

Received March 25, 2020, accepted April 15, 2020, date of publication May 11, 2020, date of current version May 22, 2020.

Digital Object Identifier 10.1109/ACCESS.2020.2993671

# Understanding Online Impulse Buying Behavior in Social Commerce: A Systematic Literature Review

SAMAH ABDELSALAM<sup>1,2</sup>, NAOMIE SALIM<sup>1</sup>, ROSE ALINDA ALIAS<sup>3</sup>,  
AND OMAHYA HUSAIN<sup>1,2</sup>

<sup>1</sup>Department of Information Systems, School of Computing, Universiti Teknologi Malaysia, Johor Bahru 81310, Malaysia

<sup>2</sup>Department of Computing Sciences, Faculty of Mathematical Sciences, Khartoum University, Khartoum 11115, Sudan

<sup>3</sup>Department of Information Systems, Azman Hashim International Business School, Universiti Teknologi Malaysia, Johor Bahru 81310, Malaysia

Corresponding authors: Samah Abdelsalam (sama7\_279@yahoo.com) and Naomie Salim (naomie@utm.my)

This paper funded by Universiti Teknologi Malaysia (UTM) under the University Research grant number (Q.J130000.2528.18H56).

**ABSTRACT** In the past few years, online impulse purchase has garnered attention from researchers in various fields, especially noted in the relatively new field of social commerce (S-commerce). This interactive environment is a full of impulse buying stimulators. However, no previous studies have been conducted to evaluate the status of the research about online impulse buying behavior (IBB) in S-commerce. Hence, the authors reviewed studies published between 2005 and 2019, to gain an insight into IBB. The authors used an input-moderator-mediator-output model for identifying and classifying factors that influence consumer's online IBB in S-commerce. The authors adopted a review protocol that involved two stages (i.e., automatic and manual), and identified 68 studies that addressed online IBB, of which 24 studies focused on IBB in S-commerce. The systematic review results indicated that survey-based studies (83%) and experiment methods (17%) were prevalent in online IBB in S-commerce. The authors also noted that a majority of existing studies adopted stimulus-organism-response. In this study, the factors that influence online IBB in S-commerce were classified, and a causal-chain framework for online impulse buying was developed. Finally, the authors made recommendations for future research in this field.

**INDEX TERMS** Unplanned buying, s-commerce, social interaction, systematic review.

## I. INTRODUCTION

The rapid development of online web-based technologies has significantly improved social media tools and concepts, which in turn has led to the development of novel techniques that influence E-commerce processes [1]. Furthermore, the field of E-commerce has also undergone a massive evolution leading to the emergence of a novel phenomenon known as Social commerce (S-commerce). S-commerce makes use of social media and enables consumers to share their knowledge regarding the products and their online shopping experience to help them make better purchase decisions [2]. S-commerce has four unique characteristics that distinguish it from other commercial contexts: interactivity, collaboration, community, and social aspects.

*Interactivity:* S-commerce enables social interaction between firms, as well as among customers. This interconnectivity among customers allows them to have access

The associate editor coordinating the review of this manuscript and approving it for publication was M. Shamim Hossain.

to the information provided through social interaction [3]. Social interaction also helps companies to get feedback from customers to develop new products and services and encourage customers to spread positive word of mouth [4]. In term of collaboration, S-commerce provides a collaborative environment that enables users to create their content and share it with others by employing SNS as a collaboration tool [5], which in turn contributes to the growth of co-creation activities [4]. Regarding the community, S-commerce provides a platform for people to connect with friends, conduct online social networking activities, and send product recommendations or discounts to friends [6]. S-commerce strengthens the community power of consumers based on an information network that helps them in their purchasing decisions and satisfies their needs and wants [6]. With respect to social aspects, S-commerce is built on different types of social media and focuses on social media-supported commercial activities [7]. Social media enables the development of social support that leads to better purchasing decisions in a networked user environment [8]. Thus, customers feel a sense

of social presence in S-commerce sites [9]. These characteristics of S-commerce offer enterprises novel opportunities for improving their customer relations, developing better marketing strategies, increasing their sales, and improving their economic growth [8]. Therefore, understanding consumer behavior in this interactive environment has become a cornerstone for E-retailers, enabling them to strengthen their competitiveness and to increase their profits [3].

S-commerce can be differentiated from E-commerce in terms of business goals, customer connection, and system interaction [10]. As S-commerce is a relatively new phenomenon, it does not have a definite classification. However, previous research has provided several classifications for the types of S-commerce. Zhan and Benyoucef [11] classified two types of S-commerce: (1) social network-based sites that integrate commercial features to allow transactions and advertisements, (2) traditional E-commerce based sites that add social tools to facilitate social interaction and sharing. Whilst Hu *et al.* [12] classified three types of S-commerce: (1) social network-based sites, (2) traditional E-commerce based sites, and (3) group shopping websites in which customers form online social groups based on similar interests and needs, and make purchases in order to gain price advantages. Previous work conducted by Xiang *et al.* [4] showed that user behavior is the most studied theme in literature because it is essential for both business and academia to understand the different behaviors of users in this newly emerged business model [13]. This research also focuses on the theme of user behavior, particularly impulse buying behavior (IBB).

Social interaction in the field of S-commerce has led to different consumer experiences in comparison to conventional E-commerce, which has further helped in the parallel development of IBB [14], [15]. A large portion of S-commerce revenue is accountable to IBB due to the characteristics of S-commerce [16]. However, despite the short-term economic importance of IBB, it has a negative influence on both consumers and businesses. The consequences of IBB on consumers include the perception of guilt, regret, financial strain, and strain on personal relationships [17]. These negative effects lead to complaints, customers switching to alternatives, negative word of mouth (WOM), and product returns, which in turn, harm and damage the business [18]. Therefore, it is critical for S-commerce sites to understand the consumer IBB and the factors that trigger it in order to adjust their business strategies accordingly and hence achieve their profitable marketing values in today's digital business environment in the long term.

As S-commerce is a novel phenomenon, its understanding is still limited and scattered [4]. Due to S-commerce is a newly emerging area with insufficient empirical evidence, IBB has not been well studied in this field. Therefore practitioners, information systems communities, and users of S-commerce need to understand the factors that can affect online IBB in S-commerce. Furthermore, to date, effort has not been made to consolidate IBB knowledge into the field

of S-commerce. This field of study will be very important to the business community and society in general [19]. Hence, this study aims to review online IBB in the S-commerce context, focusing on the methodological aspects, relevant theories, factors that influence online IBB, and gaps that need further work. The authors used a systematic review approach to systematically collect, analyze, and synthesize the current studies on online IBB in the S-commerce context to provide the state-of-art in this topic. To establish the main aim of the study, the following objectives were established:

- To provide an overview of research methods that have been used to study online IBB in the context of S-commerce.
- To provide an understanding of the different theoretical perspectives that have been used to study online IBB in the context of S-commerce.
- To identify and classify the factors that influence online IBB in the context of S-commerce.
- To highlight the research gaps and suggest future work on the online IBB in the context of S-commerce.

By achieving these objectives, this study can help academics and practitioners to better understand the causal-chain framework of the factors that stimulate online IBB in the S-commerce context, theoretical foundation and methodological approaches of studying the online IBB in S-commerce and its current state of research. The study also helps to recognize the areas where more investigation is needed. It also enables businesses and marketers to formulate strategies to strengthen competitiveness and increase profits. Furthermore, it provides S-commerce designers and developers the insights to implement social media features on S-commerce sites to enhance their business. To explain the results concisely and clearly, the authors systematically reviewed the papers based on the guidelines described by Kitchenham and Charters [20]. The authors conducted this systematic review using a strict sequence and well-defined methodical steps, based on a proper protocol. This technique included specific steps, i.e., developing the research protocol, describing the inclusion and exclusion criteria and assessing the article quality based on specific criteria, data synthesis, extraction and data analysis. This review synthesized, collected and analyzed 68 studies related to online IBB published in the period between 2005 and 2019. The authors analyzed primarily peer-reviewed academic journals along with conference proceedings as their data source, since their results were considered to be valid and relevant to both business and academic fields.

## II. BACKGROUND

This section provides an overview of S-commerce and IBB phenomenon.

### A. SOCIAL COMMERCE DEFINITION

Researchers used various definitions for describing S-commerce as it encompasses multiple fields, including sociology,

computer science, marketing, and psychology [10], [21]. S-commerce is defined as a new business model of E-commerce, which makes use of Web 2.0 technologies and social media to support social-related exchange activities [13].

Researchers proposed a variety of definitions based on the main elements of S-commerce, hence, there is no single generic definition. The authors used the four elements proposed by Han *et al.* [13] to analyze the concept of S-commerce. Several definitions were selected from literature and classified based on these elements. It was found researchers who used only two elements in their definitions focused on either commercial activities and social media [22], [23], or commercial and social activities [24]–[26]. Researchers who identified social commerce with three elements concentrated either on commercial activities, social media, and social activities [27]–[29], or commercial activities, social media, and Web 2.0 [30], [31]. There were researchers who used all four elements to define S-commerce [2], [13]. It can be concluded that social commerce consists of four elements, namely, social media, commercial activities, social activities, and Web2.0. Key elements that should be used in the social commerce definition are social media and commercial activities, compared to the other two elements, social activities and Web2.0, which are not used frequently to define S-commerce. The use of “social media” in a social commerce definition implies social activities and Web2.0 as social media enables social interactions and the use of social media depends on Web2.0 technologies. This may explain why some researchers do not mention these elements explicitly. This study adopts the definition of S-commerce as described by Han *et al.* [13] where it is as a new business model of E-commerce, which makes use of Web 2.0 technologies and social media to support social-related exchange activities.

## B. IMPULSE BUYING BEHAVIOR

Many shoppers' purchases are unplanned, sudden, initiated on the spot, associated with a strong desire, feelings of pleasure, and excitement. It was estimated that about \$4 billion is spent annually in an impulsive manner [32] which shows that the economic importance of impulsive buying is well established [33]. IBB initially occurred in retail shops [34], [35], then the advent of the internet age, and the proliferation of E-commerce led to the emergence of online IBB [14]. Researchers claimed that the online shopping environment is more conducive to IBB than its offline counterpart [36] since the online shopping environment frees consumers from constraints such as inconvenient store locations, limited operating hours, and social pressure from staff and other consumers [19]. Moreover, due to advanced developments in Web 2.0, the popularity of social media, and the growth of social networking sites, many S-commerce platforms have been developed [37]. These platforms placed more emphasis on the social aspects rather than the products or services.

In contrast, conventional E-commerce focuses on maximizing efficiency with strategies for sophisticated searches,

one-click buying, specification-driven virtual catalogs, and recommendations based on consumers' past shopping behavior [38]. Customers usually interact with E-commerce platforms individually and independently from other customers [39]. E-commerce, in its classical form, provides one-way browsing, where information from customers is rarely (if ever) sent back to businesses or other customers [39]. S-commerce on the other hand uses social media features and provides facilities to enable users' interactions and participation [23]. This combination of social and commercial activities catches consumers' eyes. When users surf on social networking websites, they are exposed to a volume of information from vendors, news, friends, celebrities, or experts, which induces them to purchase products impulsively [40]. Under these circumstances, impulse buying is unavoidable [40], and most of the users' buying behavior on S-commerce platforms can be viewed as IBB [14]. Owing to this combination of social media and commercial activities, the factors that trigger impulse buying may differ from other contexts. As a consequence of this phenomenon, online IBB has increased extremely, and a significant portion of S-commerce revenue is attributed to impulse buying [16]. Thus, businesses need to understand the factors that influence consumer IBB in this interactive environment.

Impulse buying is defined by Stern [41] as a compelling, unplanned, and a hedonically complicated purchase-related behavior displayed by consumers. There are several types of impulse purchases, which include reminder, pure, suggestive, and planned impulse purchases [41]. Pure impulse purchase is defined as the unplanned purchase, which occurs when an individual is exposed to a specific stimulus. This type of purchase does not involve any prior planning and also includes a novelty purchase that defies the usual buying pattern. Reminder impulse purchase refers to the purchase made by the consumer when s/he has viewed the product or other similar cues. The consumer does not plan the purchase after s/he recalls an earlier experience or if the home stock has run out of the product. In direct contrast to this reminder impulse purchase, the suggestive impulse purchase occurs when the consumer observes a strong need to buy a specific product after viewing it for the first time. Here, the individual has not displayed any prior desire or knowledge regarding the product before s/he has viewed it [41].

On the other hand, the planned impulse purchase happens when the consumer does not plan the purchase but aims to take advantage of the promotion. The consumer visits a shopping site with a shopping list, but only intends to purchase the products based on the promotions or coupons offered. Thus, the consumer visits a shopping site with no prior knowledge about the product or with any intention to buy, but s/he buys the product if lucrative deals are offered (i.e., free accessories, low price, etc.). Similar characteristics displayed by the various types of impulse purchases refer to the unplanned nature of the IBB, wherein the consumer buys the product impulsively after being exposed to a stimulus [42].

TABLE 1. Impulse buying definitions.

Definition	Elements						Reference
	IAP	TMP D	FL	RP C	TP	ROI	
It is a consumer's unplanned purchase	✓						[43], [45]
It is a sudden, compelling, hedonically complex purchasing behavior without careful consideration of all information and choice alternatives.		✓	✓		✓		[46], [47]
It is an unplanned decision to buy some product, made spontaneously and instantly, in a retail store.	✓	✓					[48]–[50]
It is an unplanned, hedonic purchase that follows a sudden urge.	✓		✓				[41], [51]
A purchase occurs when people experience an urge to buy a product without thoughtful consideration of why and for what reason one needs the product.			✓		✓		[52]
It is a sudden, unreflective, and unintended purchase after experiencing internal and external stimuli.	✓	✓				✓	[53]
An unplanned purchase, the result of exposure to a stimulus, and decided on-the-spot.	✓	✓				✓	[54]–[56]
A sudden and immediate purchase, with no pre-shopping intention either to buy the specific product category or to fulfill a specific buying task.	✓	✓					[57]
An unplanned, sudden, and powerful temptation/urge to buy in response to internal and external stimuli, where a consumer makes a rapid decision to gratify his/her desire as an immediate self-reward, without analyzing the real need and financial consequences of the purchase.	✓	✓	✓	✓	✓	✓	[44]
An act of purchase when a consumer experiences a sudden, often powerful, and persistent urge to buy something immediately, wherein there is no prior need or intent to buy either the specific brand or even the product category before to entering the store.	✓	✓	✓				[42], [58]–[62]
An unplanned purchase characterized by rapid decision-making and subjective bias in favor of immediate possession.	✓	✓	✓				[63], [64]
It is a purchase without careful consideration of potential outcomes of the purchase, resulting from the immediate representation of the stimulus object.				✓		✓	[65]
As occurring, “when a consumer experiences a sudden, often powerful and persistent urge to buy something immediately.”		✓	✓				[66], [67]

Although previous researches studied IBB and defined it from various perspectives, there is still no clear and generic definition. Table 1 shows these definitions and the main elements of each definition. Simply, impulse buying has been defined as an unplanned purchase [43], and researchers distinguish it from an unplanned purchase. The previous works used different aspects to define IBB: (1) Intention

and planning for the purchase; if the consumer planned and intended to make a purchase before entering the shop, (2) time to make a purchase decision; if the individual consumes time to make a purchase decision or decides suddenly and on the spot, (3) if the purchase is accompanied by strong feelings, (4) reflections of purchase consequences, (5) thoughtful purchase; if the consumer thought about the need for the



purchase and the other available alternatives, (6) if the purchase decision is a result of or reaction to stimuli. Several researchers used one or more of these aspects to describe IBB, while others used all of them [44]. As can be observed from Table 1, most of the definitions focused on intention and planning for the purchase, followed by a time of making a purchase decision, and the emotions accompanying the purchase. It can also be concluded that further investigation of the IBB concept is needed to give a clear, comprehensive, and generic definition of impulse buying. In this study, the authors define IBB as: “unplanned, unintended, rapid, without thought, decided on the spot, accompanied with a strong urge to buy immediately, unreflective and is a result of stimuli.”

Although some researchers considered impulse buying to be similar to unplanned buying behavior, IBB displays the unique characteristics that distinguish it from other types of purchases, namely unplanned, unintended, rapid decision/on the spot, hedonic, thoughtless, unreflective, and as a response to stimuli. Table 2 highlights the characteristics of IBB based on the above definitions and previous works in IBB and explains each of these characteristics. Stern [41] classified the types of consumer buying behavior into planned, unplanned, and impulse buying behavior. In a planned purchase, the consumers spend a lot of time and seek information related to the product [68] since they intend to purchase the product. This process involves rational decision-making [14], [69]–[72]. On the other hand, impulse buying is a more irrational activity compared to planned buying, wherein the consumer has no intention or knowledge regarding the product they are buying [16], [73]–[75]. The decision-making process is rapid, and the decision is made in a short amount of time [75]–[77]. This purchasing behavior occurs when the consumer is feeling a strong, sudden and an irresistible desire to buy some product immediately, without reflecting on the consequences of the purchase [69], [78]–[82]. In direct contrast, unplanned buying involves all the buying decisions with a lack of advanced planning and may not be due to strong buying-related feelings or an urgent desire to buy something [83]–[85]. Thus, impulse shopping is unplanned; however, not all unplanned buying is considered to be impulse buying [86]. Unlike unplanned buying, a planned purchase is a buying behavior with the intention to buy a specific product, where the intention is made prior to entering the shop [70]. In this type of buying, the consumer uses an amount of information and a greater length of time in the buying decision process, and this is not accompanied by emotion [63]. Therefore, it is a reflective purchase wherein the consumer thinks carefully about the consequences of the purchase.

### III. RESEARCH METHODOLOGY

The authors used the systematic review approach to address all the research objectives. Scholars conducted either traditional systematic review [97], [98] or multilayer systematic review [99] to provide insights into a particular topic.

**TABLE 2. Impulse buying characteristics.**

Characteristic	Meaning	Reference
Unplanned	purchase is made without a prior plan to purchase.	[18], [41], [43], [44], [48]–[51], [54]–[56], [63], [69], [79]
Unintended	Purchase is made without prior intention to purchase.	[53], [57]–[61]
Rapid purchase decision/ on spot	Purchase is decided on the spot is rapid and dose not consume time.	[16], [18], [44], [48]–[50], [53]–[57], [63], [69], [79]
Hedonic	The consumer feels a sudden and strong urge to buy something immediately.	[41], [44], [46], [51], [52], [58]–[61], [66], [79], [80], [84], [87]
Thoughtless purchase	The consumer does not think about the actual needs of purchase and other alternatives.	[44], [46], [52], [56], [80], [81], [85], [88]–[90]
Unreflective	The buying decision is instantaneous, and the consumer does not take into consideration the consequences of this impulsive buying such as unnecessary spending	[3], [44], [65], [69], [76], [82], [91]–[95]
Result of stimuli	The buying decision is made in the shop when the individual exposed to stimuli.	[44], [53]–[56], [65], [80], [96]

A systematic review is defined as the process which evaluates, identifies, and interprets all the available studies related to the research objectives/questions, the topic of interest, and the study area. A systematic review summarizes the evidence describing the advantages and the disadvantages of a particular method, highlighting the existing research gaps, which would help in proposing further areas of research and providing a deeper understanding of the novel phenomenon [20]. This study followed Kitchenham and Charters [20] guidelines, which stated that a systematic review consists of three major stages, i.e., review planning, conducting the review, and reporting the review. Every stage includes specific activities such as (i) Identifying research objectives/questions; (ii) Formulation of a review protocol; (iii) Identifying the inclusion and the exclusion criteria; (iv) Describing the search strategy process; (v) Studies selection process; (vi) Determining the quality of the data; and (vii) Applying the data extraction and data synthesis processes. The following sections describe every stage in further detail.

#### A. REVIEW PROTOCOL

A review protocol was seen by authors to be an essential step in the systematic review performance, which specifies the processes used for conducting the systematic review. This review protocol improves the review accuracy and decreases the researcher bias [100]. This review protocol identified the review background, the research objectives/questions, search strategy, quality assessment, the data extraction, and data syntheses and defined the criteria for the study selection [20]. In sections I and II, the authors have described the

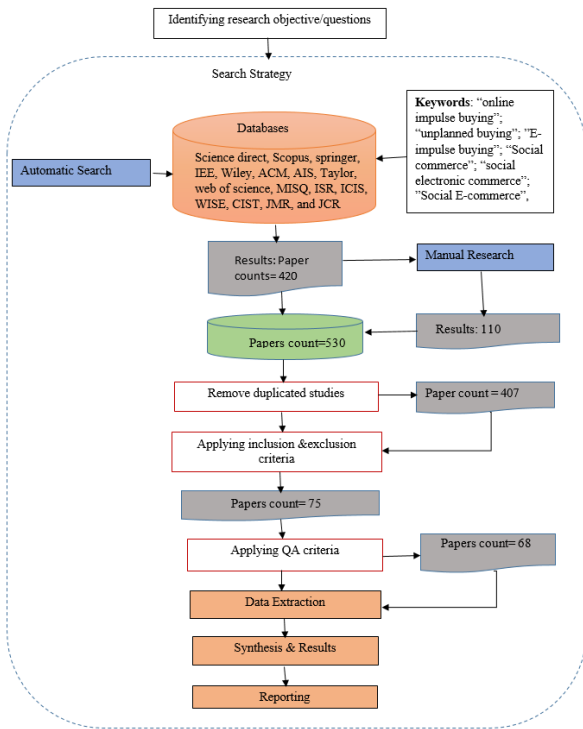


FIGURE 1. Review protocol.

TABLE 3. Inclusion and exclusion criteria.

Inclusion Criteria	Exclusion Criteria
Full-text Paper	Uncompleted study
Paper is written in English	Paper not written in English
Paper in the study domain	Paper not related to the domain
Papers within the specified period 2005-2019	Duplicated studies and papers not in the specified period

various research objectives and the background of IBB. Fig. 1 presents this review protocol.

**B. INCLUSION AND EXCLUSION CRITERIA**

The authors defined the inclusion and exclusion criteria to ensure only sole relevant papers were included in the review. This review focused only on understanding consumer IBB in the S-commerce context. For that, the authors considered journal articles and conference proceedings published in the English language between 2005 and 2019. The reasons for selecting this time duration were two-fold. First, this review offered a deeper understanding of online impulse purchasing behavior. Second, social commerce was first introduced by Yahoo in 2005 and quickly became a means for adding value to commercial services, and in 2006, the term ‘S-commerce’ first appeared in some studies [13]. Hence the authors systematically collected, analyzed, and synthesized the studies conducted in the last 15 years and only included the studies which addressed the online IBB of the consumers. Table 3 presents all the criteria included in this review.

**C. SEARCH STRATEGY**

In this study, the search strategy included two major phases, i.e., manual and automatic. As described in Fig.1, the authors

used an automated search process for determining the primary studies related to online impulse buying behavior. Webster and Watson [101] stated that the search process must not be limited to a particular set of journals, but must include many online databases. Thus, the authors select many online databases which are published in different types of academic journals, including Science Direct, Wiley, Springer Link, Scopus, AIS e-Library, ACM, IEEE Explore, Taylor and the Web of Science. The authors selected these databases, as they were believed to be the most relevant, with the highest impact factor. Furthermore, some journals and conferences (MISQ, ISR, ICIS, WISE, CIST, JMR, and JCR) in different disciplines were searched to ensure no paper was missed. To conduct the automatic search, the authors identified some specific keywords based on the research questions included in the review. The major keywords included: unplanned buying, online impulse buying, E-impulse buying, social electronic commerce, social commerce and social E-commerce. These keywords were combined using logical operators (AND /OR). Specifically, the expression (impulse buying OR unplanned buying Or E-impulse buying AND social commerce OR social electronic commerce OR social E-commerce OR social media) was used as a search expression in the search field. After deriving the data from the various data sources, the authors conducted a manual search. For this, the authors applied the backward and forward search process for determining the citations of all selected studies. They also used the Google Scholar search engine as a forward search process to find the studies that were previously cited in the primary studies. A manual search ensured the completeness and comprehensiveness of this review [101]. Thereafter, the authors used EndNote, a reference management tool, for maintaining the results of all searches and eliminating the duplicates.

**D. STUDY SELECTION PROCESS**

After the authors explored the aforementioned search engines, they conducted the study selection for identifying the studies related to all research questions. They used specific keywords and identified 420 studies using an automatic search process. Then, a manual search was used for the reference section of every study to determine any of the missing papers. One hundred ten studies were found. All studies were merged, and the duplicated studies were eliminated with the help of a Microsoft Excel worksheet, which left 407 studies. Thereafter, they applied the inclusion/exclusion criteria on the title, abstract, and the conclusion of every paper, and selected 75 studies. Studies that did not show a clear relation to the review topic were excluded, as per the recommendations of Kitchenham and Charters [20]. The authors also carried out full-text scanning for all the remaining papers using the exclusion criteria. They applied the necessary quality assessment criteria and eliminated a further seven studies. Finally, a list of 68 studies was considered as the final list of the primary studies, with 24 studies out of 68 used to achieve the main four objectives of the present paper whereas the

remaining studies that addressed IBB in E-commerce were selected and included in the review to help the authors deeply analyze the concept of IBB, identify its main characteristics and differentiate it from other types of buying behaviors. These primary studies are mentioned in Appendix A of the supplementary material.

### E. QUALITY ASSESSMENT (QA)

The QA helped in determining the general quality of all the selected studies [20]. The QA criteria were based on the quality instruments, such as the checklist of all factors or questions that had to be applied to every study. Here, the authors developed five QA criteria for assessing the quality of every study, which were as follows: QA1: Are all the topics addressed in the research paper related to online impulse buying? QA2: Is the research methodology explained in the review? QA3: Does the paper describe the data collection method? QA4: Does the paper present the data analysis steps? QA5: Does the research paper explain the context clearly?

The authors used these five QA criteria for assessing the 75 studies to determine the credibility of all selected studies. The quality of the paper was further assessed by scoring each QA criteria, where the scores ranged between high, medium, or low, based on their loading scores as described in [102], [103]. If the study satisfied a criterion, it scored 2, if it partially satisfied the criterion, it was given a score of 1, while it was scored 0 if it did not satisfy the criterion. The paper quality was believed to be high if it could score value of  $\geq 6$ , while it was considered to be medium if it scored 5, and was considered to be of lower quality if it scored  $< 5$ . On conducting the QA, seven studies were found to not satisfy the criteria and hence were excluded from the final list of papers.

### F. DATA EXTRACTION AND SYNTHESIS

Here, the authors designed a specific data extraction form for accurately recording all information, wherein they read all the papers and extracted the relevant data using EndNote and the MS Excel spreadsheets. They established the following columns in the spreadsheets: Study ID is a unique identity for the paper; Title; Author list; Year of publication; Publishing source (e.g. conference proceeding, journal, book chapter); Theories applied, Methodology; and Research context where the study has been conducted. All the factors were selected according to the objectives and the research questions.

#### 1) PUBLICATION SOURCE OVERVIEW

A majority of the papers were published in reliable journals with a high impact factor, or in conference proceedings, which further increases the significance of this review. The authors used primary studies for ensuring higher quality and providing accurate information with regards to online IBB. The publication sources were distributed as follows: 53 studies were journal articles; conference proceedings included ten papers, while 5 of the studies were conference papers.

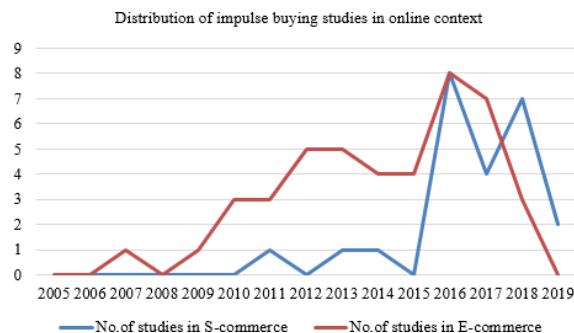


FIGURE 2. Temporal view of primary studies.

#### 2) TEMPORAL VIEW OF PUBLICATION

The authors selected the papers published between 2005 and 2019. Fig. 2 presents the distribution of all studies, based on their publication timeline. As shown in Fig. 2, there has been a gradual increase in the number of IBB-related papers between 2008 and 2016. The highest number of papers were noted in 2016, i.e., 16 studies. In the period between 2007 and 2016, many studies in E-commerce addressed IBB. After that, and in the period between 2016 and 2019, social commerce has been well recognized, and researchers have given more attention to these platforms to study IBB.

#### 3) RESEARCH METHODS OF ONLINE IMPULSE BUYING STUDIES

This section presents the research methods used for analyzing the primary studies related to online IBB. A majority of the studies (46) in an online context (E-commerce and S-commerce) were survey-based, while 17 studies were experimental. Only one study used an interview method, and two studies were conducted using mixed methods. Furthermore, all the reviews (two) analyzed in the literature addressed the customer's online IBB in the context of E-commerce. None of the reviews studied the S-commerce context. Since S-commerce differs from E-commerce and generally depends on the social interaction amongst the customers [4], there is a need to address the consumer's online buying behavior in this context. The authors believed that this was the first review that analyzed the consumer's online buying behavior in the field of social commerce.

## IV. RESULTS

In this section, the authors analyze, discuss, and present the results of reviewing the previous studies of online IBB in S-commerce systematically. The research methods, product categories, research context, theoretical foundation, and the factors that trigger impulse buying behavior in S-commerce have been discussed.

### A. ONLINE IMPULSE BUYING RESEARCH METHODS IN S-COMMERCE CONTEXT

Out of the 68 studies that were analyzed, 24 studies addressed online IBB in the S-commerce context. After investigating

**TABLE 4.** Online impulse buying product categories, research context, and sampling.

Targeted participant	Age	SC type	Sampling technique	Product category	Context	Ref
Users of SC Sites	–	WeChat, QQ, Sina Weibo	Purposive	–	China	[81]
	–	Group buying	Random	Smartphones	Taiwan	[15]
	–	Sina Weibo Website	Purposive	–	China	[106]
	–	Group buying	Purposive	Digital cameras, restaurant coupons, performance coupons, CD/DVD, sport equipment, furniture, office supplies, household item, cosmetic, clothes, travel vouchers	–	[110]
	–	Group buying (ju.taobao.com, dianping.com, meituan.com)	Purposive	–	China	[111]
	18-elder	Facebook	Purposive	Fashion Apparel	–	[77]
	15-64	Facebook	Purposive	Apparel	Malaysia	[112]
	15-64	Facebook	Purposive	–	Malaysia	[105]
	–	Group buying (Groupon.com)	Purposive	Restaurants coupons	–	[37]
	–	–	–	Cosmetics, mobile phones, computers	–	[113]
	–	Mogujie.com	Purposive	–	China	[112]
	–	Group buying (ju.taobao.com, dianping.com, meituan.com)	Purposive	–	China	[114]
	–	social commerce sites in South Korea	Quota	Restaurant products and services	Korea	[73]
	–	Facebook	Purposive	–	Taiwan	[40]
	–	Facebook	Purposive	Food	Taiwan	[115]
	–	WeChat	Random	–	China	[66]
–	WeChat, Sina Weibo and QQ	Convenience	–	China	[107]	
–	Instagram	Purposive	–	Indonesia	[116]	
–	sojump.com	Purposive	Apparel and accessory products	China	[117]	
–	Facebook	Purposive	Apparel	Malaysia	[109]	
University student	–	–	Convenience	–	China and Pakistan	[88]
	–	Group buying	Convenience	–	China	[36]
	–	–	Random	Movie films	United state	[104]
	–	YouTube vlogs	Purposive	Apparel	–	[108]

these 24 studies, the authors found that the survey was the most popular research method, used by 83% of the papers, while 17% of studies applied the experiment method. These two methods were used to understand the different types of stimuli that trigger consumers' impulse buying responses. Previous researches used experimental studies to examine the influence of website features in online impulse buying. For instance, Hostle *et al.* [104] studied how the use of recommendation agents in S-commerce sites affects a consumer's impulse buying. Such experimental settings enable scholars to understand the influence of particular features of a website on online impulse buying. Moreover, the study of the effects of consumers' characteristics, perceptions, attitudes, and intentions in impulse buying depends on survey data. The use of surveys allowed researchers to explore the influence of the unobservable constructs. For example, Leong *et al.* [105] examined the effect of personality traits in the consumer's impulse buying behavior.

### B. ONLINE IMPULSIVE PRODUCT CATEGORIES, RESEARCH CONTEXT POPULATION, AND SAMPLING

As shown in Table 4, a majority of the identified studies that addressed online impulse buying in the context of S-commerce were conducted in Asia, in particular, China, such as the study conducted by Xi *et al.* [106]. Only one

study was conducted in the United States [104]. Previous studies that addressed online impulse buying in S-commerce either used users of a particular S-commerce site as their samples [73], [107] or used university student samples [36]. Previous studies have suggested that the use of student samples was appropriate because young people are the dominant group of online consumers [19]. Furthermore, different sampling techniques were used by these studies, such as convenience, random, quota, and purposive sampling. Purposive sampling was the most used sampling technique (see Table 4). Additionally, various product categories were tested in previous works, where apparel was the most used product category [108], [109], followed by restaurant coupons [73]. Many studies did not specify the type of product. Thus there is sufficient empirical evidence that online impulse buying happens irrespective of product type, where once the study respondents were exposed to internal and external stimuli, they were motivated to buy impulsively.

### C. THEORETICAL FOUNDATION OF ONLINE IMPULSIVE BUYING BEHAVIOR IN S-COMMERCE

To understand a consumer's online IBB in the S-commerce context, psychological theories and social related theories have been adopted in these studies. The theoretical foundations for these studies include: latent state-trait theory,

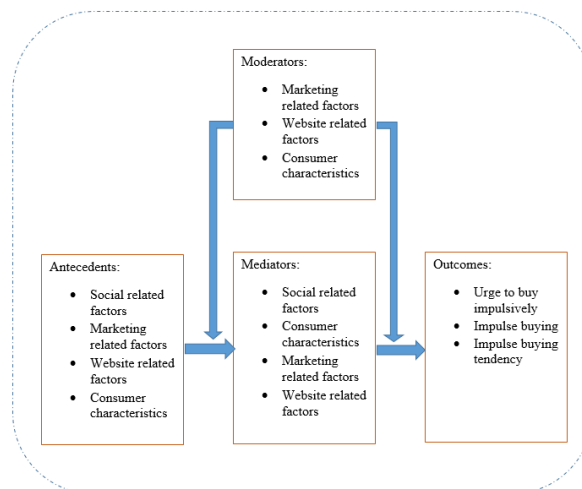


heuristic information processing (HIP), observational learning, process theory, social influence theory, social network paradigm, uses and gratification theory, stimulus-organism-response framework, parasocial interaction (PSI) theory, social capital theory, flow theory, self-determination theory, signaling theory, theory of Web usage, social impact theory and trust transference theory. The majority of the previous researches (10 studies) used the stimulus-organism-response framework in their studies to understand how the stimulating cues perceived from the environment trigger one's internal evaluation, which subsequently leads to one of the impulse buying responses (urge to buy impulsively, and impulse buying).

#### D. FACTORS INFLUENCING ONLINE IBB IN S-COMMERCE CONTEXT

After conducting an in-depth analysis of the selected 24 studies, the authors conceptualized a causal-chain framework for determining the various factors which influenced the consumer's online IBB and their interrelationships in an S-commerce context. This adopted framework was based on the input-moderator-mediator-output model, described by Mohammed *et al.* [118] and consisted of antecedents (as inputs), mediators, moderators, and outcomes (as outputs). The antecedents included the input variables or factors which led to the output, i.e., a cause-effect relationship between the inputs and the outputs, which were elucidated by all mediators, wherein the moderators affected the strength or the direction of this relationship [119]. Tables 7, 6, and 5 describe all the adopted factors, which were further grouped into the respective categories as antecedents, moderators, mediators, and outcomes. For the analysis of the factors that affected online IBB, the authors investigated the outcome of this framework, which focused on two types of IBB (impulse buying and their desire to buy impulsively). Researchers have a different focus; therefore, the same factors appearing in different literature may be revealed in different positions in the framework. For instance, the factor of "impulsiveness" was used as a mediator [36], or an antecedent [73], while Zhang *et al.* [114] used it as the moderator.

All factors that affect online IBB in an S-commerce context were classified as per the classification approach proposed by Chan *et al.* [19] for studying online IBB in an E-commerce context. This classification included website-related factors, situational or social factors, marketing factors, and consumer/individual characteristics. Here, the authors classified every factor based on the opinions expressed by the authors of the original studies or based on the definition of the factor if the author's opinion was unclear. Chan *et al.* [19] described the website-related factors as the visible or audible website cues, which included the design features of the presentations of the websites. These were used by several researchers [14], [36], who assessed the effect of the website's visual appeal. This also included the consumer's beliefs or perceptions regarding the S-commerce websites. For example, Liu *et al.* [36] investigated the perceived



**FIGURE 3.** Causal-chain framework for online impulse buying in social commerce.

ease-of-use. On the other hand, the marketing category consists of the various marketing cues used by the marketers for attracting the consumers of S-commerce for purchasing a product [19]. For instance, Farivar and Yuan [37] studied the effect of scarcity on the consumer's online IBB. Chan *et al.* [19] described the consumer characteristics as the inherent factors of the consumers, which were associated with their propensity, while the social-related factors included all other factors related to the social interactions between consumers, which affected the consumer's buying response. Fig. 3 shows the causal-chain framework of online impulse buying in social commerce. All the different aspects of Figure 3 have been illustrated in the following subsections.

##### 1) ANTECEDENTS

An antecedent refers to a cue or stimulus which precedes the behavioral outcome and forms the input of this causal-chain framework [119]. All studies showed that the antecedents which affected the consumer's online IBB in an S-commerce context belong to one of four categories, i.e., social-related factors, website-related factors, consumer characteristics, and marketing-associated factors. The category of website-related factors was the most studied among other categories; 19 factors have been examined in previous works. As shown in Table 5, information quality and visual appeal were the most significant website-related factors that were found to influence IBB.

##### 1) SOCIAL-RELATED FACTORS

Several studies examined the effect of the social-related factors as the antecedents. For example, scholars in [15], [37] investigated the effect of the number of "likes" on online IBB. Furthermore, Electronic Word of Mouth (eWOM) and brand-related user-generated content were used interchangeably in the literature, where they were also assessed in the form of antecedents [77], [88]. As shown in Table 5, the number of

**TABLE 5. Factors adopted as antecedents.**

Antecedents	Reference	Frequency
a) Social Related Factors		
• Number of “likes”	[15], [37]	2
• Social presence	[110], [117]	2
• Review quality and source credibility	[111]	1
• Observational learning	[111]	1
• Similarity	[66] [14]	12
• Expertise	[14]	1
• Likeability	[14]	1
• Online review’s hedonic and Utilitarian value	[114]	1
• Electronic word-of-mouth (eWOM)	[77], [88]	2
• Social capital	[40]	1
• Closeness	[109]	1
• Familiarity	[109]	1
b) Website related factors		
• Information quality	[15], [66], [117]	3
• Personalization	[106]	1
• Social interaction	[106]	1
• Tempo music	[110]	1
• Navigational characteristics	[113]	1
• Entertainment	[108], [113]	2
• Information fit-to-task	[14]	1
• Visual appeal	[14], [36], [116]	3
• Website ease of use	[36]	1
• Subject Involvement	[40]	1
• Vividness	[40]	1
• Previous Purchases	[37]	1
• Serendipity	[81]	1
• Informativeness	[108], [113]	2
• Recommendation agent	[104]	1
• Website personality	[107]	1
• Advertisement content	[116]	1
• Production quality	[108]	1
• Creativity	[108]	1
c) Consumer characteristics		
• Big five personality traits	[105]	1
• Impulsiveness	[73]	1
• Trustworthiness	[106], [109]	2
• Expertise	[106]	1
• Browsing	[112]	1
• Harmonious Passion	[115]	1
• Obsessive Passion	[115]	1
• Usage intensity	[81]	1
• Social and physical attractiveness	[108]	1
• Homophily	[108]	1
• Hedonic and utilitarian motivation	[109]	1
• Urgency	[109]	1
d) Marketing related factors		
• Scarcity	[37], [81]	2
• Product availability	[36], [116]	2
• Vicarious expression	[66]	1
• Aesthetic appeal	[66]	1

“likes”, similarity, social presence, and eWOM were the most studied factors in this category. The other social-related factors are described in Table 5.

**2) WEBSITE-RELATED FACTORS**

Various website-related factors are used as antecedents for determining their effect on online IBB. The majority of the previous researches focused on website-related factors in their studies. One of the most important

**TABLE 6. Factors adopted as moderators.**

Moderator	Reference	Frequency
a) Marketing related factors		
• Scarcity	[73], [110]	2
• Product type	[113]	1
• Sales promotion	[107]	1
b) Consumer characteristics features		
• Big five personality traits	[88]	1
• Hedonic shopping	[81]	1
• Impulsiveness	[15], [37], [114]	3
• Absorption	[37]	1
• Experience	[105]	1
• Income	[112]	1
c) Website related factors		
• Serendipity	[73]	1

factors was visual appeal [14], [36]. Li *et al.* [113] studied the effect of website navigational characteristics on online IBB. Table 5 presents the other website-related factors investigated in online impulse buying literature.

**3) CONSUMER CHARACTERISTICS**

In this category, eight out of twenty-four earlier studies used consumer characteristics as antecedents for analyzing their effect on the consumer’s online IBB in the S-commerce context. For example, Leong *et al.* [112] investigated the effect of five antecedents, which referred to different personality traits (i.e., agreeableness, extraversion, openness, neuroticism, and conscientiousness) on online IBB, as shown in Table 5.

**4) MARKETING-RELATED FACTORS**

The existing researches paid little attention to this category. As presented in Table 5, only product availability, scarcity, vicarious expression, and aesthetic appeal were used as antecedents for analyzing online IBB in an S-commerce context.

**2) MODERATORS**

A moderator refers to a factor or research variable which affects the strength and/or direction of the relationship between all independent and dependent variables [119]. As shown in Table 6, the moderators that were used in previous studies were related to marketing-related factors, consumer characteristics, and website-related factors. No social-related factors have been used as moderators in existing studies.

**1) MARKETING-RELATED FACTORS**

Various researchers studied how marketing factors affected the strength and the direction of the relationships between the antecedents and their subsequent online IBB. Scarcity was the most investigated marketing-related factor [73], [110], as it has a significant moderation effect on consumer’s online IBB. Refer to Table 6 for an outline of the remaining factors.

**2) CONSUMER CHARACTERISTICS**

A majority of the previous researchers that investigated the moderation role in their studies used this category. These studies analyzed the effect of consumer

TABLE 7. Factors adopted as mediators.

Mediator	Reference	Frequency
a) Social Related Factors		
• Social support	[106]	1
• Social influence	[106]	1
• Peer Communication	[40]	1
• Parasocial interaction	[106], [108]	2
b) Consumer characteristics		
• Arousal	[77], [110]	2
• Pleasure	[77], [110]	2
• Positive affect	[107], [111]	2
• Negative affect	[107]	1
• Urge to buy impulsively	[40], [105], [109], [112], [114]	5
• Urgency	[105]	1
• Impulse buying tendency	[14], [36]	2
• Shopping value(utilitarian, hedonic value)	[73], [117]	2
• Instant gratification	[36]	1
• Normative evaluation	[36]	1
• Perceived usefulness	[14], [108], [116]	3
• Perceived enjoyment	[14], [108], [116]	3
• Satisfaction	[104]	1
• Affective trust	[66]	1
• Cognitive trust	[66]	1
• Product affection	[66]	1
• Impulsiveness	[116]	1
c) Marketing related factors		
• Product promotion effectiveness	[104]	1
d) Website related factors		
• Product search effectiveness	[104]	1

characteristics on the strength of the relationships between the antecedents and the online IBB. For example, Akram et al. [81] used the hedonic shopping features (such as relaxation shopping, social shopping, adventure shopping, value shopping or idea shopping) as moderators. The most important factor that was found to play a significant moderation role on IBB was impulsiveness [15], [37], [114].

3) WEBSITE-RELATED FACTORS

As seen in Table 6, serendipity is the sole Website-related factor that was used as a moderator in earlier studies of online impulse buying in S-commerce [73].

3) MEDIATORS

Mediators refer to factors or variables which describe the cause-effect relationship between the antecedents and the outcomes (for example, online IBB) [119]. As shown in Table 7, most of the mediators examined in the previous works belong to the consumer characteristics category. In contrast, only one study investigated the role of a website-related factor and marketing factor as a mediator [104].

1) SOCIAL-RELATED FACTORS

Some social factors, like the social influence (informational or normative) and the social support (informational or emotional), have been used as mediators in

earlier S-commerce studies that investigated the causality between the input and the outcome (i.e., online IBB) [106]. In Table 7, it can be noticed that parasocial interaction was the most used mediator in previous literature [106], [108].

2) CONSUMER CHARACTERISTICS

Many studies examined the role played by consumer characteristics as a mediator. Most of the studies [40], [105], [112], [114] used the urge to buy impulsively as a mediator, which affects the consumer’s IBB. Table 7 describes other consumer characteristics (pleasure, arousal, and urgency), used as a mediator.

3) MARKETING RELATED FACTORS

As shown in Table 7, product promotion effectiveness was the only marketing factor used as a mediator [104].

4) WEBSITE RELATED FACTORS

Similar to marketing factors, product search effectiveness was the only website factor used as a mediator [104].

4) OUTCOMES

Outcomes refer to the expected result behavior caused by the antecedents, due to the mediators and moderators [119]. These outcomes include the dependent variables of the consumer’s online impulse buying. There are two main types of impulse buying responses, namely, urge to buy impulsively (UBI) and actual impulse buying [112]. These are adopted by many researchers as an outcome variable for studying online IBB in the S-commerce context. IBB occurs when the consumers experience a UBI and consider it necessary to buy the product. On the other hand, it is not necessary that consumers actually purchase the product if they encounter a strong UBI [112], and therefore, UBI and the actual impulsive buying are considered to be different concepts. Previous studies either focused on UBI [14], [15], [36], [37], [73], [111] or actual impulsive buying [14], [88], [109], [110]. Few studies considered both the impulse buying responses [40], [105], [112], [114], wherein the UBI was a mediator, and the outcome referred to the actual impulsive buying. Some other studies focused on the user’s impulse buying tendencies [77], [113]. Table 8 presents these factors in detail.

TABLE 8. Outcomes.

Outcomes	Reference	Frequency
Urge to buy impulsively	[14], [15], [36], [37], [73], [108], [111], [116], [117]	9
Impulse buying	[40], [66], [81], [88], [104]–[107], [109], [110], [112], [114], [115]	13
Impulse buying tendency	[77], [113]	2

V. DISCUSSION AND FUTURE WORK

Based on the analysis of the systematic review work, the authors outline some areas for future research that may

**TABLE 9. Research agenda.**

Systematic review	Questions
Social commerce definition	<ul style="list-style-type: none"> <li>• What is the standard definition of S-commerce?</li> <li>• What are the main elements of S-commerce considering new technologies?</li> </ul>
Impulse buying definition	<ul style="list-style-type: none"> <li>• What is the standard definition of impulse buying?</li> <li>• What are the main components of each different type of impulse purchase (reminder, pure, suggestive, and planned impulse purchases)?</li> </ul>
Diverse research methods and research context	<ul style="list-style-type: none"> <li>• What are the impacts of using mixed methods or triangulation or neurophysiological approaches on impulse buying studies results?</li> <li>• What is the impact of replicating the previous studies in a different context other than Asia?</li> </ul>
Theoretical considerations	<ul style="list-style-type: none"> <li>• What are other theories from different disciplines are valid to better explain and understand online impulse buying in social commerce in IS?</li> </ul>
Impulse buying responses	<ul style="list-style-type: none"> <li>• Is the urge to buy impulsively significantly different from actual impulse buying?</li> <li>• If the future researches replicate the existing studies by considering both UBI and IBB, will the results differ?</li> </ul>
Social interaction	<ul style="list-style-type: none"> <li>• What other social-related factors in S-commerce contribute significantly to online impulse buying?</li> </ul>
Moderation and mediation roles of Website and marketing factors	<ul style="list-style-type: none"> <li>• What other Website and marketing factors in S-commerce play important roles as moderation and mediation in online impulse buying?</li> </ul>

yield interesting insights into the field, but have not yet been covered or which need more investigation. Furthermore, the authors provide a novel research agenda (see Table 9) to include promising questions for future work derived from our analysis of the previous researches.

In this systematic review, diverse definitions of social commerce from academic publications have been collected and analyzed. After analyzing these definitions, it has been found that previous studies defined the S-commerce concept by focusing on different perspectives: social media, commercial activities, social activities, and Web2.0. Despite several efforts having been made to conceptualize the definition of S-commerce, there is no generic and clear definition of S-commerce. What are the main elements of social commerce? Since S-commerce evolved rapidly and comprises newer technologies and encompasses multiple fields including sociology, computer science, marketing, and psychology [13], there is a need to update the concept of S-commerce based on the new developments in technologies, and to provide a broader domain to include all the sciences that contribute to it. Future researches should give a clear definition of S-commerce considering these questions to clarify the concept of S-commerce.

Additionally, online impulse buying increased significantly in the online context due to the appearance of S-commerce. In this paper, the authors synthesized previous

studies of online impulse buying and analyzed various definitions of impulse buying. The authors showed that these earlier studies defined impulse buying from different angles: intention and planning for the purchase, time to make a purchase decision, feelings, reflections of purchase consequences, thoughtful purchase, and the reaction to stimuli. Since there is still a lack of a standard definition of the impulse buying concept [4], other research questions that need to be investigated in future research are “What is the standard definition of impulse buying?” “What are the main components of each different type of impulse purchase (reminder, pure, suggestive, and planned impulse purchases)?” Answers to these questions will provide a greater understanding of and insights into the impulse buying concept.

This study also consolidated and summarized the findings of the previous studies that addressed online IBB in the context of S-commerce. The authors found that most of the existing studies of online IBB used survey and experimental methods. These two methods have methodological shortcomings which influence the results of the study. For example, in controlled settings, the experimental designs may cause the individual to interpret, perceive, and react upon what he/she believes the experimenters are looking for [50]. As for survey defects, participants may respond to the questionnaire in a socially desirable manner and underreport the level or occurrence of their online IBB. Since the survey and experiment methods are insufficient to capture the actual IBB, future studies could use mixed methods or tribulations method or a neurophysiological approach to provide more rigorous and objective measurements of online IBB and accurate results.

Furthermore, the majority of the previous works have been conducted in Asia, particularly in China. Previous researches showed that culture influences consumer purchases [120]. Since people in this region shared the same culture, replicating these studies in a different context may produce a different, new, accurate, and deeply intuitive understanding of impulse buying.

Moreover, regarding the theoretical foundation of the previous works, the majority of the studies adopted stimulus-organism-response as their underlying framework to study online IBB. Although online impulse buying attracted the attention of scholars in S-commerce, the theoretical foundation of online IBB research is still in its infancy and scattered. Developing new theories in this area of study is considered as one of the challenging issues for information systems research [4]. Thus, additional research efforts are needed to investigate the causes of online IBB theoretically and empirically to enrich our understanding of such behavior and expand this area of study. Furthermore, after analyzing the factors that influence online IBB in S-commerce, it has been noticed that previous studies focused on either the urge to buy impulsively or actual impulse buying, which are different concepts. An individual tends to buy impulsively if he/she experiences an urge to buy. However, the consumer may or may not purchase the product if he/she experiences a strong UBI [112].



On the other hand, one of the main features of impulse buying is a strong emotion that accompanies it. Thus it is necessary to use UBI to study actual impulse buying. Therefore, the authors recommend that both UBI and actual impulse buying should be considered when studying IBB to provide precious and real results regarding impulse buying. Moreover, most of the studies used website-related factors as antecedents of IBB, and little attention was given to marketing and social-related factors. Impulse buying has been studied for decades in marketing research; therefore, it is important to examine the influence of different marketing factors on online IBB in S-commerce. The main focus of S-commerce is the social aspect, which differentiates it from other contexts [4]. S-commerce enables social interaction among consumers; thus, the social-related factors play a significant role in consumer behavior in this interactive platform. The authors suggest that future research puts more emphasis on marketing such as warranty and advertising and social-related factors (e.g., social enhancement and maintaining interpersonal connectivity). The authors also recommend that more investigation of the moderation and mediation roles of the website and marketing factors on impulse buying is needed to give a comprehensive understanding of online IBB. Table 9 presents a research agenda.

## VI. CONCLUSIONS

Impulse buying has significantly appeared in S-commerce and it attracted the attention of scholars. In this study, the authors used a systematic review approach to: (1) provide an overview of online IBB research methods in the context of S-commerce, (2) understand the theoretical foundation of online IBB in S-commerce, (3) identify and classify the factors that influence impulse buying behavior in the context of S-commerce, and (4) highlight research gaps and future work. Additionally, the authors analyzed different definitions of the S-commerce concept and defined its key elements. They also offered a clear perspective with regards to the consumer's online IBB and identified the major differences between the impulse buying behavior, unplanned or planned (rational) buying. Moreover, they presented the main characteristics of impulse buying.

Literature analysis revealed that survey-based (83%) and experiment method-based studies (17%) were prevalent in online IBB researches. Furthermore, some researchers adopted a few theories for studying online IBB, wherein the S-O-R framework was the most popular. In addition, the authors also classified all the factors that affected online IBB into four different categories, i.e., website-related, marketing-related, consumer characteristics, and social factors, and provided a Causal-Chain framework for this behavior. Finally, the authors proposed a future research agenda on online IBB, which could be very helpful to both academicians and practitioners in the fields of S-commerce and IBB.

This study helps researchers to deeply understand the online IBB concept and the main characteristics of IBB that enable them to differentiate it from other types of

**TABLE 10. Primary studies references.**

Study-ID	References
S1	Chen, Y.-F., and Wang, R.-Y. (2016). Are humans rational? Exploring factors influencing impulse buying intention and continuous impulse buying intention. <i>Journal of Consumer Behaviour</i> , 15(2), 186-197.
S2	Lin, S.-W., and Lo, L. Y.-S. (2015). Evoking online consumer impulse buying through virtual layout schemes. <i>Behaviour &amp; Information Technology</i> , 35(1), 38-56.
S3	Xiang, L., Zheng, X., Lee, M. K. O., and Zhao, D. (2016). Exploring consumers' impulse buying behavior on social commerce platform: The role of parasocial interaction. <i>International Journal of Information Management</i> , 36(3), 333-347.
S4	Huang, L.-T. (2015). Exploring utilitarian and hedonic antecedents for adopting information from a recommendation agent and unplanned purchase behavior. <i>New Review of Hypermedia and Multimedia</i> , 22(1-2), 139-165.
S5	Akram, U., Hui, P., Kaleem Khan, M., Tanveer, Y., Mehmood, K., and Ahmad, W. 2018a. "How Website Quality Affects Online Impulse Buying: Moderating Effects of Sales Promotion and Credit Card Use," <i>Asia Pacific Journal of Marketing and Logistics</i> (30:1), pp. 235-256.
S6	Chen, T.-Y., Yeh, T.-L., and Lo, W.-C. (2017). Impacts on Online Impulse Purchase through Perceived Cognition. <i>Journal of International Consumer Marketing</i> , 29(5), 319-330.
S7	Aragoncillo, L., and Orus, C. (2018). Impulse buying behaviour: an online-offline comparative and the impact of social media. <i>Spanish Journal of Marketing - ESIC</i> .
S8	Lo, L. Y.-S., Lin, S.-W., and Hsu, L.-Y. (2016). Motivation for online impulse buying: A two-factor theory perspective. <i>International Journal of Information Management</i> , 36(5), 759-772.
S9	Rezaei, S., Ali, F., Amin, M., and Jayashree, S. 2016. "Online Impulse Buying of Tourism Products: The Role of Web Site Personality, Utilitarian and Hedonic Web Browsing," <i>Journal of Hospitality and Tourism Technology</i> (7:1), pp. 60-83.
S10	Wells, J. D., Parboteeah, V., and Valacich, J. S. (2011). Online Impulse Buying: Understanding the Interplay between Consumer Impulsiveness and Website Quality*. <i>Journal of the Association for Information Systems</i> , 12(1), 32-56.
S11	Ozen, H., and Engizek, N. (2014). Shopping online without thinking: being emotional or rational? <i>Asia Pacific Journal of Marketing and Logistics</i> , 26(1), 78-93.
S12	Chan, T. K. H., Cheung, C. M. K., and Lee, Z. W. Y. (2017). The state of online impulse-buying research: A literature analysis. <i>Information &amp; Management</i> , 54(2), 204-217.
S13	Liu, Y., Li, H., and Hu, F. (2013). Website attributes in urging online impulse purchase: An empirical investigation on consumer perceptions. <i>Decision Support Systems</i> , 55(3), 829-837.
S14	Zheng, X., Liu, N., and Zhao, L. (2013). A Study of the Effectiveness of Online Scarce Promotion —Based on the Comparison of Planned Buying and Unplanned Buying. Paper presented at the Wuhan International Conference on e-Business
S15	Park, E. J., Kim, E. Y., Funches, V. M., and Foxx, W. (2012). Apparel product attributes, Web browsing, and e- impulse buying on shopping Websites. <i>Journal of Business Research</i> , 65(11), 1583-1589.

buying behaviors. It also provides a causal chain framework to allow these researchers to identify and understand the

TABLE 10. (Continued.) Primary studies references.

S16	Hostler, R. E., Yoon, V. Y., Guo, Z., Guimaraes, T., and Forgionne, G. (2011). Assessing the impact of recommender agents on on-line consumer unplanned purchase behavior. <i>Information &amp; Management</i> , 48(8), 336-343.
S17	Vojvodic, K., and Matic, M. (2013). Challenges of E-Retailing: Impulsive Buying Behaviour. 29, 155-171.
S18	Lee, C.-H., and Wu, J. J. 2017. "Consumer Online Flow Experience: The Relationship between Utilitarian and Hedonic Value, Satisfaction and Unplanned Purchase," <i>Industrial Management &amp; Data Systems</i> (117:10), pp. 2452-2467.
S19	Chung, N., Song, H. G., and Lee, H. (2017). Consumers' impulsive buying behavior of restaurant products in social commerce. <i>International Journal of Contemporary Hospitality Management</i> , 29(2), 709-731.
S20	Dawson, S., and Kim, M. (2010). Cues on apparel Web sites that trigger impulse purchases. <i>Journal of Fashion Marketing and Management: An International Journal</i> , 14(2), 230-246.
S21	Wu, I.-L., Chen, K.-W., and Chiu, M.-L. (2016). Defining key drivers of online impulse purchasing: A perspective of both impulse shoppers and system users. <i>International Journal of Information Management</i> , 36(3), 284-296.
S22	Nagar, K. (2016). Drivers of E-store Patronage Intentions: Choice Overload, Internet Shopping Anxiety, and Impulse Purchase Tendency. <i>Journal of Internet Commerce</i> , 15(2), 97-124.
S23	Moran, B., Bryant, L., and Kwak, L. E. (2015). Effect of Stress, Materialism and External Stimuli on Online Impulse Buying. <i>Journal of Research for Consumers</i>
S24	Xu, Y., and Huang, J.-S. (2014). Effects of Price Discounts and Bonus Packs on Online Impulse Buying. <i>Social Behavior and Personality: an international journal</i> , 42(8), 1293-1302
S25	Wei, W. J., Ma, Z. J., and Chen, Y. W. (2017). Empirical Study of the Relationship Between Flow Experience, Perceived transaction value and impulse buying behavior. Paper presented at the Industrial Engineering and Engineering Management (IEEM).
S26	Parboteeah, D. V., Taylor, D. C., and Barber, N. A. (2016). Exploring impulse purchasing of wine in the online environment. <i>Journal of Wine Research</i> , 27(4), 322-339.
S27	Chen, J. V., Su, B.-c., and Widjaja, A. E. (2016). Facebook C2C social commerce: A study of online impulse buying. <i>Decision Support Systems</i> , 83, 57-69.
S28	Akram, U., Hui, P., Khan, M., Yan, C., and Akram, Z. (2018). Factors Affecting Online Impulse Buying: Evidence from Chinese Social Commerce Environment. <i>Sustainability</i> , 10(2), 352.
S29	Huang, L.-T. (2016). Flow and social capital theory in online impulse buying. <i>Journal of Business Research</i> , 69(6), 2277-2283.
S30	Huang, Y.-F., and Kuo, F.-Y. (2012). How impulsivity affects consumer decision-making in e-commerce. <i>Electronic Commerce Research and Applications</i> , 11(6), 582-590.
S31	Zhang, K. Z. K., Hu, B., and Zhao, S. J. 2014. "How Online Social Interactions Affect Consumers' Impulse Purchase on Group Shopping Websites?," <i>PACIS</i> , p. 81.
S32	Atici, B., and Bati, U. (2010). Impulse Purchasing Behaviors of the Turkish Consumers in Websites as a Dynamic Consumer Model: Technology Products Example. <i>International Journal of Advanced Corporate Learning (IJAC)</i> , 3(4).
S33	Xi, H., Hong, Z., Jianshan, S., Li, X., and Jiuchang, W. 2016. "Impulsive Purchase Behavior in Social Commerce The Role of Social Influence," <i>Pacific Asia Conference on Information Systems (PACIS)</i> .

factors that trigger IBB in S-commerce and the current state of the IBB research in S-commerce. Furthermore, this paper

TABLE 10. (Continued.) Primary studies references.

S34	Zhou, Q., Chen, x., and Chen, y. w. (2014). Influence of Online Store Belief and Product Category on Impulse Buying An empirical investigation on consumer perceptions. Paper presented at the Industrial Engineering and Engineering Management (IEEM), 2014 IEEE International Conference on. IEEE, 2014.
S35	Lim, S. H., Lee, S., and Kim, D. J. (2016). Is Online Consumers' Impulsive Buying Beneficial for E-Commerce Companies? An Empirical Investigation of Online Consumers' Past Impulsive Buying Behaviors. <i>Information Systems Management</i> , 34(1), 85-100.
S36	Zhang, K. Z. K., Xu, H., Zhao, S., Yu, Y., and Cheung, C. (2018). Online reviews and impulse buying behavior: the role of browsing and impulsiveness. <i>Internet Research</i> , 00-00.
S37	Kim, A. J., and Johnson, K. K. P. (2016). Power of consumers using social media: Examining the influences of brand-related user-generated content on Facebook. <i>Computers in Human Behavior</i> , 58, 98-108.
S38	Vonkeman, C., Verhagen, T., and van Dolen, W. (2017). Role of local presence in online impulse buying. <i>Information &amp; Management</i> , 54(8), 1038-1048.
S39	Ning Shen, K., and Khalifa, M. (2012). System design effects on online impulse buying. <i>Internet Research</i> , 22(4), 396-425.
S40	Chih, W.-H., Wu, C. H.-J., and Li, H.-J. (2012). The Antecedents of Consumer Online Buying Impulsiveness on a Travel Website: Individual Internal Factor Perspectives. <i>Journal of Travel &amp; Tourism Marketing</i> , 29(5), 430-443.
S41	Ju, J., and Ahn, J.-H. (2016). The effect of social and ambient factors on impulse purchasing behavior in social commerce. <i>Journal of Organizational Computing and Electronic Commerce</i> , 26(4), 285-306.
S42	Leong, L.-Y., Jaafar, N. I., and Amin, S. (2018). The effects of Facebook browsing and usage intensity on impulse purchase in f-commerce. <i>Computers in Human Behavior</i> , 78, 160-173.
S43	Turkylmaz, C. A., Erdem, S., and Uslu, A. (2015). The Effects of Personality Traits and Website Quality on Online Impulse Buying. <i>Procedia - Social and Behavioral Sciences</i> , 175, 98-105.
S44	Rezaei, S., Ali, F., Amin, M., and Jayashree, S. 2016. "Online Impulse Buying of Tourism Products: The Role of Web Site Personality, Utilitarian and Hedonic Web Browsing," <i>Journal of Hospitality and Tourism Technology</i> (7:1), pp. 60-83.
S45	Li, W., Cui, H., and Cheng, Y. (2016). The Impact of Atmospherics in Virtual Community on online impulse buying intention the moderating effect of product types. Paper presented at the Service Systems and Service Management (ICSSSM).
S46	Liao, C., To, P.-L., Wong, Y.-C., Palvia, P., and Kakhki, M. D. (2016). THE IMPACT OF PRESENTATION MODE AND PRODUCT TYPE ON ONLINE IMPULSE BUYING DECISIONS. <i>Journal of Electronic Commerce Research</i> , 17(2).
S47	Xuan, Z. (2013). The Influence of Delivery Time on Online Impulse Buying of Chinese Customer. 205-210.
S48	Verhagen, T., and van Dolen, W. (2011). The influence of online store beliefs on consumer online impulse buying: A model and empirical application. <i>Information &amp; Management</i> , 48(8), 320-327.
S49	Floh, A., and Madlberger, M. (2013). The role of atmospheric cues in online impulse-buying behavior. <i>Electronic Commerce Research and Applications</i> , 12(6), 425-439.
S50	Wu, G., and Sun, T. (2011). Trait Predictors of Online Impulsive Buying Tendency: A Hierarchical Approach. <i>The Journal of Marketing Theory and Practice</i> , 19(3), 337-346.

proposed an agenda for future research to enable senior and junior researchers to recognize those areas where more

TABLE 10. (Continued.) Primary studies references.

S51	Farivar, S., and Yuan, Y. (2017). Understanding Consumers' Impulse Buying Behavior in Social Commerce Platforms. Paper presented at the Twenty-third Americas Conference on Information Systems.
S52	Leong, L.-Y., Jaafar, N. I., and Sulaiman, A. 2017. "Understanding Impulse Purchase in Facebook Commerce: Does Big Five Matter?," <i>Internet Research</i> (27:4), pp. 786-818.
S53	Wu, Y.-L., and Ye, Y.-S. (2013). Understanding Impulsive Buying Behavior in Mobile Commerce. Paper presented at the Pacific Asia Conference on Information Systems(PACIS).
S54	Chen, C.-C., and Yao, J.-Y. (2018). What drives impulse buying behaviors in a mobile auction? The perspective of the Stimulus-Organism-Response model. <i>Telematics and Informatics</i> .
S55	Wen-jing, C., and Yue, T. 2010. "What's the Reason for Online Unplanned Purchase," pp. 2281-2283.
S56	Husnain, M., Qureshi, I., Fatima, T., and Akhtar, W. (2016). The Impact of Electronic Word-of-Mouth on Online Impulse Buying Behavior: The Moderating role of Big 5 Personality Traits. <i>Journal of Accounting &amp; Marketing</i> , 05(04).
S57	Huang, L.-T. (2017). Exploring Consumers' Intention to Urge to Buy in Mobile Commerce the perspective of pleasure arousal dominance. Paper presented at the Pacific Asia Conference on Information Systems.
S58	Wang, Y.-C., and Tsai, C.-T. S. 2017. "Feeling Better When Buying More? Harmonious Passion and Obsessive Passion in Online Food Group Buying," <i>British Food Journal</i> (119:6), pp. 1263-1275.
S59	Chen, Y., Lu, Y., Wang, B., and Pan, Z. 2019. "How Do Product Recommendations Affect Impulse Buying? An Empirical Study on Wechat Social Commerce," <i>Information &amp; Management</i> (56:2), pp. 236-248.
S60	Akram, U., Hui, P., Khan, M. K., Yan, C., Tanveer, Y., and Hashim, M. 2019. "Shopping Online without Thinking: Myth or Reality," pp. 15-28.
S61	Handayani, R. C., Purwandari, B., Solichah, I., and Prima, P. 2018. "The Impact of Instagram "Call-to-Action" Buttons on Customers' Impulse Buying," pp. 50-56.
S62	Chen, Y., Liu, J., and Fan, S. 2018. "The Impacts of Environmental Cues and Browsing Experience on Impulse Buying on Social Shopping Website," <i>Wuhan International Conference on e-Business (WHICEB): AIS Electronic Library (AISeL)</i> , p. 1.
S63	Arviansyah, Dhaneswara, A. P., Hidayanto, A. N., and Zhu, Y.-Q. 2018. "Vlogging: Trigger to Impulse Buying Behaviors," <i>Pacific Asia Conference on Information Systems (PACIS), Japan: AIS Electronic Library (AISeL)</i> , p. 249.
S64	Leong, L.-Y., Jaafar, N. I., and Sulaiman, A. 2018b. "What Triggers Impulse Purchase in Facebook Commerce?," <i>International Journal of Mobile Communications</i> (16:4), pp. 459-492.
S65	Brooks, S., Califf, C., and Martin, T. 2012. "Do Distractions and Interruptions Mitigate Online Impulse Purchasing?: An Empirical Investigation," <i>Americas Conference on Information Systems(AMCIS)</i> , Seattle, Washington: AIS Electronic Library (AISeL).
S66	Dewi, M. A. A., Nurrohmah, I., Sahadi, N., Sensuse, D. I., and Nopripon, H. 2017. "Analysing the Critical Factors Influencing Consumers' E-Impulse Buying Behavior," <i>International Conference on Advanced Computer Science and Information Systems (ICACSIS): IEEE</i> , pp. 81-92.
S67	Jeffrey, S. A., and Hodge, R. 2007. "Factors Influencing Impulse Buying During an Online Purchase," <i>Electronic Commerce Research</i> (7:3-4), pp. 367-379.
S68	Parboteeah, D. V., Valacich, J. S., and Wells, J. D. 2009. "The Influence of Website Characteristics on a Consumer's Urge to Buy Impulsively," <i>Information systems research</i> (20:1), pp. 60-78.

investigations are needed. Since S-commerce is still a novel concept, the results described in this review could act as the

foundation for future research, and help them identify several novel research questions, and obtain an overview of the existing research for positioning their work. Additionally, this review is helpful for business and marketers; by proposing a causal chain framework of the factors that trigger IBB in S-commerce, the business and marketers can make use of this list of factors and formulate their business and marketing strategies based on it to strengthen their competitiveness and increase profits. This study also provides S-commerce designers and developers insights to implement social media features in S-commerce Sites based on the list of the factors that trigger the online IBB in S-commerce to enhance their business.

## APPENDIX

See Table 10.

## ACKNOWLEDGMENT

Samah Abdelsalm would like to thank the Ministry of Higher Education, Sudan, and University of Khartoum, Faculty of Mathematical Science, Sudan, for sponsoring Samah Abdelsalam in her Ph.D. Program at Universiti Teknologi Malaysia.

## REFERENCES

- [1] Z. Huang and M. Benyoucef, "User preferences of social features on social commerce websites: An empirical study," *Technol. Forecasting Social Change*, vol. 95, pp. 57–72, Jun. 2015.
- [2] X. Lin, Y. Li, and X. Wang, "Social commerce research: Definition, research themes and the trends," *Int. J. Inf. Manage.*, vol. 37, no. 3, pp. 190–201, Jun. 2017.
- [3] L. Y.-S. Lo, S.-W. Lin, and L.-Y. Hsu, "Motivation for online impulse buying: A two-factor theory perspective," *Int. J. Inf. Manage.*, vol. 36, no. 5, pp. 759–772, Oct. 2016.
- [4] A. H. Busalim and A. R. C. Hussin, "Understanding social commerce: A systematic literature review and directions for further research," *Int. J. Inf. Manage.*, vol. 36, no. 6, pp. 1075–1088, Dec. 2016.
- [5] S. Kim and H. Park, "Effects of various characteristics of social commerce (s-commerce) on consumers' trust and trust performance," *Int. J. Inf. Manage.*, vol. 33, no. 2, pp. 318–332, Apr. 2013.
- [6] C. S.-P. Ng, "Examining the cultural difference in the intention to purchase in social commerce," in *Proc. PACIS*, 2012, p. 163.
- [7] J. Chen and X.-L. Shen, "Consumers' decisions in social commerce context: An empirical investigation," *Decis. Support Syst.*, vol. 79, pp. 55–64, Nov. 2015.
- [8] N. Hajli and J. Sims, "Social commerce: The transfer of power from sellers to buyers," *Technol. Forecasting Social Change*, vol. 94, pp. 350–358, May 2015.
- [9] J. B. Kim, "The mediating role of presence on consumer intention to participate in a social commerce site," *J. Internet Commerce*, vol. 14, no. 4, pp. 425–454, Oct. 2015.
- [10] Z. Huang and M. Benyoucef, "From e-commerce to social commerce: A close look at design features," *Electron. Commerce Res. Appl.*, vol. 12, no. 4, pp. 246–259, Jul. 2013.
- [11] K. Z. K. Zhang and M. Benyoucef, "Consumer behavior in social commerce: A literature review," *Decis. Support Syst.*, vol. 86, pp. 95–108, Jun. 2016.
- [12] T. Hu, H. Dai, and A. F. Salam, "Integrative qualities and dimensions of social commerce: Toward a unified view," *Inf. Manage.*, vol. 56, no. 2, pp. 249–270, Mar. 2019.
- [13] H. Han, H. Xu, and H. Chen, "Social commerce: A systematic review and data synthesis," *Electron. Commerce Res. Appl.*, vol. 30, pp. 38–50, Jul. 2018.
- [14] L. Xiang, X. Zheng, M. K. O. Lee, and D. Zhao, "Exploring consumers' impulse buying behavior on social commerce platform: The role of parasocial interaction," *Int. J. Inf. Manage.*, vol. 36, no. 3, pp. 333–347, Jun. 2016.



- [15] J. V. Chen, B.-C. Su, and A. E. Widjaja, "Facebook C2C social commerce: A study of online impulse buying," *Decis. Support Syst.*, vol. 83, pp. 57–69, Mar. 2016.
- [16] I.-L. Wu, K.-W. Chen, and M.-L. Chiu, "Defining key drivers of online impulse purchasing: A perspective of both impulse shoppers and system users," *Int. J. Inf. Manage.*, vol. 36, no. 3, pp. 284–296, Jun. 2016.
- [17] C.-C. Chang and A.-H. Tseng, "The post-purchase communication strategies for supporting online impulse buying," *Comput. Hum. Behav.*, vol. 39, pp. 393–403, Oct. 2014.
- [18] S. H. Lim, S. Lee, and D. J. Kim, "Is online Consumers' impulsive buying beneficial for E-Commerce companies? An empirical investigation of online Consumers' past impulsive buying behaviors," *Inf. Syst. Manage.*, vol. 34, no. 1, pp. 85–100, Jan. 2017.
- [19] T. K. H. Chan, C. M. K. Cheung, and Z. W. Y. Lee, "The state of online impulse-buying research: A literature analysis," *Inf. Manage.*, vol. 54, no. 2, pp. 204–217, Mar. 2017.
- [20] B. Kitchenham and S. Charters, "Guidelines for performing systematic literature reviews in software engineering," Tech. Rep., 2007. [Online]. Available: <http://citeseerx.ist.psu.edu/viewdoc/download;jsessionid=C00B42E161B99C2F28D8595B750F1DED?doi=10.1.1.117.471&rep=rep1&type=pdf>
- [21] J. C. Mendoza-Tello, H. Mora, F. A. Pujol-Lopez, and M. D. Lytras, "Social commerce as a driver to enhance trust and intention to use cryptocurrencies for electronic payments," *IEEE Access*, vol. 6, pp. 50737–50751, 2018.
- [22] R. G. Curty and P. Zhang, "Social commerce: Looking back and forward," *Proc. Amer. Soc. Inf. Sci. Technol.*, vol. 48, no. 1, pp. 1–10, 2011.
- [23] C. Wang and P. Zhang, "The evolution of social commerce: The people, management, technology, and information dimensions," *Commun. Assoc. Inf. Syst.*, vol. 31, no. 1, p. 5, 2012.
- [24] Y.-C.-J. Wu, J.-P. Shen, and C.-L. Chang, "Electronic service quality of facebook social commerce and collaborative learning," *Comput. Hum. Behav.*, vol. 51, pp. 1395–1402, Oct. 2015.
- [25] T. Yamakami, "A view model of social commerce: The building blocks of next-generation e-commerce," in *Proc. 14th Int. Symp. Commun. Inf. Technol. (ISCIT)*, Sep. 2014, pp. 284–288.
- [26] X. Wang, X. Lin, and M. K. Spencer, "Exploring the effects of extrinsic motivation on consumer behaviors in social commerce: Revealing consumers' perceptions of social commerce benefits," *Int. J. Inf. Manage.*, vol. 45, pp. 163–175, Apr. 2019.
- [27] D. Kim, "Under what conditions will social commerce business models survive?" *Electron. Commerce Res. Appl.*, vol. 12, no. 2, pp. 69–77, Apr. 2013.
- [28] A. T. Stephen and O. Toubia, "Deriving value from social commerce networks," *J. Marketing Res.*, vol. 47, no. 2, pp. 215–228, Apr. 2010.
- [29] L. Zhou, P. Zhang, and H.-D. Zimmermann, "Social commerce research: An integrated view," *Electron. Commerce Res. Appl.*, vol. 12, no. 2, pp. 61–68, Apr. 2013.
- [30] T.-P. Liang and E. Turban, "Introduction to the special issue social commerce: A research framework for social commerce," *Int. J. Electron. Commerce*, vol. 16, no. 2, pp. 5–14, Dec. 2011.
- [31] S. Sharma and R. E. Crossler, "Disclosing too much? Situational factors affecting information disclosure in social commerce environment," *Electron. Commerce Res. Appl.*, vol. 13, no. 5, pp. 305–319, Sep. 2014.
- [32] J. Liao and L. Wang, "Face as a mediator of the relationship between material value and brand consciousness," *Psychol. Marketing*, vol. 26, no. 11, pp. 987–1001, Nov. 2009.
- [33] A. J. Badgaiyan, A. Verma, and S. Dixit, "Impulsive buying tendency: Measuring important relationships with a new perspective and an indigenous scale," *IIMB Manage. Rev.*, vol. 28, no. 4, pp. 186–199, Dec. 2016.
- [34] Q. Zhou, X. Chen, and Y. W. Chen, "Influence of online store belief and product category on impulse buying: An empirical investigation on consumer perceptions," in *Proc. IEEE Int. Conf. Ind. Eng. Eng. Manage.*, Dec. 2014, pp. 1453–1456.
- [35] T. Sun and G. Wu, "Trait predictors of online impulsive buying tendency: A hierarchical approach," *J. Marketing Theory Pract.*, vol. 19, no. 3, pp. 337–346, Jul. 2011.
- [36] Y. Liu, H. Li, and F. Hu, "Website attributes in urging online impulse purchase: An empirical investigation on consumer perceptions," *Decis. Support Syst.*, vol. 55, no. 3, pp. 829–837, Jun. 2013.
- [37] S. Farivar and Y. Yuan, "Understanding consumers' impulsive buying behavior in social commerce platforms," in *Proc. 23rd Amer. Conf. Inf. Syst.*, Boston, MA, USA, 2017. [Online]. Available: <https://pdfs.semanticscholar.org/3bf4/17b251ac11ea7779f65a488886e97854db82.pdf>
- [38] B. Carroll, "Social shopping: A new twist on E-commerce," *Furniture Today*, vol. 32, no. 20, p. 81, 2008.
- [39] Y. A. Kim and J. Srivastava, "Impact of social influence in e-commerce decision making," in *Proc. 9th Int. Conf. Electron. Commerce ICEC*, 2007, pp. 293–302.
- [40] L.-T. Huang, "Flow and social capital theory in online impulse buying," *J. Bus. Res.*, vol. 69, no. 6, pp. 2277–2283, Jun. 2016.
- [41] H. Stern, "The significance of impulse buying today," *J. Marketing*, vol. 26, no. 2, p. 59, Apr. 1962.
- [42] J. D. Wells, V. Parboteeah, and J. S. Valacich, "Online impulse buying: Understanding the interplay between consumer impulsiveness and website quality," *J. Assoc. Inf. Syst.*, vol. 12, no. 1, pp. 32–56, 2011.
- [43] X. Luo, "How does shopping with others influence impulsive purchasing?" *J. Consum. Psychol.*, vol. 15, no. 4, pp. 288–294, Jan. 2005.
- [44] S. Prashar, C. Parsad, and T. Sai Vijay, "Application of neural networks technique in predicting impulse buying among shoppers in india," *Decision*, vol. 42, no. 4, pp. 403–417, Dec. 2015.
- [45] C.-H. Lee and J. J. Wu, "Consumer online flow experience: The relationship between utilitarian and hedonic value, satisfaction and unplanned purchase," *Ind. Manage. Data Syst.*, vol. 117, no. 10, pp. 2452–2467, Dec. 2017.
- [46] M. Khalifa and K. Shen, "System design effects on online impulse-buying," in *Proc. ICIS*, 2007, p. 110.
- [47] Z. Xuan, "The influence of delivery time on online impulse buying of chinese customer," in *Proc. 6th Int. Symp. Comput. Intell. Design*, Oct. 2013, pp. 205–210.
- [48] D. Perkov and M. Jurčević, "Features of impulse buying in croatian retail," *Ekonomski Vjesnik/Econviews-Rev. Contemp. Bus., Entrepreneurship Econ. Issues*, vol. 31, no. 2, pp. 349–360, 2018.
- [49] S. A. Jeffrey and R. Hodge, "Factors influencing impulse buying during an online purchase," *Electron. Commerce Res.*, vol. 7, nos. 3–4, pp. 367–379, Nov. 2007.
- [50] D. V. Parboteeah, J. S. Valacich, and J. D. Wells, "The influence of website characteristics on a Consumer's urge to buy impulsively," *Inf. Syst. Res.*, vol. 20, no. 1, pp. 60–78, Mar. 2009.
- [51] J. Lee and K. K. P. Johnson, "Buying fashion impulsively: Environmental and personal influences," *J. Global Fashion Marketing*, vol. 1, no. 1, pp. 30–39, Feb. 2010.
- [52] T. Verhagen and W. van Dolen, "The influence of online store beliefs on consumer online impulse buying: A model and empirical application," *Inf. Manage.*, vol. 48, no. 8, pp. 320–327, Dec. 2011.
- [53] W.-H. Chih, C. H.-J. Wu, and H.-J. Li, "The antecedents of consumer online buying impulsiveness on a travel website: Individual internal factor perspectives," *J. Travel Tourism Marketing*, vol. 29, no. 5, pp. 430–443, Jul. 2012.
- [54] S. Brooks, C. Califf, and T. Martin, "Do distractions and interruptions mitigate online impulse purchasing?: An empirical investigation," in *Proc. 18th Amer. Conf. Inf. Syst.*, Seattle, WA, USA, Aug. 2012. [Online]. Available: <https://pdfs.semanticscholar.org/8ab1/a5aa0bc190987155e6e2f80b6d511a6d46e6.pdf>
- [55] P.-C. Lin and Z.-H. Lin, "Buying impulse triggered by digital media," *Service Industries J.*, vol. 33, nos. 9–10, pp. 892–908, Jul. 2013.
- [56] C. Vonkeman, T. Verhagen, and W. van Dolen, "Role of local presence in online impulse buying," *Inf. Manage.*, vol. 54, no. 8, pp. 1038–1048, Dec. 2017.
- [57] Y. Xu and J.-S. Huang, "Effects of price discounts and bonus packs on online impulse buying," *Social Behav. Personality, Int. J.*, vol. 42, no. 8, pp. 1293–1302, Sep. 2014.
- [58] S. Mittal, D. Chawla, and N. Sondhi, "Segmentation of impulse buyers in an emerging market—An exploratory study," *J. Retailing Consum. Services*, vol. 33, pp. 53–61, Nov. 2016.
- [59] F. Piron, "Defining impulse purchasing," in *NA—Advances in Consumer Research*, vol. 18, R. H. Holman and M. R. Solomon, Eds. Provo, UT, USA: Association for Consumer Research, 1991, pp. 509–514. [Online]. Available: <https://www.acrwebsite.org/volumes/7206/volumes/v18/NA-18>
- [60] S. E. Beatty and M. Elizabeth Ferrell, "Impulse buying: Modeling its precursors," *J. Retailing*, vol. 74, no. 2, pp. 161–167, Jun. 1998.
- [61] U. M. Dholakia, "Temptation and resistance: An integrated model of consumption impulse formation and enactment," *Psychol. Marketing*, vol. 17, no. 11, pp. 955–982, Nov. 2000.
- [62] C. A. Turkyilmaz, S. Erdem, and A. Uslu, "The effects of personality traits and website quality on online impulse buying," *Procedia Social Behav. Sci.*, vol. 175, pp. 98–105, Feb. 2015.



- [63] M. A. A. Dewi, I. Nurrohmah, N. Sahadi, D. I. Sensuse, and H. Noprison, "Analysing the critical factors influencing consumers' e-impulse buying behavior," in *Proc. Int. Conf. Adv. Comput. Sci. Inf. Syst. (ICACSIS)*, Oct. 2017, pp. 81–92.
- [64] B. Moran, "Effect of stress, materialism and external stimuli on online impulse buying," *J. Res. Consumers*, vol. 27, no. 27, p. 26, 2015. [Online]. Available: [http://jrconsumers.com/Academic\\_Articles/issue\\_27/Issue27-AcademicArticle-Kwak26-51.pdf](http://jrconsumers.com/Academic_Articles/issue_27/Issue27-AcademicArticle-Kwak26-51.pdf)
- [65] P. Boonchoo and A. Thourungrroje, "A cross-cultural examination of the impact of transformation expectations on impulse buying and conspicuous consumption," *J. Int. Consum. Marketing*, vol. 29, no. 3, pp. 194–205, May 2017.
- [66] Y. Chen, Y. Lu, B. Wang, and Z. Pan, "How do product recommendations affect impulse buying? An empirical study on WeChat social commerce," *Inf. Manage.*, vol. 56, no. 2, pp. 236–248, Mar. 2019.
- [67] K. D. Vohs and R. J. Faber, "Spent resources: Self-Regulatory resource availability affects impulse buying," *J. Consum. Res.*, vol. 33, no. 4, pp. 537–547, Mar. 2007.
- [68] R. S. Bhakat and G. Muruganantham, "A review of impulse buying behavior," *Int. J. Marketing Stud.*, vol. 5, no. 3, p. 149, 2013.
- [69] E. J. Park, E. Y. Kim, V. M. Funches, and W. Foxx, "Apparel product attributes, Web browsing, and e-impulse buying on shopping websites," *J. Bus. Res.*, vol. 65, no. 11, pp. 1583–1589, Nov. 2012.
- [70] X. Zheng, N. Liu, and L. Zhao, "A study of the effectiveness of online scarce promotion-based on the comparison of planned buying and unplanned buying," in *Proc. WHICEB*, 2013, p. 51.
- [71] C.-C. Chen and J.-Y. Yao, "What drives impulse buying behaviors in a mobile auction? The perspective of the Stimulus-Organism-Response model," *Telematics Informat.*, vol. 35, no. 5, pp. 1249–1262, Aug. 2018.
- [72] U. Akram, P. Hui, M. Kaleem Khan, Y. Tanveer, K. Mehmood, and W. Ahmad, "How website quality affects online impulse buying: Moderating effects of sales promotion and credit card use," *Asia Pacific J. Marketing Logistics*, vol. 30, no. 1, pp. 235–256, Jan. 2018.
- [73] N. Chung, H. G. Song, and H. Lee, "Consumers' impulsive buying behavior of restaurant products in social commerce," *Int. J. Contemp. Hospitality Manage.*, vol. 29, no. 2, pp. 709–731, Feb. 2017.
- [74] K. Ning Shen and M. Khalifa, "System design effects on online impulse buying," *Internet Res.*, vol. 22, no. 4, pp. 396–425, Aug. 2012.
- [75] C. Wen-jing and T. Yue, "What's the reason for online unplanned purchase," in *Proc. Int. Conf. E-Bus. E-Government*, May 2010, pp. 2281–2283.
- [76] S. Dawson and M. Kim, "Cues on apparel Web sites that trigger impulse purchases," *J. Fashion Marketing Manage., Int. J.*, vol. 14, no. 2, pp. 230–246, May 2010.
- [77] A. J. Kim and K. K. P. Johnson, "Power of consumers using social media: Examining the influences of brand-related user-generated content on Facebook," *Comput. Hum. Behav.*, vol. 58, pp. 98–108, May 2016.
- [78] Y.-F. Chen and R.-Y. Wang, "Are humans rational? Exploring factors influencing impulse buying intention and continuous impulse buying intention," *J. Consum. Behav.*, vol. 15, no. 2, pp. 186–197, Mar. 2016.
- [79] S.-W. Lin and L. Y.-S. Lo, "Evoking online consumer impulse buying through virtual layout schemes," *Behav. Inf. Technol.*, vol. 35, no. 1, pp. 38–56, Jan. 2016.
- [80] B. Atici and U. Bati, "Impulse purchasing behaviors of the turkish consumers in websites as a dynamic consumer model: Technology products example," *Int. J. Adv. Corporate Learn. (iJAC)*, vol. 3, no. 4, pp. 6–12, 2010.
- [81] U. Akram, P. Hui, M. Khan, C. Yan, and Z. Akram, "Factors affecting online impulse buying: Evidence from chinese social commerce environment," *Sustainability*, vol. 10, no. 2, p. 352, 2018.
- [82] L.-T. Huang, "Exploring consumers' intention to urge to buy in mobile commerce: The perspective of pleasure-arousal-dominance," in *Proc. PACIS*, 2017, p. 288.
- [83] Y.-L. Wu and Y.-S. Ye, "Understanding impulsive buying behavior in mobile commerce," in *Proc. PACIS*, 2013, p. 142.
- [84] L.-T. Huang, "Exploring utilitarian and hedonic antecedents for adopting information from a recommendation agent and unplanned purchase behaviour," *New Rev. Hypermedia Multimedia*, vol. 22, nos. 1–2, pp. 139–165, Jan. 2016.
- [85] L. Aragoncillo and C. Orus, "Impulse buying behaviour: An online-offline comparative and the impact of social media," *Spanish J. Marketing ESIC*, vol. 22, no. 1, pp. 42–62, Apr. 2018.
- [86] K. Nagar, "Drivers of E-store patronage intentions: Choice overload, Internet shopping anxiety, and impulse purchase tendency," *J. Internet Commerce*, vol. 15, no. 2, pp. 97–124, Apr. 2016.
- [87] K. Vojvodic and M. Matic, "Challenges of E-retailing: Impulsive buying Behaviour," in *Challenges for the Trade of Central and South-east Europe*. Bingley, U.K.: Emerald Group Publishing Limited, 2013, pp. 155–171.
- [88] M. Husnain, I. Qureshi, T. Fatima, and W. Akhtar, "The impact of electronic Word-of-Mouth on online impulse buying behavior: The moderating role of big 5 personality traits," *J. Accounting Marketing*, vol. 5, no. 4, pp. 1–10, 2016.
- [89] C. Liao, P.-L. To, Y.-C. Wong, P. Palvia, and M. D. Kakhki, "The impact of presentation mode and product type on online impulse buying decisions," *J. Electron. Commerce Res.*, vol. 17, no. 2, p. 153, 2016.
- [90] S. Rezaei, F. Ali, M. Amin, and S. Jayashree, "Online impulse buying of tourism products: The role of Web site personality, utilitarian and hedonic Web browsing," *J. Hospitality Tourism Technol.*, vol. 7, no. 1, pp. 60–83, Feb. 2016.
- [91] A. Floh and M. Madlberger, "The role of atmospheric cues in online impulse-buying behavior," *Electron. Commerce Res. Appl.*, vol. 12, no. 6, pp. 425–439, Nov. 2013.
- [92] Y.-F. Huang and F.-Y. Kuo, "How impulsivity affects consumer decision-making in e-commerce," *Electron. Commerce Res. Appl.*, vol. 11, no. 6, pp. 582–590, Nov. 2012.
- [93] H. Ozen and N. Engizek, "Shopping online without thinking: Being emotional or rational?" *Asia Pacific J. Marketing Logistics*, vol. 26, no. 1, pp. 78–93, Jan. 2014.
- [94] W. J. Wei, Z. J. Ma, and Y. W. Chen, "Empirical study of the relationship between flow experience, perceived transaction value and impulse buying behavior," in *Proc. IEEE Int. Conf. Ind. Eng. Eng. Manage. (IEEM)*, Dec. 2017, pp. 2246–2250.
- [95] T.-Y. Chen, T.-L. Yeh, and W.-C. Lo, "Impacts on online impulse purchase through perceived cognition," *J. Int. Consum. Marketing*, vol. 29, no. 5, pp. 319–330, Oct. 2017.
- [96] D. V. Parboteeah, D. C. Taylor, and N. A. Barber, "Exploring impulse purchasing of wine in the online environment," *J. Wine Res.*, vol. 27, no. 4, pp. 322–339, Oct. 2016.
- [97] O. S. Albahri, A. S. Albahri, K. I. Mohammed, A. A. Zaidan, B. B. Zaidan, M. Hashim, and O. H. Salman, "Systematic review of real-time remote health monitoring system in triage and priority-based sensor technology: Taxonomy, open challenges, motivation and recommendations," *J. Med. Syst.*, vol. 42, no. 5, p. 80, May 2018.
- [98] A. H. Mohsin, N. S. Jalood, M. J. Baqer, A. H. Alamoody, E. M. Almahdi, A. S. Albahri, M. A. Alsaalem, K. I. Mohammed, H. A. Ameen, S. Garfan, A. A. Zaidan, B. B. Zaidan, O. S. Albahri, S. A. B. Ariffin, A. Alemran, O. Enaizan, A. H. Shareef, and A. N. Jasim, "Finger vein biometrics: Taxonomy analysis, open challenges, future directions, and recommended solution for decentralised network architectures," *IEEE Access*, vol. 8, pp. 9821–9845, 2020.
- [99] A. H. Mohsin, A. A. Zaidan, B. B. Zaidan, A. S. Albahri, O. S. Albahri, M. A. Alsaalem, and K. I. Mohammed, "Real-time remote health monitoring systems using body sensor information and finger vein biometric verification: A multi-layer systematic review," *J. Med. Syst.*, vol. 42, no. 12, p. 238, Dec. 2018.
- [100] B. Kitchenham, *Procedures for Performing Systematic Reviews*, vol. 33. Keele, U.K.: Keele Univ., 2004, pp. 1–26.
- [101] J. Webster and R. T. Watson, "Analyzing the past to prepare for the future: Writing a literature review," *MIS Quart.*, vol. 26, no. 2, pp. 13–23, Jun. 2002. [Online]. Available: <https://www.jstor.org/stable/4132319?seq=1>
- [102] A. Balaid, M. Z. Abd Rozan, S. N. Hikmi, and J. Memon, "Knowledge maps: A systematic literature review and directions for future research," *Int. J. Inf. Manage.*, vol. 36, no. 3, pp. 451–475, Jun. 2016.
- [103] S. Nidhra, M. Yanamadala, W. Afzal, and R. Torkar, "Knowledge transfer challenges and mitigation strategies in global software development—A systematic literature review and industrial validation," *Int. J. Inf. Manage.*, vol. 33, no. 2, pp. 333–355, 2013.
- [104] R. E. Hostler, V. Y. Yoon, Z. Guo, T. Guimaraes, and G. Forgieone, "Assessing the impact of recommender agents on on-line consumer unplanned purchase behavior," *Inf. Manage.*, vol. 48, no. 8, pp. 336–343, Dec. 2011.
- [105] L.-Y. Leong, N. I. Jaafar, and A. Sulaiman, "Understanding impulse purchase in Facebook commerce: Does big five matter?" *Internet Res.*, vol. 27, no. 4, pp. 786–818, Aug. 2017.
- [106] H. Xi, Z. Hong, J. Sun, X. Li, J. Wei, and R. Davison, "Impulsive purchase behaviour in social commerce: The role of social influence," in *Proc. PACIS*, 2016, p. 364.

- [107] U. Akram, P. Hui, M. K. Khan, C. Yan, Y. Tanveer, and M. Hashim, "Shopping online without thinking: Myth or reality," in *Proc. Int. Conf. Manage. Sci. Eng. Manage.* Cham, Switzerland: Springer, 2018, pp. 15–28. [Online]. Available: [https://www.researchgate.net/profile/Umar\\_Akram4/publication/325997808\\_Shopping\\_Online\\_Without\\_Thinking\\_Myth\\_or\\_Reality/links/5b6e8ebe92851ca650552370/Shopping-Online-Without-Thinking-Myth-or-Reality.pdf](https://www.researchgate.net/profile/Umar_Akram4/publication/325997808_Shopping_Online_Without_Thinking_Myth_or_Reality/links/5b6e8ebe92851ca650552370/Shopping-Online-Without-Thinking-Myth-or-Reality.pdf)
- [108] Arviansyah, A. P. Dhaneswara, A. N. Hidayanto, and Y.-Q. Zhu, "Vlogging: Trigger to impulse buying behaviors," in *Proc. PACIS*, 2018, p. 249.
- [109] L.-Y. Leong, N. I. Jaafar, and A. Sulaiman, "What triggers impulse purchase in Facebook commerce," *Int. J. Mobile Commun.*, vol. 16, no. 4, pp. 459–492, 2018.
- [110] J. Ju and J.-H. Ahn, "The effect of social and ambient factors on impulse purchasing behavior in social commerce," *J. Organizational Comput. Electron. Commerce*, vol. 26, no. 4, pp. 285–306, Oct. 2016.
- [111] K. Z. Zhang, B. Hu, and S. J. Zhao, "How online social interactions affect consumers' impulse purchase on group shopping Websites," in *Proc. PACIS*, 2014, p. 81.
- [112] L.-Y. Leong, N. I. Jaafar, and S. Ainin, "The effects of facebook browsing and usage intensity on impulse purchase in f-commerce," *Comput. Hum. Behav.*, vol. 78, pp. 160–173, Jan. 2018.
- [113] W. Li, H. Cui, and Y. Cheng, "The impact of atmospherics in virtual community on online impulse buying intention: The moderating effect of product types," in *Proc. 13th Int. Conf. Service Syst. Service Manage. (ICSSSM)*, Jun. 2016, pp. 1–5.
- [114] K. Z. K. Zhang, H. Xu, S. Zhao, and Y. Yu, "Online reviews and impulse buying behavior: The role of browsing and impulsiveness," *Internet Res.*, vol. 28, no. 3, pp. 522–543, Jun. 2018.
- [115] Y.-C. Wang and C.-T.-S. Tsai, "Feeling better when buying more? Harmonious passion and obsessive passion in online food group buying," *Brit. Food J.*, vol. 119, no. 6, pp. 1263–1275, Jun. 2017.
- [116] R. C. Handayani, B. Purwandari, I. Solichah, and P. Prima, "The impact of instagram 'Call-to-Action' buttons on Customers' impulse buying," in *Proc. 2nd Int. Conf. Bus. Inf. Manage. ICBIM*, 2018, pp. 50–56.
- [117] Y. Chen, J. Liu, and S. Fan, "The impacts of environmental cues and browsing experience on impulse buying on social shopping Website," in *Proc. 17th Wuhan Int. Conf. E-Bus. Social Netw. Commerce*, 2018. [Online]. Available: <https://aisel.aisnet.org/cgi/viewcontent.cgi?article=1059&context=whiceb2018>
- [118] S. Mohammed, L. Ferzandi, and K. Hamilton, "Metaphor no more: A 15-year review of the team mental model construct," *J. Manage.*, vol. 36, no. 4, pp. 876–910, Jul. 2010.
- [119] E. W. T. Ngai, S. S. C. Tao, and K. K. L. Moon, "Social media research: Theories, constructs, and conceptual frameworks," *Int. J. Inf. Manage.*, vol. 35, no. 1, pp. 33–44, Feb. 2015.
- [120] S. Pookulangara and K. Koesler, "Cultural influence on consumers' usage of social networks and its' impact on online purchase intentions," *J. Retailing Consum. Services*, vol. 18, no. 4, pp. 348–354, Jul. 2011.



**NAOMIE SALIM** received the B.Sc. degree in computer science from Universiti Teknologi Malaysia, the M.Sc. degree in computer science from the University of Western Michigan, and the Ph.D. degree in information studies from the University of Sheffield. She is currently a Professor with the Faculty of Engineering, School of Computing, Universiti Teknologi Malaysia, where she is also the Deputy Dean (research and innovation) of the Faculty of Engineering. She has authored more than 100 journals and conference papers since the inception of her research career. Her main research interests include text mining, machine learning, information retrieval, cheminformatics, and natural language processing.



**ROSE ALINDA ALIAS** received the B.Sc. degree in computer science and the M.Sc. degree in computer information systems from the University of Miami, Coral Gables, FL, USA, and the Ph.D. degree in information systems from the University of Salford, U.K. She is currently a Professor with the Azman Hashim International Business School (AHIBS), Universiti Teknologi Malaysia. Her main research interests include knowledge management, information systems strategy and planning, and information systems quality.



**OMAYMA HUSAIN** received the B.Sc. and M.Sc. degree in information technology from the Faculty of Mathematical Sciences, Khartoum University, Sudan. She is currently pursuing the Ph.D. degree in information systems with the School of Computing, Faculty of Engineering, Universiti Teknologi Malaysia. She is also a Lecturer with the Computer Sciences Department, Faculty of Mathematical Sciences, Khartoum University. Her current research interests include information systems, information retrieval, and expert systems.

• • •



**SAMAH ABDELSALAM** received the B.Sc. and M.Sc. degree in information technology from the Faculty of Mathematical Sciences, Khartoum University, Sudan. She is currently pursuing the Ph.D. degree in information systems with the School of Computing, Faculty of Engineering, Universiti Teknologi Malaysia. She is also a Lecturer with the Computer Sciences Department, Faculty of Mathematical Sciences, Khartoum University. Her current research interests include information systems, social commerce, and e-commerce.