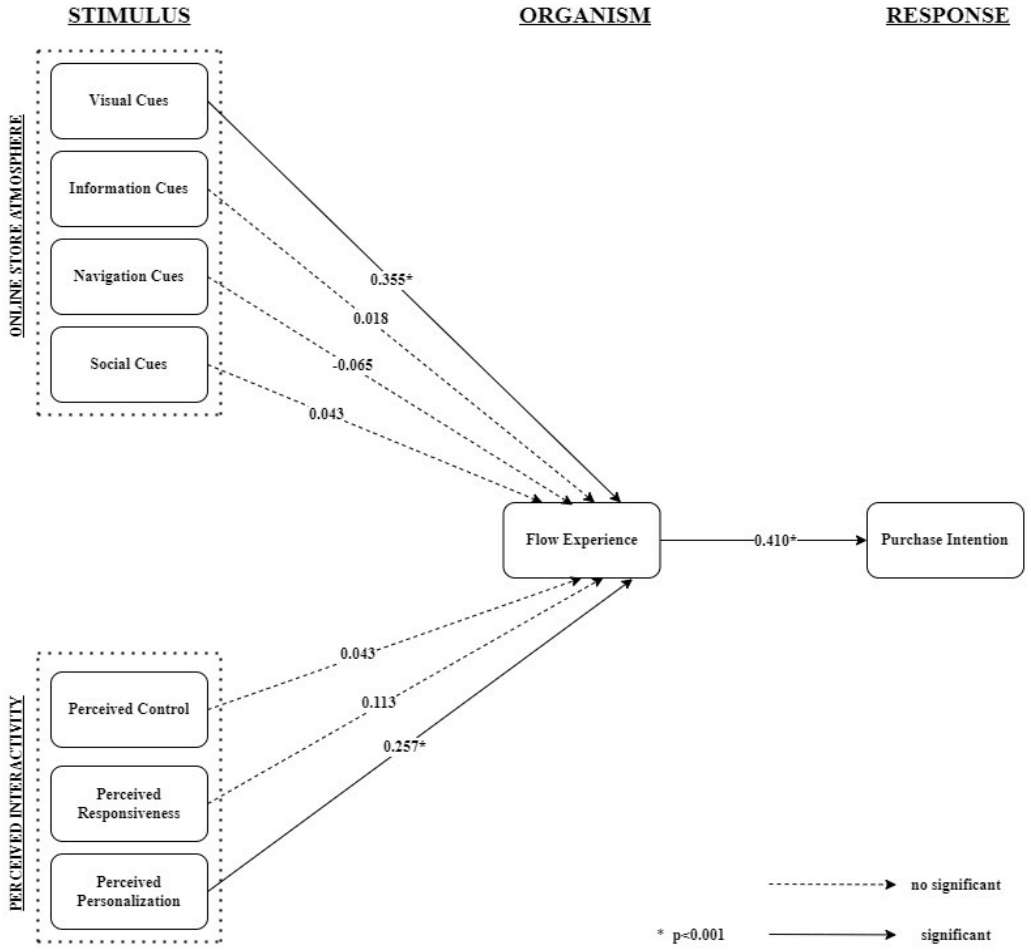
Table 6. Structural Model Results (Mediating Analysis Results)

Hypotheses	Standardized β	Standard Deviation	t-value	p-value
H_{4a}: Visual Cues → Flow Experience → Purchase Intention	0.146	0.023	6.461	0.000*
H_{4b}: Information Cues → Flow Experience → Purchase Intention	0.007	0.024	0.299	0.765
H_{4c}: Navigation Cues → Flow Experience → Purchase Intention	-0.027	0.026	1.015	0.310
H_{4d}: Social Cues → Flow Experience → Purchase Intention	0.018	0.024	0.723	0.469
H_{4e}: Perceived Control → Flow Experience → Purchase Intention	0.017	0.020	0.889	0.374
H_{4f}: Perceived Responsiveness → Flow Experience → Purchase Intention	0.046	0.026	1.806	0.071
H_{4g}: Perceived Personalization → Flow Experience → Purchase Intention	0.105	0.023	4.508	0.000*
*: p<0.001				

Mediation occurs when a third variable, called the mediating variable, intervenes in the other two related constructs in the model. That is, a change in the exogenous variable leads to a change in the mediating variable, which in turn changes the endogenous variable in the path model. Thus, analyzing the relationships of the mediating variable with other variables in the model allows for

the verification of the mechanisms underlying the cause-and-effect relationship between an exogenous variable and an endogenous variable (Hair et al., 2017). The approach developed by Zhao et al. (2010) was used to analyze the mediation effect in the research model. According to Zhao et al. (2010), in order to talk about the mediation effect, it is sufficient for the indirect effect to be significant. An indirect effect is the result of multiplying the path coefficient of the arrow from the independent variable to the mediating variable by the path coefficients of the arrow from the mediating variable to the dependent variable. However, the direct effect is the coefficient of the arrow from the independent variable to the dependent variable (Zhao et al., 2010). Since a direct relationship between these variables cannot be assumed within the framework of the S-O-R model, it is sufficient to analyze only the indirect effect (Tuncer, 2021; Zhao et al., 2010). According to the findings in the table, visual cues indicate a significant indirect effect on purchase intention through the flow experience (β=0.146; t=6.461; p<0.001); and perceived personalization has a significant indirect effect on purchase intention through the flow experience (β=0.105; t=4.508; p<0.001). Thus, as the indirect effects have been found significant, there is a mediation effect revealed in our study. Within the framework of these results, hypotheses H_{4a} and H_{4g} were found to be supported. The other hypotheses were not supported. The measurement model is shown in figure 2.

Figure 2. Structural Model



5. Discussion and Conclusion

This research aims to examine the relationship between online store atmosphere, perceived interactivity, flow experience, and purchase intention. Besides, within the framework of the Stimulus-Organism-Response theory, since the online store atmosphere and perceived interactivity with purchase intention could not be examined directly, we performed the procedure indirectly. The relationships between the variables in the research model were tested using PLS-SEM. A model is developed by integrating online store atmosphere and perceived interactivity into the S-O-R theory. The findings of this research offer both theoretical and practical contributions to the field of e-commerce. The findings of the research are discussed below.

First, visual cues, one of the dimensions of the online store atmosphere, were found to positively affect the flow experience. Visual cues have been one of the most influential factors in the flow experience. This finding also supports previous findings in the literature (Disastra et al., 2019; Kühn and Petzer, 2018; Jeon et al., 2017). Disastra et al. (2019) state that by improving the visual design of online retail websites, potential customers can be attracted and consumers' interest in purchasing can be increased. Accordingly, visual cues facilitate consumers' flow experience. We also found that information cues, navigation cues, and social cues did not have a significant impact on the flow experience. Restrictive navigation cues reduce the likelihood of a flow experience. However, restrictive navigation cues can increase the time it takes for consumers to reach the information they want (Dailey, 2004). In this case, it is predicted that information cues may reduce the likelihood of experience with flow. According to Lee (2012), the number of social cues in the content of an e-commerce website can assist businesses in improving shoppers' feelings toward the relevant site. But one can assume that if there are social elements (such as deceptive product reviews and evaluations) on the e-commerce website that may mislead consumers, the likelihood of flow experience may decrease correlatively.

Second, perceived personalization, one of the dimensions of the perceived interactivity, was found to positively affect the flow experience. Perceived personalization was one of the most influential factors in the flow experience. This finding is also in line with previous results in the literature (Zhang et al., 2014; Zhou, 2020; Cui et al., 2022). For perceived personalization, it is necessary to provide personalized information and products/services depending on users' preferences. To illustrate, businesses can use location-based services to communicate information related to the business, considering users' locations and interests (Zhou, 2020). Thus, one may claim that customers' information searching processes and costs will be reduced with perceived personalization. Moreover, the quality of customers' decision-making will improve, and a better experience can be offered to them (Tam and Ho, 2006; Zhang et al., 2014). Accordingly, perceived personalization facilitates consumers' flow experience. On the other hand, we revealed that perceived control and perceived responsiveness did not have a significant effect on flow experience. E-commerce platform users can be suspicious and concerned when their personal information is collected and used by businesses in an unauthorized way. Furthermore, on the e-commerce platform, users can wait for a response to their requests. In such cases, users need to spend more time and effort reviewing information. Hereby, users' flow experience can be hindered (Zhou, 2020).

Third, flow experience was found to positively affect purchase intention. This finding supports previous findings in the literature as well (Hsu et al., 2012b; Gao and Bai, 2014; Liu et al., 2016; Hossain and Zhou, 2018; Tuncer, 2021). Thus, we have determined that consumers' flow experience is an important determinant of purchase intention. The flow experience can differ depending on the interface and design of a website. Consequently, flow experience occurs at different levels

and under various conditions (Hsu et al., 2012b). Hence, to provide their customers with a flow experience, online stores must pay attention to the content, navigation cues, and layout of their websites. When a customer's propensity to trust the online store and their willingness to buy is high, the impact of the flow experience on purchase intention is also increased considerably (Hsu et al., 2012a).

Some theoretical contributions can be drawn from the findings of this research. In this research, firstly, the effect of online store atmosphere on the flow experience in the context of e-commerce is revealed. While previous research examined the online store atmosphere with cues such as visual, information and navigation, this research examined social cues in addition to these cues. For example, Ettis (2017) examined the effect of online store background color on the flow experience. In this research, online store atmosphere was analyzed in more detail as visual, information, navigation and social cues. Therefore, this research differs from another research. In addition, since online store atmosphere and flow experience are analyzed within the framework of the S-O-R model, this research makes a valuable contribution in this regard. Secondly, the effect of perceived interactivity on the flow experience in the context of e-commerce was revealed. In this research, as in Wu's (2006) research, perceived interactivity was examined in more detail as perceived control, perceived responsiveness, and perceived personalization. Finally, in the context of e-commerce, the indirect effect of online store atmosphere and perceived interactivity on purchase intention through flow experience was revealed. There is no research on the indirect effect between these variables in literature. Thus, original research has emerged.

Some practical implications can be drawn from the findings of this research. First, visual cues can enhance the flow experience. By presenting high-quality photos, videos and informative texts for products or services on the e-commerce website (Tuncer, 2021), consumers' flow experience can be improved, and purchase intention can be increased accordingly. Therefore, it is recommended to include visually appealing elements/cues in online store designs. These elements include interactive media tools such as streaming video, 3-D modeling, salespeople in the form of avatars/digital characters, and virtual reality technology. Through them, online store consumers can be provided with a fun and enjoyable experience. However, it is recommended to reduce distracting visual elements that are not related to online shopping (Ettis, 2017). Second, perceived personalization can enhance the flow experience. E-commerce websites can offer special deals and offers to consumers by using their previously reviewed products/services and purchase history. In this case, the importance of machine learning, a sub-branch of artificial intelligence, will emerge consequently. Personalized offerings to consumers through machine learning can then improve the flow experience and increase purchase intention.

5.1. Limitations and Future Research

Although the findings of this study contribute to the literature, more research is required due to some limitations. In this research, the flow experience was investigated in a single dimension. But if other dimensions of the flow experience are included in the research, it is necessary to determine how and in what direction there will be a change in terms of the relevant variables. Another limitation of this research is that the data was collected only from the backgrounds in Turkey. By collecting data from consumers in different countries, changes in consumer behavior can be examined comparatively. Another limitation is that only consumers' purchase intentions were measured. In future studies, the actual behavior of consumers can be included in the research and the differences between intention and actual behavior can be examined respectively. In this way, a more detailed managerial understanding can be offered to retail managers. In addition, gender, age, income, and educational status can be analyzed as control variables in future studies.

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