

Review

# The Role of Virtual Environment in Online Retailing: State of the Art and Research Challenges

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**Abstract:** The aim of the paper is to systematically analyse the effects of the online environment on customers' behaviour in order to offer a first, comprehensive state-of-the-art of the research on this topic. By analyzing a final sample of 105 papers, 4 themes have been identified, according to the theoretical lenses adopted by scholars. Results show that the traditional stimuli–organism–responses approach (also known as S–O–R) is the most frequently applicable conceptual framework for the analysis of the effects of the online setting, and worth mentioning are the modifications to the original S–O–R model proposed by scholars, which allow considering the specificities of the online environment.

**Keywords:** online environment; e-servicescape; customers' behaviour; systematic literature review



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## 1. Introduction

Over recent years, e-commerce has become a critical aspect for companies across the globe, to the point that, in 2025, global B2C e-commerce sales are forecasted to reach 7.391 billion U.S. dollars, a significant increase when compared to the 1.336 billion of 2014 [1]. These data confirm that B2C e-commerce is one of the fastest growing sectors within the world economy, and researchers agree in predicting that Internet shopping will continue to grow at a tremendous rate, despite its statistics not being easily accessible.

In the investigation of B2C e-commerce peculiarities, scholars are increasingly pointing out the relevance of firms' adopted electronic retailing format (i.e., the website) in affecting customers' behaviour in terms, as an example, of purchase and repurchase intentions, repatronage behaviours, loyalty, and word of mouth (WOM). These reactions seem to be very similar to those associated with customers' interactions to physical retail settings [2,3], the goal both in the physical and online setting being the same, i.e., to enhance customers' experience by means of the proper management of the environment in which the products are sold or in which the services are provided [4,5].

Specifically focusing attention on the online setting, the conscious designing of web environments in order to develop positive effects in customers and to increase positive responses is generally labelled "online atmosphere/online servicescape" and just as physical retailers provide relevant information through the "atmospherics" [6] or the "servicescape" [7] of their physical stores, online retailers (also known as e-tailers) also provide important information through the atmospherics of their websites (the e-servicescape). Over the years, different terms have been used by scholars to describe the online setting, i.e., "cybermarketscapes", "e-scapes", "online atmos-pherics", "cyberscape", "bricks-and-clicks" setting (in contrast to "bricks-and-mortar") or the "clicks-only" setting a clear consensus on the dif-ferences among such labels has not yet emerged. Following [8], in this paper, web/online/e-atmospherics, web/online/e-servicescape and web/online/e-environment are used synonymously.

Research clearly points out that, to date, the online environment has a strategic relevance for firms; notwithstanding, no clear systematization of how the online retail context does affect customers' behaviour and, in turn, firms' outcomes is available yet.

Thus, this paper aims at answering the following research question: which are the effects of the online environment on customer's behaviour? In order to answer to such a research question, a systematic literature review (SLR) on 105 papers has been conducted.

In particular, this paper aims to fill the above highlighted gap by systematically reviewing the academic literature on the effects of the online environment on customer's behaviour, which has been published over the years in management journals, in order to give readers a still-missing structured, solid, and updated analysis of the existing results on the topic. In doing so, by applying a strict reading guide, a final sample of 105 papers has been analyzed; then, papers have been categorized according to (a) the paper's keywords, (b) the paper's research question(s), and (c) the employed theoretical framework. In doing so, we have identified the following four themes, "S-O-R (stimuli-organism-responses) application"; "TAM (technology acceptance model) application"; "Flow-theory application"; "Convergences". Results show that the S-O-R approach is the most frequently applicable conceptual framework to the analysis of the online setting and worth mentioning are the modifications to the original S-O-R model proposed by the scholars, which allow taking into account the specificities of the online environment.

The paper is organized as follows. Firstly, the theoretical underpinnings are presented. Secondly, the methods for the analysis are defined. Thirdly, an overall analysis of the selected papers is provided. Fourthly, the literature trends for each of the identified themes are discussed. Finally, the most significant conclusions and managerial implications are presented.

## 2. Theoretical Underpinnings

Traditionally, to analyse the impact of the environment on customer's behaviours, three different theories have been elaborated over the years.

The first one is here labelled S-O-R approach and is grounded on three studies. First, the ref. [6]'s study, in which the concept of atmospherics, defined as the "conscious designing of buying environments to produce specific emotional effects in the buyer that enhance his purchase probability" (p. 50), is introduced for the first time. Second, the ref. [9]'s study, in which the S-O-R framework is presented. In more detail, as Stimuli, [9] refer to the physical aspects of the environment (i.e., colour, thermal stimulation, light intensity, sound stimulation, taste and odour, tactile stimulation). As Organism, they refer to PAD (i.e., Pleasure-Arousal-Dominance), where pleasure-displeasure is the person's feeling state, ranging from extreme pain or unhappiness to extreme happiness or satisfaction; arousal was defined as a mental activity determining the degree to which a person feels excited, stimulated, alert, or active in a situation, and dominance-submissiveness refers to the extent to which the individual feels in control of the situation rather than being restricted in his/her behaviour. Finally, according to [9], any response to an environment can be categorized as either "approach" or "avoidance" behaviour, which include four important aspects: the desire to physically stay in the situation; the desire to explore the situation; the desire to work in the situation; the desire to affiliate with the situation. Interestingly, these two scholars hypothesize the presence of moderating variables, e.g., neuroticism, extraversion, affiliative tendency. Third, the ref. [7]'s paper in which the marketing research relating to atmospherics and the S-O-R framework find their integration in the servicescape model, whose purpose is to understand how the physical surroundings affect both customers and employees in service organizations. These three studies are profoundly influencing the research on the effect of the online environment on customer's behaviour. In this regard, worth mentioning are [10,11] who, for the first time, theoretically apply and thereafter empirically test the S-O-R approach to the online shopping environment

The second theory is the flow theory. Flow was introduced by [12], who defines it as "the state in which people are so involved in an activity that nothing else seems to matter"

(p. 4). Additionally, it is described as “the holistic sensation that people feel when they act with total involvement” (p. 36). Recently the flow concept has been used for describing human-computer interactions in a computer-mediated environment, and it is conceptualised as a cognitive state which is determined by: (1) high levels of skill and control; (2) high levels of challenge and arousal; (3) focused attention; and (4) interactivity and telepresence [13]. Thus, according to the scholars who adopt such an approach to analyse the impact of the online environment on customer’s behaviours, customers must experience flow in their online interactions in order to generate positive behaviour outcomes. Moreover, the elements of flow are clustered into two categories. The first includes the functional flow elements, for example interactive speed of the website, which are typically associated to a satisfying virtual buying experience for users with utilitarian goals. The second category comprehends the so-called hedonic flow elements (e.g., time distortion), that typically allow users to perceive him/herself as more socially adept than in reality. Ref. [14] show that the concept of flow has major impact in terms of benefits for the so-called utilitarian customer, in comparison to the experiential-oriented ones.

The third theory is the technology acceptance model (TAM). The TAM is widely used in information systems and aims to predict the user’s intention to use the technology by considering the web store as a technology system and the web consumer as a computer user. Although since its introduction research has extended to the point to identify TAM 2 and TAM 3 [15,16], the original TAM postulates that usage intentions depend on the perceived ease of use (PEOU) and perceived usefulness (PU) of an information system [17]. PU is defined as the extent to which a person believes that using the system will enhance his or her performance, while PEOU is defined as the extent to which a person believes that using the system will be free of effort. More recently, “enjoyment” has been proposed as a new construct to consider, and it was defined by [17] as the degree to which using technology supplies reinforcement by itself, aside from any results in terms of outcomes that might be foreseen.

Stemming from this brief overview, this paper aims at systematizing the theoretical and empirical management papers that, over the years, have applied the three above defined theories to analyse the influence of the online environment on customers’ behaviour. In order to address this question as precisely as possible, we adopt the systematic literature review (SLR) method, whose criteria and main results are highlighted in the next section.

### 3. Method and Review Framework

The research question of this study has been addressed by conducting an SLR, and [18]’s approach—among the most cited for SLR in management—has been followed.

Accordingly, four steps have been developed.

#### 3.1. General Planning of the Review, in terms of Identification of Keywords, Databased Research and Protocol

In this step, 30 keywords have been identified to start the process. These keywords are: “e-servicescape” or “e servicescape” or “online-servicescape” or “online servicescape” or “electronic servicescape” or “electronic-servicescape” or “web servicescape” or “virtual servicescape” or “e-scape” or “cyberscape” or “e-atmosphere\*” or “e atmosphere\*” or “online-atmosphere\*” or “online atmosphere\*” or “electronic atmosphere\*” or “electronic-atmosphere\*” or “web atmosphere\*” or “website atmosphere\*” or “web site atmosphere\*” or “virtual atmosphere\*” or “e-environment\*” or “e environment\*” or “online-environment\*” or “online environment\*” or “electronic environment\*” or “electronic-environment\*” or “ web environment\*” or “website environment\*” or “web site environment\*” or “virtual environment\*”.

The asterisk at the end of a search word allowed for different suffixes (e.g., “virtual environment” or “virtual environments”).

These keywords have been selected in order to ensure inclusion of all those papers dealing with online environment issues.

Three databases have been selected to conduct the research: Clarivate Web of Science (WoS), Ebsco, and Scopus. We selected these three databases as they are considered the most comprehensive sources of studies in the social sciences (e.g., [19,20]), which also contain a great range of high-quality peer-reviewed journals [21]; therefore, they have been widely adopted in previous management research (e.g., [22–24]).

We searched the keywords previously identified within peer-reviewed “journal articles” (purposely excluding conference papers, books, and book chapters); moreover, we considered only papers written in English and only management journals were selected (the Journal of Quality List 2021 was used for Ebsco Host’s papers identification). Overall, 5440 papers were identified. After eliminating duplicates, 297 articles were identified.

Details are shown in Table 1.

**Table 1.** The search options for Scopus, Web of Science, and Ebsco.

Database	Criteria	Results
Scopus	Search in: Article Title, Abstract, Keywords Document type: Article; Review Subject area: Business, management and accounting Data range: all years to 2021 Language: English	2003
Web of Science (WoS)	Search in: Topic Document type: Article, Review, Editorial Materials Subject area: Business; management; operations research management science Data range: all years to 2021 Language: English	781
Ebsco	Search in: Abstract Document type: Peer reviewed journal articles Data range: all years to 2021 Language: English	2656

Source: Own elaboration.

### 3.2. Inclusion/Exclusion Criteria

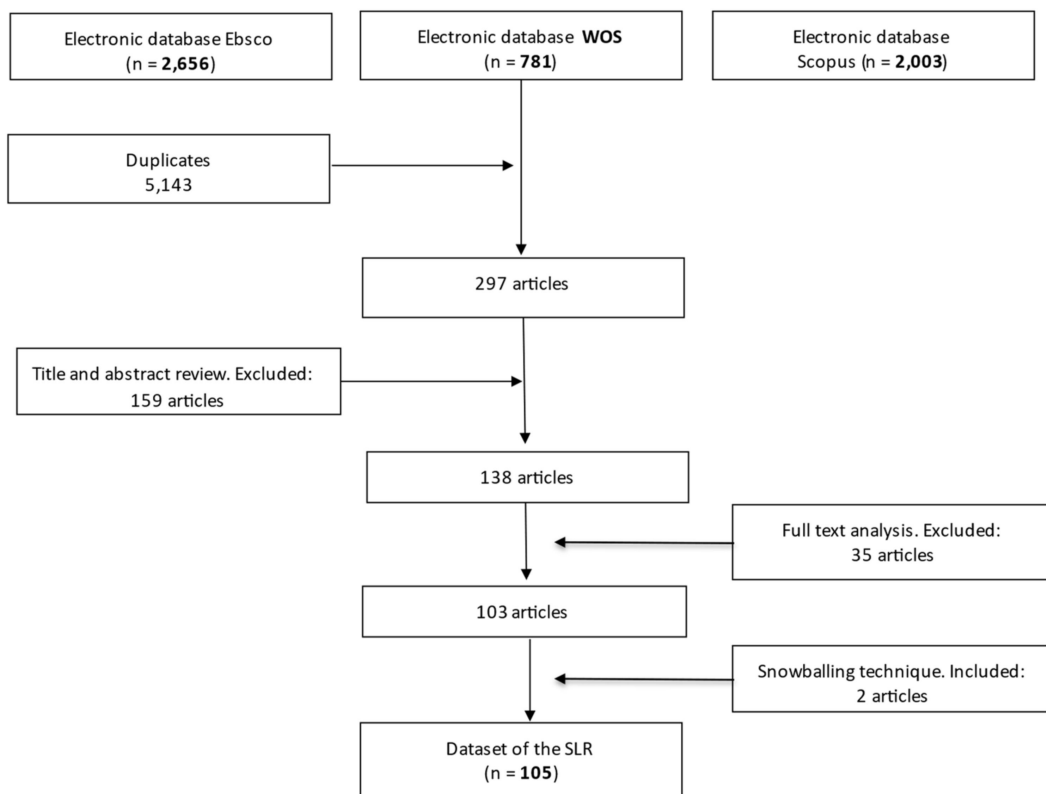
Abstracts were reviewed to ensure substantive context. Three main inclusion/exclusion criteria were used: (i) papers related to the physical environment were discarded; (ii) papers related to the influence of the online environment not focused on customers’ behaviour were discarded; (iii) only those papers grounded on a clear theoretical framework aimed at investigating the influence of the online environment on customers’ behaviour were considered.

This process excluded 159 papers, leading to 138 relevant documents.

### 3.3. The Selected Articles’ Evaluation

A full-text analysis of selected papers was performed to ensure articles’ substantive relevance and the previous three criteria were further applied. Finally, the research outputs were consolidated by adopting the snowballing technique. 105 articles were considered eligible for the SLR.

Figure 1 illustrates the flow diagram of the different steps undertaken for this systematic review.



Source: own elaboration.

**Figure 1.** SLR steps.

## 4. Research Results

### 4.1. The Evidence Base

In this section, we provide an overview of the evidence base we have used for this manuscript.

Specifically, we analyzed the 105 selected papers according to (i) the journals in which they have been published; (ii) the distribution of the years of publications.

Regarding the journals involved in the conversation, in Table 2, the journals having published at least three or more papers on the subject in the investigated period are identified.

Interesting to note is the fact that the number of journals that have published a minimum of three papers on this issue is consistently lower in comparison to the overall number of journals in our dataset (equal to 52). Few are, indeed, the journals really committed in understanding the underlying dynamics of an online environment and, among them, Journal of Business Research definitely plays an outstanding role, with 15 papers published on this topic.

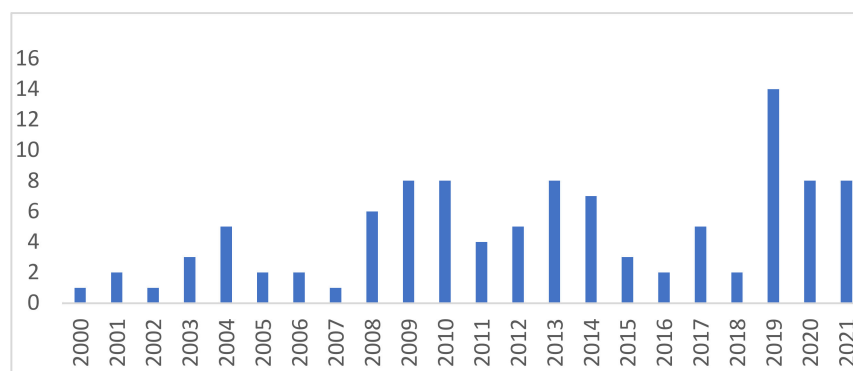
If we then move to the distribution of papers per year, Figure 2 shows that the distribution of publications on a yearly base has been swinging over time, even though a consistent increase in the interest towards this topic can be noticed starting from 2008.

At an overall level, indeed, if we consider the entire period, an average of 4.7 papers per year has been published, but if we consider the time period 2000–2007, an average of 2.1 papers per year have been published, against an average of 6.3 papers per year published in the time period 2008–2021.

**Table 2.** Journals most involved in the conversation.

Journal	No. of Published Papers
Journal of Business Research	15
Journal of Retailing & Consumer Services	8
European Journal of Marketing	6
International Journal of Retail & Distribution Management	6
Internet Research	4
Information & Management	3
Journal of Consumer Behaviour	3
Journal of Fashion Marketing & Management	3
Journal of Internet Commerce	3
Journal of Service Research	3

Source: Own elaboration.



Source: own elaboration.

**Figure 2.** Distribution of papers per year.

#### 4.2. Papers' Analysis

Extraction and synthesis of data represent the final step of the SLR process [25], allowing for an in-depth analysis of the selected papers in order to highlight the areas of interest, the links among each of the papers, and the connections between and among each research theme. Specifically, in order to analyse the 105 papers, a three-step analysis has been performed. Firstly, by manually sorting three dimensions, namely: a) the paper's keywords, b) the paper's research question(s), and c) the employed theoretical framework, codes for each paper have been identified. Secondly, coherent codes have been grouped into four themes:

- Theme 1—S—O—R application.
- Theme 2—Flow theory application.
- Theme 3—TAM application.
- Theme 4—Convergences.

Finally, an in-depth systematic analysis of the selected 105 papers was conducted. To do this, a reading guide for the papers was established, shared among the authors, and then employed to read and analyze the articles.

In Table 3, a sample of the investigated papers is presented.

Table 3. A sample of the selected papers.

Theme	Author(s)	Year of Publication	Journal	Keywords	Research Question(s)	Methodological Approach	Sample	Type of Sample
1	Eroglu, S.A.; Machleit, K.A.; Davis, L.M. [10]	2003	Psychology & Marketing	n.a.	The study presents an empirical verification of the effect of online atmospherics on shopper outcomes and responses.	SEM/confirmatory factor analysis	328	students
4	Williams, R.; Dargel, M. [26]	2004	Marketing Intelligence & Planning	Internet, Electronic commerce, Worldwide web	The aim of this paper is to consider how the “cyberscape” may be designed and planned in such a way as to induce positive approach behaviours—prolonged usage, intention to return, and recommendation to others, the latter being perhaps the most important driver of traffic to commercial websites.		n.a.	
2	Bridges, E.; Florsheim, R. [27]	2008	Journal of Business Research	Online buying behavior, Online flow, Pathological Internet use	The authors address the relationship between various elements of flow, the online experience, and purchasing online. Further, they examine what hedonic elements can accomplish from the marketer’s viewpoint.	multiple regression	337	students
1	Hopkins, C.D.; Grove, S.J.; Raymond, M.A.; LaForge, M.C. [28]	2009	Journal of Internet Commerce	Ambient conditions, Attitude toward Web site, e-servicescape, Purchase intentions, Spatial layout/functionality	The purposes are to (1) develop a theory-driven framework to conceptualize the Web site as an e-servicescape, (2) discern the degree to which the dimensions of an e-servicescape impact effective Web site design, and (3) identify the relative importance of the e-servicescape dimensions with respect to customers’ online experience.	SEM	216	web surfers
1	Harris, L.C.; Goode, M.M.H. [8]	2010	Journal of Services Marketing	Internet, Service levels, Trust, Purchasing, Retailing	This study aims to provide insights into how consumers’ interpretations of e-servicescape affect their subsequent evaluations of web site trustworthiness and ultimately their intentions to repurchase.	SEM/confirmatory factor analysis	257	web surfers
1	Dholakia, R.R.; Zhao, M. [29]	2010	International Journal of Retail & Distribution Management	Internet shopping, Customer satisfaction, Consumer behaviour, Repeat buying	The study is an attempt to shed additional insights into the relationships between website attributes and their effects on customer satisfaction and loyalty.	regression	1079 (in 2003) and 1242 (in 2004)	web surfers
1	Brengman, M.; Karimov, F.P. [30]	2012	Management Research Review	Electronic commerce, Consumer behaviour, Trust, Social media, Internet, Initial online trust, Social networks, Corporate blog, B2C e-commerce	The objective of the study is to investigate whether the mere integration of web communities, such as an SNS and/or a corporate blog in the e-tail interface can affect consumers’ initial trust towards an unfamiliar e-vendor and subsequent purchase intentions.	MANCOVA and ANCOVA	226	students
1	Brunner-Sperdin, A.; Scholl-Grissemann, U.S.; Stokburger-Sauer, N.E. [31]	2014	Journal of Business Research	Website perception, Gestalt approach, Sense-making, Exploration, Emotions, Consumer responses	The study aims to develop and tests a conceptual model that accounts for consumers’ holistic perception of websites. Moreover, it aims to validate the web-Gestalt model and to assess whether a website’s sense-making potential and exploration potential lead to emotional responses, such as pleasure and arousal, which consequently affect satisfaction and loyalty intentions to the website.	SEM/confirmatory factor analysis	191 (study 1) and 213 (study 2)	students (study 1) and customers who had previously booked a hotel on the website (study 2)

Table 3. Cont.

Theme	Author(s)	Year of Publication	Journal	Keywords	Research Question(s)	Methodological Approach	Sample	Type of Sample
1	Hassouneh D.; Brengman L. [32]	2015	Journal of Electronic Commerce Research	Metaverse Retailing, Atmospherics, Content Analysis, Second Life, Store Design	This paper aims to set a first step towards understanding virtual store design principles by exploring current practices in terms of the application of store atmospherics in Social Virtual World stores and proposing a new typology for 3D virtual store atmospherics.	content analysis	27	Second Life Stores
3	Lim, W.M. [33]	2015	Internet Research	Consumer behaviour, e-commerce	The objectives of this study were twofold: (1) to enhance understanding of the antecedents of e-shopping acceptance and usage behavior drawn from both IS and CB theoretical underpinnings; and (2) to subsequently test the significance of this model empirically and thus offer useful and practical implications for organizations wanting to venture successfully into e-shopping in terms of realizing and maintaining gains of site traffic and e-shopping transactions.	SEM	320	e-shoppers
1	Wu, W.Y.; Quyen, P.T.P.; Rivas, A.A.A. [34]	2017	Information Systems and e-Business Management	e-servicescapes, Website trustworthiness, Website attitude, Brand attitude, e-WOM intention, Purchase intention	The study aims to contribute to the literature as follows: (1) by examining the nature of e-servicescapes and the e-servicescape dimensions from the view of Taiwanese consumers, and the effects that these dimensions have on the perceived trustworthiness of a website, customer responses to a website, brand evaluations, purchase intentions and e-WOM intentions. (2) By also examining the moderating effects of gender and online purchasing experience on the relationship between e-servicescape and internal responses.	PLS-SEM	290	students
1	Connell, C.; Marciniak, R.; Carey, L.L.; McColl, J. [35]	2019	European Journal of Marketing	Online consumer behaviour, Fashion, Online retailing, Customer engagement, Websites, Environmental psychology	This study addresses three research areas: firstly, the question of how retail websites engage customers will be considered with a specific focus on identifying the environmental cues that stimulate Customer Engagement. Secondly, the nature of CE with websites will be established by identifying the relationships between specific environmental cues and CE dimensions. Finally, insight will be provided into the role of the website in a customer-brand engagement process.	thematic analysis	22	over-55-year-old women who have browsed and bought fashion and fashion-related items online
1	Pizzi, G.; Vannucci, V.; Aiello, G. [36]	2020	Journal of Business Research	Virtual reality, Retailing, Presence, Shopping experience, Inattentional blindness, Patronage intention	The purpose of the study is twofold: to observe whether higher or lower levels of inattentional blindness emerge for consumers who are exposed to the virtual versus physical store environment (RQ1). Second, whether being exposed to a virtual or physical retail store environment sequentially affects individuals' perceptions of social presence, shopping experience, change in value perceptions, WOM referral intention, and patronage intention; and whether the lack of conscious recognition of the retail store brand significantly moderates this set of relationships (RQ2).	SEM/confirmatory factor analysis	200	web surfers



Table 3. Cont.

Theme	Author(s)	Year of Publication	Journal	Keywords	Research Question(s)	Methodological Approach	Sample	Type of Sample
3	Jain, S. [37]	2021	Journal of Fashion Marketing and Management	Attitude, India, Online luxury purchase intention, Perceived risk, Web atmospherics, Technology acceptance model (TAM)	The prime objective of the study is to develop a conceptual framework based upon technology acceptance model (TAM), which integrates the role of key variables that influence consumers' intention to purchase luxury fashion goods online. The second objective of the study is to understand the mediating role of attitude in the relationship between antecedent factors (perceived usefulness, perceived ease of use, perceived enjoyment and price consciousness) and online luxury purchase intention. Finally, it aims to measure the moderating effect of perceived risk and web atmospherics on the relationship between attitude and online luxury purchase intentions.	SEM/confirmatory factor analysis and Hayes Process macro in SPSS	250	luxury fashion consumers

Source: own elaboration.

## 5. Analysis of the Literature

An in-depth analysis of the most intriguing food for thought of the selected papers, according to the adopted theoretical framework, is hereafter provided.

### 5.1. Theme 1—S–O–R Application

The first identified theme refers to all the papers within our dataset dealing with the S–O–R approach. In academic literature, the S–O–R approach is traditionally grounded on three core studies: Ref. [6]'s one, the ref. [9]'s study and the ref. [7]'s paper. These three studies are still, to date, profoundly influencing the research on the online environment's impact on patronage intentions as this theme clusters the highest number of papers. Worth mentioning are [10,11] who, for the first time, theoretically apply and then empirically test the S–O–R approach to a virtual purchasing setting.

Interestingly, the results from their empirical analysis show that “online store atmosphere does . . . make a difference” [11] (p. 148). Specifically, the virtual environment's atmosphere influences pleasure, which affects attitude, which then has strong effects not only on satisfaction and approach/avoidance behaviour, but also on customers' pleasure and arousal.

That being stated, two sub clusters in this theme have been identified:

1. new insights: in this sub-cluster a deep analysis of how scholars, starting from [10,11], have revised the traditional S–O–R model to find a better fit with the online environment is presented.
2. Emerging trends: in this sub-cluster papers that investigate new issues by applying the S–O–R approach are categorised.

#### 5.1.1. New Insights

In this sub-cluster, papers have been further analysed according to the investigated S–O–R's dimension—i.e., stimuli (S)–organism (O)–responses (R)—and its moderators.

##### Stimuli

Papers here clustered take a step further in research on S–O–R's stimuli dimension applicable to the online environment.

Two different kinds of papers can be identified: those that, considering a significant number of e-servicescape cues, examine the online setting from a holistic perspective, such as [28,31,38]; those that have basically followed [10]'s indications, grounding their analyses

on specific cues with the aim of understanding how e-servicescape influences customers' behaviour, such as [39–44]'s papers.

Interestingly, differently from the research on the physical servicescape, still few are the papers in the dataset which analyse the effects of cues such as colours and music on the Internet purchasers' emotional responses thus, consequently, on their behaviours; an exception is represented by the paper by [44], whose results show that Taiwanese interviewers experiencing a fast-tempo music condition show a higher level of approach-behavioural intention than those experiencing a slow-tempo condition and that warm colour generates higher levels of purchasing intention. Even fewer are those works that take a step further by analysing the interaction between music and colour through the lens of the S–O–R model. This line of inquiring is coherent with the idea, well developed in studies on the physical servicescape [45], that the “right” fit between music and colour can strengthen the participants' level of arousal and pleasure as the servicescape is a holistic system.

### Organism

Papers here clustered contribute to the literature by considering new variables able to conceptualise the organism dimension of the S–O–R model.

The first group of papers “revises” the traditional pleasure/arousal model. [46], for example, use “excitement” as the organism and define it as “a positive emotional state that consists of high levels of pleasure and arousal” (p. 1172). [47] uses the traditional pleasure and arousal dimensions as the organism, but they also introduced the expression “delight”, referring to it as a particular emotion which derives from the mix between the specific emotions of arousal and pleasure.

The second group of papers takes into consideration the dominance emotion of the PAD model. Specifically, [48] clearly explains why it is important to investigate such emotion when referring to the online environment and the reason can be identified in the fact that “online shoppers control the shopping process” (p. 227). Ref. [49] employs the entire PAD model to analyse the effect that product presentation (flat or “on model”) and music have on emotions, further examining if and how emotions affect cognitive (attitude towards the website) and conative responses (purchase intention). Results show that the way in which products are presented has an impact on pleasure, as well as on arousal and dominance.

The third group of papers adopts different measures derived from PAD to investigate emotions. Ref. [50], for example, introduces the concept of “mood”, which refers to a variable related to the organism, specifically measured adopting [51] “Joy and Distress” scale. Ref. [40] abandons the PAD model in favour of the concept of emotions proposed by [52]. Ref. [53] uses, as organism, both the personal cognitive evaluations related to states based on circumstances and the six emotional states from [54].

Finally, the fourth group of papers introduces trust as the organism. Worth citing among them are surely three papers; the first is the paper by [44] that, differently from [11], is based on [7]'s model. By using trust in the website as the organism and purchase intentions as responses, results show that aesthetic appeal is the most significant e-servicescape dimension on trust and that trust is positively related to shoppers' purchase intentions. The second is the paper by [55] that, for the first time, analyses the Thai Generation Y group, showing that for this target, online repurchase intention is positively related to the extent to which they trust the website. The third is the paper by [56], which examines the relationships between e-servicescape and trust; trust and E-WOM; and trust and customer loyalty. Results show that e-servicescape is “positively related to trust”; consistent with previous studies [8,34,57], trust is positively associated with E-WOM and customer loyalty. Moreover, trust affects E-WOM behavioral intentions.

## Response

No specific papers have been allocated to this sub-theme. This is a result of the way in which papers have been classified. In order to reduce complexity, each paper has been indeed allocated to a single theme, according to the criteria previously identified. Therefore, although some—however still modest—modifications have been proposed over the years relating to this dimension (e.g., [58]), they do not strongly emerge from this analysis, as the corresponding papers have contributed more to the advancements of other S–O–R dimensions.

## Moderators in the S–O and O–S junctions

A new interest is arising in the variables able to moderate the S–O and O–R junctions of the S–O–R model.

Ref. [59], for example, hypothesizes the moderating effect of one personal characteristic (product involvement) in the S–O junction, confirming that low task-relevant cues attract customers with a low level of product involvement, while customers with a high level of involvement can be attracted by more detailed product and service information.

Strong interest is growing in relation to the moderating role of gender. In the already analysed paper by [47], this variable has been introduced as moderator. Ref. [60] takes a step further as they use the selectivity hypothesis to interpret gender differences. According to their results, if a website must target men, it should be enriched with low task-relevant cues; if a website must target women, it should mix both low task and high task-relevant cues, and great effort should be devoted in increasing the richness and quality of the information.

## 5.1.2. Emerging Trends

In this sub-cluster, those papers that explain the most relevant developments in the e-servicescape literature are grouped. Accordingly, three sub-themes can be identified: one refers to the analysis of the culture's influence on online customers' behaviour; one refers to the atmospherics of 3D virtual reality stores; one refers to the combination of online and offline environments.

Regarding the first sub-theme, surprisingly, in the dataset only few papers develop cross-cultural research. The paper by [61] compares the online behaviour of Chinese and American customers adopting [62]'s classification of collectivism and individualism. Specifically, their results show that "culture does affect the ways in which American and Chinese online customers respond to atmospheric cues" (pp. 810–811). These pioneering results clearly show that the possibility of creating "a website that fits all" is very unlikely: In a collectivist socio-cultural context, websites should be planned and structured in order to stimulate arousal while the same websites can have negative effects on customers' behaviour in an individualistic context. A new perspective is proposed by [63,64], which inverts the S–O–R model and tests it in Chinese and Canadian cultures; results from the analysis show that in an individualistic socio-economic culture (Canada), the most relevant emotion is that of pleasure, while in a collectivistic society (China), such a role is played by dominance. Moreover, according to Hofstede's model, the impact of low task-relevant cues on the attitude towards the website and the consequent level of involvement is stronger for the Chinese than for the Canadians.

Relating to the second sub-theme, two papers in the dataset, [65,66], compare the atmospherics of traditional stores both to 2D and 3D virtual stores; both the studies point out that 2D online stores seem to be more different from traditional stores if compared to 3D ones. These two papers develop a taxonomy for the so-called "virtual store atmospherics" for the first time in the literature. Recently, a work on immersive virtual convenience store by [66] has been published and, interestingly, results show that participants continue to exhibit realistic shopper behaviours making such stores a cost-effective alternative to other methods for measuring consumer behaviour.

Regarding the third sub-theme, the first paper to use the same survey (with minor adjustments) for evaluating the same brand's online and offline stores is that by [67]. Results

show that emotions and loyalty are positively influenced by the graphic layout in the case of the offline store; on the contrary, no significant relationship has been tested in the online one. These findings underline how different the two environments are for the customers and how difficult it is for managers to transfer a model developed for one context to another context. Recently, ref. [36] shows that “individuals exposed to a virtual-reality-based retail environment perceive higher levels of presence than those exposed to a more traditional, physical store environment”.

### 5.2. Theme 2—Flow Theory

Here clustered are those papers implementing the flow theory to understand online consumer behaviour.

By analysing the papers included in our dataset, it emerges that, although several studies adopting this theory have been published over the years (e.g., [68]), still few are those published in management journals. Among them, the paper by [27] contributes to the literature by analysing how flow elements affect “pathological Internet use” (PIU). According to the scholars, “if a state of flow serves as a trigger or precursor of compulsive behaviour, marketers who attempt to induce online flow may also have an obligation to try to avoid socially negative consequences for consumers” (p. 310). Their results show that developing hedonic website value by facilitating escaping elements of flow does not lead to increased online sales that are of interest to marketers, but it could result in PIU. In addition, they proved that there is a positive connection between functional flow components and online purchasing behaviour. Finally, ref. [69]’s results show that the flow experience on B&B websites is more positively influenced by hedonic motivations than utilitarian ones.

### 5.3. Theme 3—TAM Model

Here clustered are those papers which combine information systems and consumer behaviour.

The analysis of the selected papers applying this theory shows that results generally support the significant correlation between the atmospherics of the website and online customers’ purchasing behaviour as well as the positive relationship between PEOU and PU. In line with this, for example, ref. [33] shows that PEOU affects customers’ attitude directly and indirectly (through PU) toward online shopping. Worth mentioning is also the paper by [70] which, in line with the theory, verifies that enjoyment can play a key role in affecting attitudes. Interestingly, ref. [37] adds four exogenous factors, namely, “perceived enjoyment”, “perceived risk”, “price consciousness” and “web atmospherics” to the existing TAM in order to increase its explanatory power and better predict online luxury goods consumption behavior. Specifically, the author hypothesizes that web atmospherics moderate the effect of attitude on online luxury purchase intention and the empirical research support such a hypothesis.

### 5.4. Theme 4—Convergences

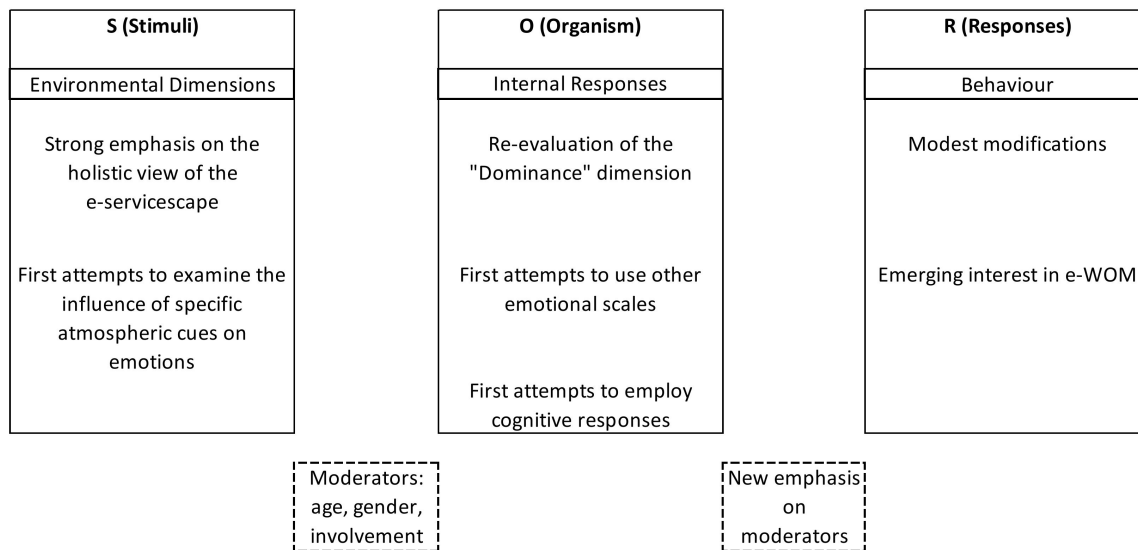
In this theme, the first attempts of cross-fertilization between at least two different and separate research communities have been identified. Such cross-fertilization mainly occurs between those papers that apply the S–O–R model to analyze the impact of the online servicescape on customers’ behaviour and those that apply the flow framework for the same scope. In this regard, a very cited paper is that by [26] which, as the authors declare, for the first time, “translates recent research on flow and the Internet into the S–O–R model” (p. 319). Similarly, and more recently, ref. [71] develops a theoretical model in which the typical elements of the virtual servicescape are combined with the flow concept, highlighting that more studies on this possible overlap are definitely needed.

## 6. Discussion and Conclusion

The main aim of the paper was to systematically analyse the effects of the online environment on customers’ behaviour in order to offer a first, comprehensive state-of-the-art of this research.

Accordingly, the systematic literature review method has been adopted, on the basis of which 105 papers were considered eligible to be included in the final dataset.

The in-depth analysis of the 105 papers according to the adopted theoretical approach has shown that, undoubtedly, the S–O–R approach is the most used by scholars to deepen the effect of the e-servicescape on customers' behaviour and that the traditional S–O–R model has been slightly modified by scholars in order to be suitable to fit with the peculiarities of the online setting. In Figure 3, the most intriguing advancements introduced for each variable of the S–O–R model are highlighted. What follows is a deep comment on the figure in order to better specify the possible future research avenues.



Source: own elaboration.

**Figure 3.** Advancements in the application of the S–O–R model to the e-servicescape.

Regarding the stimuli, “classical” cues are generally taken into consideration (e.g., navigation, colours, graphics, music, product presentation, security), forgetting the opportunities new technologies have recently offered and that are likely to be implemented in the near future, such as online scent and online taste, flash motion pictures/videos, and interactive avatars, which can enhance customers' experience (see ref. [72]). Even the interactivity of the website with blogs and social media is still under-researched, and no papers have yet considered the interaction with other communication methods (e.g., smartphones). Moreover, while the review of the literature brings to light that the starting point in all the papers is that the e-servicescape cues can positively affect customers' emotion and cognition, results also show that no empirical research on the negative effect has yet been published. Questions such as: “What happens in the case of an overuse or negative use of some cues?” still have to be answered by scholars.

With regard to the organism, several advancements can be registered. Worth mentioning are, for example, the (still few) attempts to consider the “dominance” dimension, that has been neglected in the physical servicescape studies but transpires to be important in the e-servicescape, as it reflects the level of control over the shopping situation. However, if scholars agree on the possibilities to use such a dimension, a question needs to be answered: how can previous results that do not consider dominance and its possible influence on pleasure and arousal and customers' behaviour be interpreted? Moreover, if the PAD model continues to be used, new insights able to overtake the current criticism related to the fact that it is too narrow in its internal states and thus unable to capture the overall effect of site atmosphere [10], must be implemented. One possibility is, for example, to consider the three PAD dimensions as a multidimensional construct; according to [73], indeed, arousal could be considered as a broader concept, including energetic and tense

forms of it. Interestingly, by analysing the selected papers, attempts to use different scales for measuring emotions, at least in theory more effective than the PAD as they offer a richer assessment of emotional responses (e.g., [53,74,75]), were observed. Stemming from these pioneering studies, future research should consider new emotions, such as interest, surprise, joy, delight, frustration and disgust, in order to propose an alternative to the PAD model as well as better testing the effect of dominance and/or better explaining the PAD model (e.g., [76]).

With regard to the responses, very few papers analyse the impact of emotions on e-customers' time and money spent on a specific website, which deserves future empirical research. Moreover, what is surprising is the scant attention given to social interaction considerations. For example, cognitive technologies have not been considered by scholars yet, opening up a research gap that urgently needs to be filled, in order to have academia aligned with practice.

Some scholars have also expanded the S-O-R model by including moderators in the S-O junction as well as the O-R junction. Although they are still used in a small number of papers, their results show how important it is to target the right customers with the right website. What emerges from these studies is the strong need to customize the websites according to, for example, the customers' age, gender, task, and involvement. As these are the first attempts in this direction, future research should continue using moderators, taking into consideration, for example, age cohort effects, customers' psychological traits, different product categories, different situational involvement (e.g., experiential and utilitarian orientations), the presence of a physical store, customer familiarity with the e-servicescape, cultural background, and the online retail reputation.

After having focused the attention on the S-O-R framework, the second part of this conclusion deepens the more general issues that have emerged in this research area and are related to the methodology employed by scholars, which can delineate future research methods.

A first issue deals with the website(s) used for research. A debate is still ongoing about the convenience of using mock vs. real websites. The positions are, indeed, divergent. According to those scholars who use real website(s), by using mock websites, with a number of disabled functions, limited product assortment and conducting the experiment in a laboratory, the reality of the virtual purchasing is shrunk. Conversely, according to those scholars who use mock website (s), a laboratory experimental design allows the researchers to manipulate the stimuli, to select the right ones, and to eliminate distorting effects, such as those from prior experience, from brand awareness and reputation, etc. Comparisons between results by using mock and real websites could probably solve such a dilemma.

A second issue concerns the type of analysis employed. Interestingly, no papers use a longitudinal approach. Although difficult, such an approach could allow scholars to trace the evolution and adaptation of customer behaviour when changes are introduced to the website. Moreover, considerations can emerge by analysing the few papers that compare the offline and online settings of the same company. Future research should work to understand if and how the two settings influence each other in shaping expectations, forming emotions, and influencing behaviours (see ref. [77,78]).

Other considerations emerge, finally, by analysing the first empirical attempts of cross-fertilization between the different research communities. Future research in this direction could help to improve the understanding of customers' behaviours in the online setting.

Regarding the limitations of this paper, they generally are ascribable to SLRs (e.g., ref. [18]). Therefore, the first limit is related to the databases chosen for the analysis (Scopus, WoS, and EBSCO) as they could not include all the management abstracts dealing with the investigated issue. The second limit is related to (i) the keywords and (ii) the criteria employed to select the papers, which have led the authors to identify a final dataset that other keywords and criteria may not have.

Despite these limitations, the paper's findings can be useful both for researchers and practitioners. Marketers and designers should, on the one hand, work hard to "tailor" the websites according to the characteristics their customers have and, on the other hand, to integrate off-line and on-line communication. Scholars should start from this relevant basis to foster those new and emerging insights that currently are ready to be developed.

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