

An innovative approach to online consumer behaviour segmentation: the self-determination theory in an uncertain scenario

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Abstract

Purpose – In the most recent years, social, innovative, economic and political changes in the European context have characterized consumers' behaviours. The paper aims to understand if the use of electronic commerce differs in a situation characterized by uncertainty.

Design/methodology/approach – An innovative approach to categorising online consumer behaviour considers the self-determination theory and basic psychological needs in an uncertain scenario. The research is based on a quantitative analysis obtained by clustering algorithms on a sample of 1,000 digital users in European countries. A structured questionnaire was administered online and distributed through the leading online social platforms and direct mailing.

Findings – The results show online activities during changes in consumer behaviour patterns and retailers' strategies. This research will allow online retail managers and practitioners to obtain important information to help them define appropriate customer-oriented strategic actions to enhance value in the electronic context for both customers and firms.

Originality/value – The innovation of this research approaches the categorization of online consumer behaviour by exploiting the self-determination theory in an uncertain scenario. Precisely, the novelty of this research is to highlight three detailed categories of electronic commerce consumers, namely, unwilling, halfback and digital, to collect, store and disseminate information about these categories of Online Consumers Behaviours.

Keywords Innovative approach, Electronic commerce, Online consumer behaviour, Uncertain scenario, Cluster analysis, Market innovation

Paper type Research paper



1. Introduction

The current historical scenario that has been prevalent over the last few years requires critical reflections on the behaviour of electronic commerce consumers and the consequential information that it is possible to gather from the analysis of these behaviours. The COVID-19 pandemic (Vermicelli *et al.*, 2022) has generated several modifications in consumer behaviour and, in general, in the everyday lives of people adapting to new changes (Caboni and Pizzichini, 2022; Bellis *et al.*, 2022; Eger *et al.*, 2021; Donthu and Gustafsson, 2020; Barnes, 2020). Following the outbreak of the pandemic (Vermicelli *et al.*, 2022), vital public health measures were applied to the first and second waves based on massive mobility restrictions, fever screening, community distancing and, generally, community containment (Bellis *et al.*, 2022; Pantano *et al.*, 2020; Laato *et al.*, 2020; Studdert and Hall, 2020). The COVID-19 pandemic (Vermicelli *et al.*, 2022) has forced consumers to consider the high potential of electronic commerce to deepen the benefits that they can obtain (Guthrie *et al.*, 2021; Li *et al.*, 2020; Tran, 2021; Hwang, 2009).

By surfing shopping websites, consumers can find all the information necessary to satisfy their needs and examine several products from different electronic retailers placed on the same webpage (Liu *et al.*, 2017) while avoiding social contact, practising social distancing, and preventing the spread of contagion and preserving their health. Considering this scenario, this paper aims to fill the gap between the categorization of electronic consumers in a normal and uncertain scenario. More specifically, it is fundamental to find answers to the following research questions:

RQ1. Are electronic commerce consumers' habits changing due to an uncertain scenario?

RQ2. What kind of innovative information can be gathered on electronic commerce consumers' that in an uncertain scenario?

This research aims to fill the research gap associated with electronic commerce consumers in an uncertain scenario such as a pandemic (Vermicelli *et al.*, 2022). In particular, this work considers uncertain scenarios as cases where consumers are influenced by particular restrictions on their purchasing behaviour, such as pandemics or natural disasters or crises in general (Santos *et al.*, 2020; Sedita *et al.*, 2022). In contrast, all other situations where consumers can finalize their purchases in the way that they usually prefer (online, offline or multichannel) are referred to as a normal scenario. Specifically, the uncertain scenario of the COVID-19 crisis (Santos *et al.*, 2020; Sedita *et al.*, 2022; Vermicelli *et al.*, 2022) has caused profound people to live modifications and particular effects such as isolation, community containment, the avoidance of social contact and the practice of social distancing (Wilder-Smith and Freedman, 2020). Specifically, consumer habits have changed significantly due to the severe restrictions and lockdowns (Pantano *et al.*, 2020; Sheth, 2020; Hale *et al.*, 2020) that have been applied during the spread of the virus. Before the COVID-19 outbreak, both online and offline channels were valid purchase alternatives (Pantano *et al.*, 2020), as were integrated shopping practices. Indeed, the possibility of accessing the Internet everywhere and consumers' growing familiarity with the use of smart devices have contributed to the spread of "online to offline commerce", where consumers collect information about goods and services online but then complete their purchases in a physical store (Yang *et al.*, 2020). However, during the pandemic, consumers could choose only online channels (Guthrie *et al.*, 2021; Tran, 2021) as the leading way to shop due to severe restrictions (Sheth, 2020; Hale *et al.*, 2020). The wider spread of social commerce, i.e. "any commercial activities facilitated by or conducted through the broad social media and Web 2.0 tools in consumers' online shopping processes or business' interactions with their customers" (Lin *et al.*, 2017, p. 191; Wang *et al.*, 2019, p. 165), has allowed consumers to access retail offers, compare products and prices (Guthrie *et al.*, 2021; Naem, 2021; Shahbaznezhad *et al.*, 2021; Tran, 2021; Appel *et al.*, 2020)

and become more familiar with various shopping services by exploiting home delivery services, working from home (Alvarez-Torres and Schiuma, 2022) and learning online (Barnes, 2020; Roggeveen and Sethuraman, 2020). In a normal situation, shopping as an activity generates value as a pleasurable activity for socializing (Nohutlu *et al.*, 2022); however, during an uncertain scenario such as the COVID-19 crisis (Santos *et al.*, 2020; Sedita *et al.*, 2022), the shopping experience becomes an isolated activity (individual activity) due to the need to avoid social contact and the application of social distancing (Wilder-Smith and Freedman, 2020).

The innovative approach of this research considers the self-determination theory (Deci and Ryan, 2000, 2012) as a theoretical lens used to observe the phenomenon by contemplating several factors that influence electronic consumers' behaviour in an uncertain scenario. For these reasons, this paper is organized as follows. First, the theoretical background is obtained by considering the three main pillars of self-determination theory (autonomy, competence and relatedness) to identify how it is possible to expand this theory in an uncertain scenario. This theory is concerned with the need for autonomy, which is the desire to self-organize each action (Deci and Ryan, 1985a, 1987); the need for competence, which is the ability to attend to the possibility of being effective in each interaction with the referred environments (Deci and Ryan, 1980, 1985a); and finally, the need for relatedness (Baumeister and Leary, 1995), which is the process of feeling connected and supported by the most important people for each individual. Specifically, the consideration of self-determination theory (Deci and Ryan, 2000, 2012) appears to be fundamental in uncertain scenarios where the ability of people to make choices and manage their own lives becomes much more important than it is in everyday life. The capacity to self-determine allows people to feel that they have control over their choices and lives. Furthermore, an uncertain scenario is mainly caused by consistent instability; consequently, people need to react more innovatively to find solutions to regain their everyday life (Sedita *et al.*, 2022). In the development of self-determination theory, Deci and Ryan (2000, 2012) stated that people are motivated to grow and change by three innate and universal psychological needs; therefore, in an uncertain scenario, the need for autonomy, competence and relatedness become fundamental pillars for the reacquisition of a normal life. Considering the foundations of self-determination theory, this paper bases its theoretical background on four main theoretical underpinnings, namely, electronic commerce in uncertain situations; the need for autonomy and competence through the Internet; relatedness; and human factors. Afterwards, a quantitative research method is presented based on a survey and statistical cluster analysis (Kassambara, 2017). Then, the main findings of the cluster analysis are discussed, by identifying the principal characteristics of three clusters of online consumers. Hence a specific section is devoted to the conclusion to attest that in an uncertain scenario like a pandemic, successful online retailers can implement innovative practices to engage and retain customers. Finally, the paper will introduce managerial implications for firms by highlighting that the implementation of technological strategies can guarantee excellent customer experiences (Hoyer *et al.*, 2020) by innovating their business model. At least the limitations and future research directions will be presented.

2. Theoretical background

2.1 Self-determination theory variables: autonomy and competence through the Internet

To understand how people approach electronic commerce in an uncertain situation, this study refers to self-determination theory (Deci and Ryan, 2000, 2012) by considering the three principal needs (autonomy, competence and relatedness) that motivate human behaviour. In fact, in an uncertain situation, consumers need autonomy to be independent and to independently satisfy their desires. Thus, considering these conditions, it is necessary to also

consider the need to feel successful and competent (competence). More specifically, electronic commerce skills in an uncertain scenario can be an innovative way to overcome several problems related to the impossibility of physically going shopping as usual. Finally, the need to feel connected to others (relatedness) must also be considered, particularly in an uncertain scenario where social activity is often limited. Currently, the internet is an integral part of peoples' lives. More specifically, the internet is considered a tool and a place where interactions among consumers can be developed to enhance their communication and obtain information (Cho and Khang, 2006). Information and communication technologies have become essential in human life, especially during the rapid spread of the pandemic (Barnes, 2020; Vermicelli *et al.*, 2022) or in an uncertain scenario in general (Sedita *et al.*, 2022). Particularly, in an uncertain situation such as the COVID-19 pandemic (Sedita *et al.*, 2022; Vermicelli *et al.*, 2022), the Internet was increasingly used to find practical information related to products before and during purchasing (Suki, 2013; Feldmann *et al.*, 2021). According to Grant *et al.* (2013), a major challenge for electronic retailers is serving information that meets visitors' needs at a given point in their purchase process. Profoundly, the use of the internet during the COVID-19 pandemic assumed strategic value for several categories of consumers (Effenberger *et al.*, 2020; Feldmann *et al.*, 2021) who searched the web for the characteristics of the same products as those related to the real purchase process. Understanding consumers' behaviours and social interactions (Nohutlu *et al.*, 2022) is useful for shifting them from physical stores to an online environment (Badrinarayanan *et al.*, 2012), specifically during an uncertain scenario (Anderson *et al.*, 2021). Additionally, the internet is a complex of stimuli, such as visual, individual and interpersonal stimuli, and for this reason, many web experiences are the result of affective behaviours (Fu *et al.*, 2020; Im *et al.*, 2010). To contextualize the use of the Internet during an uncertain scenario, it is necessary to underline how it increased its social value as a vehicle through which consumers can search for and share information with other consumers (Schultz and Peltier, 2013). In fact, in accord with self-determination theory (Deci and Ryan, 2000, 2012), the Internet is considered a tool that is used to fully satisfy the need for both autonomy and relatedness. More specifically, the social values that one derives from the use of the Internet in an uncertain situation permit one to gain a specific benefit; if people are often motivated to act by extrinsic motivation such as money or prizes (Arghashi and Yuksel, 2022), then self-determination theory (Deci and Ryan, 2000, 2012) focuses principally on internal sources of motivation such as a need to gain knowledge or independence (intrinsic motivation). The extension of this theory under the central scenario permits us to observe how the Internet appears as a tool able to allow people to satisfy their need for autonomy and competence according to the self-determination theory (Deci and Ryan, 2000, 2012). Overall, to create an in-depth electronic experience, several elements need to be met, such as a blend of online elements, information, emotions, several stimuli and goods (Hauff *et al.*, 2023). Habibi *et al.* (2014) defined a web navigation behaviour model based on four variables and their interrelationships, specifically, 1) the Internet experience, 2) web atmospherics, 3) online behaviour and 4) outcomes. The variables listed in Habibi *et al.* (2014) help explain consumer behaviour during the COVID-19 pandemic. More profoundly, considering an uncertain scenario such as the COVID-19 outbreak, it is possible to underline how the Internet experience (variable 1) could be considered one of the leading digital experiences during the pandemic in an electronic commerce process. Second, web atmospherics (variable 2) has become the new setting in which consumers experience their shopping process. Third, online behaviour (variable 3) during COVID-19 has changed to adapt to the new situation and exploit all the benefits derived from the Internet to satisfy consumer shopping needs to the greatest extent possible (Prendergast and Ching Lam, 2013). Web atmospherics are strictly connected to the two characteristics of functional and hedonic characteristics (Holbrook and Hirschman, 1982) that refer to structure, effectiveness, informativeness and entertainment.

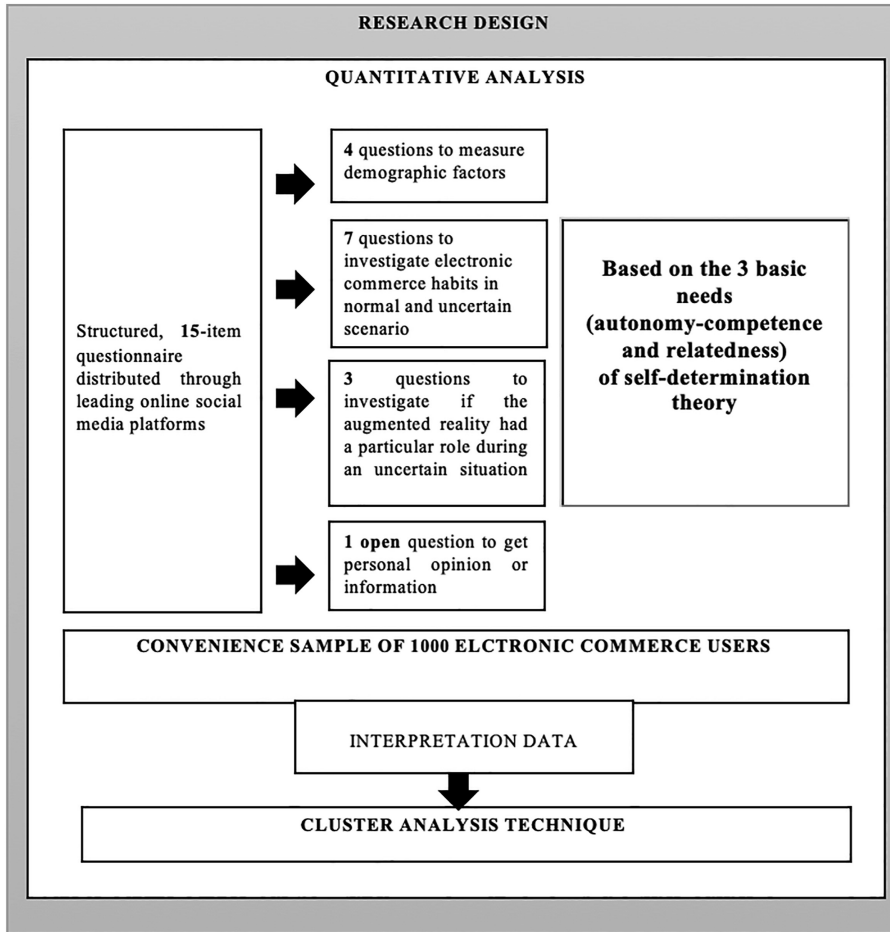
2.2 Relatedness and human factors

The human factor's growing importance is also evident in an electronic context and customer relationships. In particular, an electronic context assumes a crucial role in the community from which consumers may obtain information, follow their suggestions (Zheng *et al.*, 2020) and finalize the purchase process. The role of information in the online context in an uncertain situation such as a pandemic can assume an innovative role because consumers may engage with other consumers by sharing their opinion and consequently finalizing their purchase (Fu *et al.*, 2020). Furthermore, information obtained from other users in unconventional situations such as a pandemic or uncertain scenario can motivate the consumer to make or not make a purchase. Remarkably, people on the web look for evidence, testimonials, reviews, and general practical and specific information before buying a product, and they rely on testimonials from other people who tell their experiences. As a result, online consumers may purchase products recommended by others (Fu *et al.*, 2020). As expressed by self-determination theory (Deci and Ryan, 2000, 2012) people need to experience a sense of belonging and attachment to other people, and the use of the Internet and the exploitation of electronic commerce appear useful for satisfying these needs. More specifically, in an uncertain scenario such as the COVID-19 pandemic (Sedita *et al.*, 2022; Vermicelli *et al.*, 2022), it is necessary to also consider the effects of environmental variables such as isolation, community containment, the avoidance of social contact and social distancing (Wilder-Smith and Freedman, 2020). In this way, as stated by Constantinides (2002), the leading e-commerce strategic, operational and organizational issues must be considered in an integrated and manageable manner. In that sense and considering self-determination theory (Deci and Ryan, 2000, 2012), the electronic context permits to achieve of a sense of belonging to a community (Baumeister and Leary, 1995), especially when external environmental forces engage in social distancing and the avoidance of social contact, as in the COVID-19 pandemic (Wilder-Smith and Freedman, 2020).

3. Methodology

3.1 Research design

The research design was based on the cluster analysis technique (Figure 1) by following two primary levels of research (Blashfield and Aldenderfer, 1978). Firstly, a structured questionnaire of 15 items was distributed through leading online social media platforms. Appel *et al.* (2020) argue that social media affects both individuals and businesses and allows consumers to interact with others freely. This offers multiple ways for marketers to reach and engage with new customers. Then, the second level of research was related to the data interpretation based on a convenience sample of 1,000 electronic commerce users using a cluster analysis technique. The innovation of this research design is based on the application of self-determination theory to the questionnaire and interpretation of the data made by cluster analysis. All analyses were performed with RStudio version 1.2 (RStudio Inc., United States). Particularly a multivariate analysis was conducted to select and then group the homogeneous elements that emerged from our dataset (Tryon, 1939). Clustering was an almost obligatory choice and was dictated by the interpretative capacity of this statistical technique regarding the characteristics of our dataset (Rokach and Maimon, 2005). Clustering techniques are based on measures related to the similarities between discrete and inhomogeneous elements as listed in the dataset (Diday and Simon, 1976; Cuzick and Edwards, 1990). Therefore, the dissimilarity between our data could be explained in terms of distance in a multidimensional representation. The quality of the analyses obtained by the clustering algorithms depended on the choice of the metric used and, therefore, on how the distance was calculated (Breckenridge, 1989). Clustering algorithms group elements based on their mutual distance, and therefore, whether they belong to a set depends on how far the element under consideration is from the set (Dvoenko, 2009).



Source(s): Authors' data elaboration

Figure 1.
Research design

3.2 Sampling

The quantitative analysis was based on a global sample of digital users who made online purchases from April 2020 to January 2022. Respondents were selected by using a convenience sample (Elliott and Haviland, 2007; Peterson and Merunka, 2014) to produce an estimator with a mean squared error (MSE) smaller than the estimators based on only a random or probability sample (Grimmett and Stirzaker, 2020). When selecting a sample, the first step is to define the population of interest. A population is seen as the entire set of subjects, objects, events or elements being studied. In our study, the population could be described as all people living in Europe who need to purchase products. According to Lenth (2001) determining the sample size is also an important step when designing a research study. Power analyses are conducted to ensure adequate sample size and therefore the ability to appropriately test an intervention or hypothesis (Fitzner and Heckinger, 2010). Statistical power may depend on the following three factors: 1) the statistical significance criterion used in the test; 2) the magnitude of the effect of interest in the population and 3) the sample size

used to detect the effect. In addition, the concept of power is used to make comparisons between different statistical testing procedures, for example, between a parametric test and a nonparametric test of the same hypothesis. Therefore, the power of a statistical test is the probability that the test will yield statistically significant results (Cohen, 2013). There are several methods used to calculate the sample size depending on the type of data or study design. Our sample size was calculated using the following formula (Kadam and Bhalerao, 2010):

$$n = \frac{2(Z_{\alpha} + Z_{1-\beta})^2 \sigma^2}{\Delta^2}$$

where n is the required sample size. For Z_{α} , Z is a constant set by convention according to the accepted α error (e.g. α -error 1%, 2-sided 2.5758 and 1-sided 2.33). For $Z_{1-\beta}$, Z is a constant set by convention according to the power of the study (e.g. power 95, value 1.6449). Last, σ is the standard deviation (estimated), and Δ is the difference in the effect of two interventions that are required; rather, it is the estimated effect size. In our case, we need the following values: Z_{α} , $Z_{1-\beta}$, σ , standard deviation (estimated), and Δ , which is the difference in the effect of the two interventions. Let us assume we will accept $p < 0.05$ and a study with 80% power as acceptable. We obtain the following values: Z_{α} is 1.96, and $Z_{1-\beta}$ is 0.8416. Thus, the standard deviation would be approximately 0.7. For Δ , the effect size would be 15%. According to the formula and by applying the data [1], it can be determined that the sample size for our study is 740 respondents. Considering a cleaning procedure with a cut-rate of 30% due to incomplete or missing elements, we need approximately 1,000 respondents to be able to affirm our research questions with any degree of confidence.

3.3 Questionnaire procedure

A structured, 15-item questionnaire was administered online to consumers through Google Forms and distributed through leading online social media platforms (Heidemann *et al.*, 2012), such as Facebook, LinkedIn and Instagram, and direct mailing or message (online word of mouth); a total of 1,000 responses (dataset) were collected (Kayam and Hirsch (2012)). The responses received from social media were distributed among the social media platforms in the following percentages: Facebook (including chat messages and groups), 30%; LinkedIn (including direct messages and posts), 35%; Instagram (direct messages and stories), 15%; and direct mailing or SMS, 20%.

The questionnaire construction was guided by the consideration of self-determination theory (Deci and Ryan, 2000, 2012) in developing the seven questions related to consumer habits in electronic commerce. More specifically, the three principal needs (autonomy, competence and relatedness) that motivate human behaviour in an uncertain scenario such as a pandemic (Sedita *et al.*, 2022; Vermicelli *et al.*, 2022) were taken into consideration.

To detect and remove errors and inconsistencies from the first dataset, we performed data cleaning (scrubbing), which was useful for improving the quality of the data (Rahm and Do, 2000; Dasu and Johnson, 2003). Moreover, to provide accurate and consistent data, it became necessary to consolidate different data representations and eliminate duplicate information. The survey was configured with four questions to measure demographic factors (Table 1) and seven questions to investigate electronic commerce consumers' habits. Specifically, questions related to consumer behaviour were structured to understand different consumer habits in normal and uncertain scenario situations such as pandemic (Sedita *et al.*, 2022; Vermicelli *et al.*, 2022). The last three questions focused on the role of augmented reality (Caboni and Hagberg, 2019; Caboni and Pizzichini, 2022) in electronic commerce purchases to understand whether the use of this technology had a particular role during an uncertain situation such as a pandemic.

Demographic characteristics

Gender	Female = 59.4% Male = 40.6%
Age	15–19 = 2.0% 20–30 = 31.5% 31–40 = 45.4% 41–50% = 14.3% 51–60 = 4.4% 61–70 = 1.2% over 70% = 1.2%
Job	Apprentices and Trainees = 3.2% Ecclesiastic = 0.4% Fixed term contract = 20, 0% Permanent term contract = 34.8% PhD student = 0.4% Retired = 0.4% Self-employed = 14.4% Student = 23.2% Technical management = 0.4% Unemployed = 0.8%
Residence Country	North or West Europe = 27.8% Central or East Europe = 5.9% South Europe = 66.3%

Source(s): Authors' elaboration

Table 1.
Demographic
characteristics of the
sample ($N = 1,000$)

3.4 Cluster analysis procedure

Later, a cluster analysis (Kassambara, 2017) was adopted as a primary technique of statistical analysis (Everitt, 2018) of a dataset in the exploratory phase (Kaski et al., 2003). The data take various forms, such as numerical data and discrete categorical data. The dataset has numerical and categorical attributes, and clustering is an instrumental technique (Edwards and Cavalli-Sforza, 1965; Caruso et al., 2019). The first step is to analyse the dissimilarities between observations in the dataset by using the Gower distance, which measures the distance between two entities characterized by mixed categorical and numerical values (Gower, 1971). The Gower distance measures the average of the partial dissimilarities throughout individuals and should have a range of [0 1].

$$d(i, y) = \frac{1}{p} \sum_{i=1}^p d_{ij}^{(f)}$$

$$d(i, j) = \frac{1}{p} \sum_{i=1}^p d_{ij}^{(f)}$$

Partial dissimilarity ($d_{ij}^{(f)}$) computation depends on the type of the variable being evaluated. Based on the Gower distance, for each feature $k = 1 \dots p$, a score $S_{ijk} \in [0,1]$ is defined. If x_i and x_j are near one another, along with feature k , then the score S_{ijk} is close to 1. Conversely, if they are far apart, along with feature k , then the score S_{ijk} is close to 0. How the score S_{ijk} is computed depends on the type of feature k . A quantity δ_{ijk} is also computed: if x_i and x_j can be compared along with feature k , then $\delta_{ijk} = 1$. If x_i and x_j cannot be compared along with feature k (for example, due to missing values), then δ_{ijk} is set to zero. The Gower distance formula represents the average of the known scores:

$$S_{ij} = \frac{\sum_{k=1}^p S_{ijk} \delta_{ijk}}{\sum_{k=1}^p \delta_{ijk}}$$

Therefore, each categorical feature is standardized, and the distance between two individuals is the average of all feature-specific distances.

3.5 The measurement models

The variable analysis was coded in a time frame (April 2020–January 2022) characterized by the spread of the pandemic uncertain scenario. Specifically, a question was assigned to each variable (for example, X1 = question 1, namely, 1. gender). A data cleaning operation was performed to eliminate anomalous values and missing answers. Specifically, the data cleaning process involved the following steps: 1) the removal of duplicate or irrelevant observations, 2) the resolution of structural errors, 3) the filtering of unwanted outliers and 4) the handling of missing data (Basile, 2019). Furthermore, inconsistent responses were adjusted, and subsequently, only three clusters were selected based on the statistical “silhouette statistical technique” (Rousseeuw, 1987). This method allows the consistency within data clusters to be validated. In the cluster analysis, the people within the groups are very similar (homogeneous), but they are highly differentiated (heterogeneous) between the groups (Groepel and Bloch, 1990). A proximity matrix was used to evaluate the clusters; indeed, by observing the correlation between the S matrix and a definitive version of the S matrix based on cluster labels, the goodness of clustering can be evaluated (Binder, 1978; Fritsch and Ickstadt, 2009). The silhouette method, calculated with the Gower distance, provides a graphical representation to interpret and validate the consistency within data clusters. The silhouette value shows the S of an object to its cluster (cohesion) compared to other clusters (separation). Values can range from -1 to $+1$. A value tending towards $+1$ indicates that the object is well-matched to its cluster and poorly matched to neighbouring clusters. The clustering configuration is appropriate if most objects have a high value. Low or negative values concerning many points indicate problems in the clustering configuration, as the clusters may be too numerous or too few (Rousseeuw, 1987). The sample’s sociodemographic characteristics related to gender, age, job position and residence country are summarized in Table 1. From the sample emerges that the specificities of the single countries in the southern area impact strongly the approaches to online shopping (around 66%).

4. Cluster analysis results

The cluster analysis results identified three profiles of consumers (Table 2) who made electronic purchases in the time frame considered. By considering self-determination theory (Deci and Ryan, 2000, 2012) in the analysis of the three profiles of online consumers, it is possible to highlight how these categories satisfy the three principal needs (autonomy, competence and relatedness) in an uncertain scenario. To generalize the data in both scenarios, online consumers showed the need for relatedness and satisfied this need through social media during electronic commerce processes. The need for autonomy and competence was shown in both scenarios, with a frequency enhancement of electronic commerce in uncertain situations.

The first cluster, called unwilling, represents people who have shown little inclination to buy products online, with a small deviation during an uncertain scenario such as a pandemic. The second cluster is called halfback because it is positioned exactly halfway between the first and third clusters. The third cluster is called digital emphasizes people’s attitudes toward experiencing online shopping both in normal and in uncertain situations. The data

	Needs	Normal scenario	Uncertain scenario
Self-determination theory	- Autonomy - Competence - Relatedness	People can purchase in all way they prefer ↓ e-commerce generates value as social activity	People have to consider particular restrictions on their purchasing process ↓ e-commerce become an isolated activity
Cluster analysis data	Unwilling	<ul style="list-style-type: none"> - Gender: Female - Age: 20–30 - Employment: Student - Nationality: South Europe - Online shopping few times year - Several products categories - Amazon, eBay - Strong attention on service quality - Use of social media - No knowledge on AR - Gender: Male - Age: 31–40 - Employment: Permanent contract - Nationality: South Europe - Online shopping once a month - Several products categories - Amazon, eBay - Discrete attention on service quality - No social media use - Knowledge on AR, without use - Gender: Female - Age: 31–40 - Employment: Temporary contract - Nationality: North-West-Europe - Online shopping once a month - Several products categories - Zalando, Zara, H&M, etc. - Not much attention on service quality - Instagram, YouTube - Knowledge on AR, without use 	<ul style="list-style-type: none"> - Gender: Female - Age: 20–30 - Employment: Student - Nationality: South Europe - Online shopping few times year - Several products categories - Amazon, eBay - Strong attention on service quality - Use of social media - No knowledge on AR - Gender: Male - Age: 31–40 - Employment: Permanent contract - Nationality: South Europe - Online shopping once a week - Several products categories - Amazon, eBay - Strong attention on service quality - Facebook, Instagram, YouTube - Knowledge on AR, without use - Gender: Female - Age: 31–40 - Employment: Temporary contract - Nationality: North-West-Europe - Online shopping more than once a week - Several products categories - Amazon, eBay - Discrete attention on service quality - Instagram, YouTube
	Halfback		
	Digital		
Source(s):	Authors' elaboration		

Table 2.
Visual representation
of the cluster
analysis data

gathered from the cluster analysis are presented visually and schematically in [Table 2](#). The results show that in a normal situation, most of the interviewees purchased online once a month (42.4%) and 34% purchased online only a few times per year. During an uncertain scenario such as a pandemic, 30.4 and 25.2% of the respondents declared that they shopped online more than once a week and once a week, respectively. Only 9.6% of the respondents purchased online a few times per year. The three online consumer profiles showed a preference to buy clothing (55.8%), followed by electronics (36.7%) and cosmetics (33.9%). To be more specific, the characteristics affecting each cluster will be presented in the following sections, with specific attention devoted to the self-determination theory ([Deci and Ryan, 2000, 2012](#)) able to demonstrate the satisfaction of the three basic psychological needs (autonomy, competence and relatedness).

4.1 Consumer profile: unwilling

The unwilling category is composed of students between 20 and 30 years old mainly from southern European countries. They show similar characteristics in shopping habits in normal and uncertain situations such as a pandemic. This category of consumers preferred to use e-commerce platforms like Amazon and eBay, with strong attention to service quality and the use of social media ([Nohutlu et al., 2022](#)) to satisfy their needs for relatedness accordingly to the self-determination theory ([Deci and Ryan, 2000, 2012](#)). As stated by ([Vithayathil et al., 2020](#)), there is a correlation between the use of social media, i.e. Facebook and Skype, and online shopping on the Amazon platform. Moreover, the “Unwilling” cluster is composed of Generation Z and Generation Y consumers for whom life often unfolds seamlessly between offline and online. Digital native consumers share a generational identity that significantly influences purchase patterns and shopping behaviour ([Eger et al., 2021](#)). The main difference concerns the frequency of shopping online. In fact, in normal conditions, being unwilling to shop online a few times per year and in an uncertain situation increases this frequency to once a month to satisfy their need for autonomy ([Deci and Ryan, 2000, 2012](#)). Accordingly, to the self-determination theory ([Deci and Ryan, 2000, 2012](#)), the exploitation of online shopping could be proper support to achieve the autonomy to purchase goods and services people need, such as in a normal situation. The low frequency of purchases could be because digital natives are inclined to choose unique and attractive experiences to spend their money on rather than on material goods ([Dabija and Lung, 2019](#)), considering also that consumers in this category are mainly students with limited buying power.

4.2 Consumer profile: halfback

The data gathered from the halfback category demonstrates an increased interest in shopping online, from once a month in average conditions to once a week in uncertain situations. The halfback demonstrated their attitude to increasing online shopping correlated to enhancing social media use. Accordingly, to the self-determination theory ([Deci and Ryan, 2000, 2012](#)), the desire to develop a sense of belonging is essential, particularly in a pandemic (uncertain scenario) in which restrictions are imposed (avoiding social contact and respecting social distancing). Several studies have also shown the relevant role of social networks ([Nohutlu et al., 2022; Vithayathil et al., 2020](#)) in increasing the sense of community and relatedness among people. Hence, the results confirm the influence of social media such as Facebook, Instagram and YouTube in a specific scenario affected by uncertain situations and lockdowns.

4.3 Consumer profile: digital

The data that emerged from the digital category showed an increased frequency of shopping online from once a month to more than once a week in an uncertain scenario by

demonstrating a high level of autonomy (Deci and Ryan, 2000, 2012) in the use of electronic commerce. By also considering the high level of competence (Deci and Ryan, 2000, 2012) that characterized the digital category, the data shows how these are inclined to shop very frequently in an uncertain scenario by exploiting their high level of autonomy to shop online. This level of competence and autonomy also refers to the preference to switch to shopping online in specialized stores such as Zalando, Yoox, Eataly, Zara and H&M in normal conditions. In an uncertain situation, they look more at general marketplaces such as Amazon, eBay or Alibaba/AliExpress. Accordingly, to the self-determination theory (Deci and Ryan, 2000, 2012) the results show that the pandemic situation reinforces the adoption of social commerce practices (Nohutlu *et al.*, 2022) by satisfying more deeply the need for relatedness (Deci and Ryan, 2000, 2012). As the self-determination theory (Deci and Ryan, 2000, 2012) recognizes the need for relatedness among people, in an uncertain scenario, the greater availability of time and social constraints increases the need to improve the shopping experiences with user interactions and user-generated content (Wang *et al.*, 2019).

5. Discussions

Interesting and innovative information arose by merging data from normal and uncertain scenarios. Based on the data gathered through the cluster analysis, the enhancement of electronic commerce and social media use is evident. In particular, the frequency of purchase in each category of electronic commerce consumers was shown to be enhanced considerably in an uncertain scenario. For example, restrictions or other regulations could limit the usual manner of shopping (availability of several channels to shop) to help contain the crisis. From this research, it emerged that online shopping is the predominant way to shop (Guthrie *et al.*, 2021; Tran, 2021) in an uncertain scenario such as a pandemic. Considering the restrictions and new rules imposed by various governments around the world (Sheth, 2020; Hale *et al.*, 2020), people are reconfiguring their shopping methods by exploiting the potential benefits offered by electronic commerce and social media (Nohutlu *et al.*, 2022; Guthrie *et al.*, 2021; Naem, 2021; Shahbaznezhad *et al.*, 2021; Tran, 2021; Appel *et al.*, 2020). A pandemic can significantly affect human behaviour (Sedita *et al.*, 2022; Vermicelli *et al.*, 2022), and consumers can become more attentive and demanding; above all, they can become accustomed to finding what they need online (Pantano *et al.*, 2020; Guthrie *et al.*, 2021; Tran, 2021). The analysis shows that a pandemic can change people's everyday lives worldwide with intense modifications (Eger *et al.*, 2021; Donthu and Gustafsson, 2020). Specifically, new circumstances, such as isolation, community containment, the avoidance of social contact and the practice of social distancing (Wilder-Smith and Freedman, 2020), drive consumers to exploit the potentiality of electronic channels to shop and influence their web experience and, consequently, their decision process. It has been found that during uncertain circumstances (Forster and Tang, 2005), consumers decide to use online shopping to maintain a sort of everyday life (Guthrie *et al.*, 2021) or a "new normal" (Dwivedi *et al.*, 2020, p. 1; Barnes, 2020). Undoubtedly, the proclivity for electronic commerce is a trend that is destined to continue, even when the current pandemic emergency is over. The lens of self-determination theory (Deci and Ryan, 2000, 2012) helps to clarify and specify how, in an uncertain scenario, the need to use the Internet and consequently electronic commerce increases for several categories of electronic consumers, as shown in the cluster analysis results. Specifically, considering the three basic needs of autonomy, competence and relatedness of the self-determination theory (Deci and Ryan, 2000, 2012) specific uncertain situations can increase these needs. Furthermore, as shown in Table 3, the need for autonomy is enhanced by uncertain situations, restrictions and unusual daily life (Sheth, 2020; Hale *et al.*, 2020). The need for competence is enhanced by the necessity to acquire products and services electronically due to the impossibility of using normal shopping channels. Moreover, the need

for relatedness is enhanced by particular rules that impose community containment, social distancing and isolation (Wilder-Smith and Freedman, 2020). Considering the enhancement of all three needs, it can be seen that Internet use and, consequently, electronic commerce both represent proper support for the reacquisition of an everyday lifestyle, as shown by the cluster analysis data.

Moreover, the three categories of consumers emerged, demonstrating a decisive push toward an electronic channel that will not be limited only to this period of the most significant restrictions (Guthrie *et al.*, 2021) but will instead turn into new habits.

6. Theoretical implications

Based on self-determination theory (Deci and Ryan, 2000, 2012), it is clear how, for each category of electronic commerce consumers, the use of social media is fundamental to overcoming the situation of isolation (Nohutlu *et al.*, 2022) and community containment imposed by the pandemic restrictions, which consequent satisfies their need for relatedness. The adaption of self-determination theory (Deci and Ryan, 2000, 2012) to uncertain scenarios contributes to filling the gap between the categorization of electronic consumers in a normal and uncertain scenario. In that sense, considering the three basic psychological needs (autonomy, competence and relatedness) appears fundamental in emphasizing the satisfaction of these needs in an uncertain scenario. An uncertain scenario is characterized by situations and rules that cannot be known in advance. However, in the current study, the innovative approach to the segmentation of online consumer behaviour with the help of self-determination theory (Deci and Ryan, 2000; 2012) has shown how essential it is to people to restore normal habits as soon as possible. Moreover, this desire to return to normality is the principal reason that pushes people to exploit the potentiality of electronic commerce in an uncertain scenario as they seek to satisfy their needs of autonomy, competence and relatedness (Deci and Ryan, 2000, 2012).

7. Managerial implications

To compete in an uncertain scenario, firms considering people’s modified needs to reacquire everyday life by exploiting the high potential of electronic commerce should implement digital strategies to guarantee an excellent customer experience (Hoyer *et al.*, 2020) by innovating their business model. Considering the new consumer attitudes could be helpful information for managers still operating in a post-pandemic world. An uncertain scenario like a pandemic offers exciting information to understand the changed need of people who use online channels as the primary way to shop. In fact, the digital communication channels will also become a priority for companies for the rapid transfer from offline to online media

Table 3.
Adaption of self-determination theory in an uncertain scenario

Uncertain scenario	Self-determination theory	
Basic psychological needs	Competence	Relatedness
Autonomy	Enhanced by	Enhanced by
- uncertain situations	- necessity to acquire products and services in an uncertain scenario	- community containment
- restrictions		- social distancing
- unusual daily life		- isolation
Source(s): Authors' elaboration		

(D'Andrea *et al.*, 2019). Therefore, it will be necessary to ensure a personalized shopping experience that can respond to the individual consumer's needs (Hickman *et al.*, 2020). Despite the lack of resources and skills, keeping business going was crucial for companies during domestic confinement. Simultaneously, with people working in different places, the empathic approach must be refined by listening better to compensate for the physical distance. In the wide context of open innovation, Greco *et al.* (2015) encourage managers to make partnerships with firms and institutions fostering interactions with organizations from foreign countries. Moreover, according to Spender *et al.* (2017), networking capabilities should be part of all education programmes for entrepreneurs.

8. Conclusion and further research

In an uncertain scenario like a pandemic, successful online retailers can implement innovative practices to engage and retain customers. Even because, the increasing number of smartphones and other Internet-enabled devices along with their applications and services make the Internet easier to be accessed and much more prolific (Akroush and Al-Debei, 2015). At the same time, electronic consumers will continuously require the adoption of smart technologies by retailers to be better satisfied. Practical examples include providing a free, limited-time delivery slot for older consumers or better conditions for same-day paid delivery services mostly for Generations Y and Z, new delivery methods in poorly served or quarantined locations (with the use of drones) and easy and immediate shipment traceability. The integration of physical and digital channels will become even more crucial as retailers will leverage new technologies to increase value creation as part of their store formats. Predicting the future of online marketing (Valos *et al.*, 2010), marketing practitioners are affected by interactivity, personalization, integration, evaluation, agency structures and capabilities. For example, they will offer extended product ranges, implement AR (Yim *et al.*, 2017; Caboni and Hagberg, 2019), or use online fulfilment and the refurbishment of physical orders, even if refurbishment is not yet widely used for online purchases or is better used only in limited categories (such as home furnishings). Firms must therefore manage a broader and more competitive market by investing more in digital tools. The main limitations of this research regard the reliability and validity of the surveys; that is, the consistency and accuracy of the adopted measures need to be improved. Reliability can be estimated by comparing the findings in different countries. Validity can be estimated by matching the results to another dataset or existing theories (Golafshani, 2003). Furthermore, the integration of customer experiences in digital channels will be a distinctive facet of digital retailers' competitive advantage (Hoyer *et al.*, 2020). The ongoing digital transformation initiatives across the retail industry (Hagberg *et al.*, 2017) will be linked more to the online environment (Wagner *et al.*, 2020). For example, the adoption of multi-communication platforms integrates and facilitates interactions with customers across email, text, voice, social media and video channels. Future research could be oriented toward understanding whether consumers who used digital to connect, learn and buy products during the lockdown will continue to have the same habits and with what intensity and whether there will ever be a return to normal as we know it. The study identifies the limitations related to the analysis of the AR questions, as the results were found to be inconsistent. Indeed, almost no respondents used these technologies. Therefore, their role in online purchases before and during the pandemic could not be investigated. Based on this limitation, further research could be developed to investigate the role of AR technologies in electronic commerce. In the same way, the role of advanced technologies, such as AI, machine learning, smart sensors and mobile and location technologies, can be investigated to understand consumer behaviour in the processes of online purchases.

Note

1. $n = \frac{2(2.5758+1.6449)^2(0.72)^2}{(0.15)^2}$ The sample size of 740 respondents, which was calculated using the above formula, is based on some conventions (type I and II errors) and a few assumptions (effect size and standard variation).

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Appendix 1

Questionnaire used for data collection

The impact of the COVID-19 pandemic on consumer buying habits in the e-commerce retailing industry

- (1) Gender
- (2) Age
- (3) Employment status
- (4) Nationality
- (5) Before the Covid-19 pandemic, how frequently did you shop online?
- (6) During the Covid-19 pandemic, how frequently have you shopped online?
- (7) In which product categories do you buy most?
- (8) Before the Covid-19 pandemic, which kind of retailers were your favourites?
- (9) During the Covid-19 pandemic, which kind of retailers were your favourites for making purchases?
- (10) How important should service quality be in relation to the following characteristics?
- (11) During the Covid-19 pandemic, which of the following social networks have most influenced your purchases?
- (12) Do you know and use Augmented Reality?
- (13) If you know Augmented Reality, during the Covid-19 pandemic, in which categories have you used it?
- (14) If you used Augmented Reality during the Covid-19 pandemic, how important was the contribution of this technology in your purchases?
- (15) If you have any personal observations fill out the form below.

Due to space limitations, the completed questionnaire will be emailed upon request.

Source: Authors' elaboration.

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