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A FCM Approach to Understand Social Commerce of Touristic Products

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Abstract *This paper uses a Fuzzy Cognitive Maps Approach (FCM) for understanding the possible influence of adopter category scenarios on purchase intention for touristic products. We also analyse the effect of the types of users of new technologies in the purchasing decision-making processes. Findings confirm that some effective marketing social media strategies on engagement, information quality or economic feasibility, could be key determinants of purchase intention. With regard to the FCM analysis, different factors have an effect on tourists' purchase intention (trust, perceived value, information quality, reputation...).*

Keywords: *Social Media, Tourism Industry, Fuzzy Set, Purchase Intention, Social Commerce*

INTRODUCTION

Information and communication technologies have engendered a new paradigm shift in the tourism industry (Mariani & Mura, 2016), playing a central role in its growth and development (Gretzel & Fesenmaier, 2009; Quaglione et al., 2020). One of the main motivations for using the Internet is online social media (Munar, 2012). Social media has become an essential part of people's life. Besides, in the current environment, social media is having a greater influence on travel decision (Mayrhofer et al., 2020; Pop et al., 2021; Riaz et al., 2021; Tham et al., 2020).

Social media has deeply transformed the way in which people access information, plan for, consume travel and subsequently share their travel experiences (Chung & Buhalis, 2008; Xiang & Gretzel, 2010). Therefore, the change caused by social media also applies to consumer decision-making processes and marketing communications (Shankar & Malthouse, 2007). In fact, travellers are increasingly using social media in order to get information on which to base their decisions (Cheunkamon et al., 2020; Di Virgilio & Antonelli, 2020; Javed et al., 2020).

The increased popularity of social media as an efficient tool for socialisation and information sharing has given rise to a new form of e-commerce called social commerce (Liang et al., 2011). The commercial impact of social commerce is now vividly obvious to various firms (Zhang et al., 2014). As a result, it is of vital importance that tourism organisation managers and destination policy makers understand the antecedents of the tourists' use and adoption of social media for travel decisions (Xiang & Gretzel, 2010).

Many researchers have already studied the importance of the use of social media in the context of tourism and its influence on purchase intention (Pookulangara & Koesler, 2011). Among the factors that have influence in purchasing decisions in the tourism context, trust and perceived value have been proven the most relevant variables and these have a huge impact on purchase intention in the tourism context (Ayeh et al., 2013; Jin et al., 2015). However, most of the studies about social media in the tourist context have been

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focused on the opinions of social media users (Filieri et al., 2015). According to Baker et al. (2013), experts provide an accessible source of information that can be quickly harnessed to gain insight. They can often provide knowledge when more traditional research has not been undertaken. A traditional definition of an expert is someone who masters knowledge in a specific fieldor area. Yet there is a limited consensus in the literature as to what an expert is, leading to the conclusion that an expert can be defined in different ways. In fact, people who have knowledge of a specific area do not necessarily need to be experts. However, key themes have emerged from among the numerous definitions of expert, including knowledge and experience.

There are sometimes conflicts and disagreements among experts on multi-criteria decision-making. In addition, the point of view of experts is not only uncertain but also fuzzy because most of the opinions are expressed in different causal relationships between concepts or variables. This issue is even more complex when the object of study is intention-to-purchase because purchase intentions are generally imprecise, vague and uncertain. To address these problems, Zadeh (1965) proposed fuzzy theory. Fuzzy cognitive maps (FCM) are able to incorporate experts' knowledge and to establish a consensus that represents a common opinion of the group (Stylios & Groumpos, 2000). In fact, researchers consider cognitive maps as the best tool for resolving issues over which experts have different opinions.

This paper presents a fuzzy model for understanding purchase intention for touristic products with respect to various factors and weighting. Furthermore, it identifies whether, in relation to a series of factors, an early adopter differs from a late adopter, in order to understand whether they exhibit distinct forms of purchase intention decision-making. To achieve this, we analyse the factors that allow usto make an effective discrimination between them.

LITERATURE REVIEW

Purchase Intention on Social Media

In the model, purchase intention for tourist products are the main variable. Trust is considered a relevant variable to explain the purchase intention on the Internet (Gonzalez & Mlynar, 2019; Hajli et al., 2017). According to the research, if people perceive a high level of trustworthiness, they are in general more inclined to purchase online (Hajli et al., 2017; Lu et al., 2016). This relation hasalso been analysed in the tourist and e-commerce contexts (Filieri et al., 2015; Hajli et al., 2017).

Perceived privacy and perceived security have been identitied as determinants of trust (Kim et al., 2008). Perceived privacy is defined as the consumer's general impression of how effectively the online seller has protected the confidentiality of the information processed during online purchasing (Kim et al., 2008). Perceived security includes the consumers' general impression of how effectively issues as verification; authentication, encryption, protection and non-repudiation have been considered (Kim et al., 2008). Positive corporate reputation is based on superior performance over a period of time. According to Rindova et al. (2015), companies with higher reputations are very likely to gain customer trust. Thus, if a company has a highly favourable reputation, it is more likely to be perceived as trustworthy by customers (Keh & Xie, 2009; Rindova et al., 2005). Word-of-mouth referral is a factor that must be included in customer behaviour. It refers to exchange of interpersonal and noncommercial communication (positive and negative) about a product or service (Goyette et al., 2010). Word-of-mouth gives information to consumers which have consequences in their purchasing decisions.

In a social media context there are some additional variables which should be taken into consideration because of the personal relations they entail. Therefore, in the present study, the trust that customers have in Facebook and in their Facebook friends – closeness (Ayeh et al., 2013) – has been considered. Perceived value is also identified as an important antecedent of purchase intention (Liu et al., 2015).Obviously; consumers prefer products or services which provide them the maximum value (Kim et al., 2012). Among the advantages of online travel, reduced shopping time (Wong & Law, 2005), information quality (Filieri & McLeay, 2014; Park et al., 2007) and even hedonic motivation are often considered.

Information quality comprises relevance, sufficiency, accuracy and currency (Dedeoglu, 2019; Park et al., 2007). It has also been established that information quality extensively influences consumer behaviour (Filieri et al., 2017; Zhang et al., 2017). Hedonic motivation is another important factor of determining technology acceptance and use. It assumes a certain amount of fun or pleasure associated with technology usage (Wang et al., 2012). Hedonic motivation has been shown to have a huge impact on the adoption and use of any technology (Brown & Venkatesh, 2005).

In addition, perceived value and ease of use are relevant factors in the acceptance and use of technology (Lee et al., 2003) as well as consumer innovativeness (San Martín & Herrero, 2012). Lifestile, habit and social influence have also shown a strong influence on purchase behaviour (Chiu et al., 2012; Kim et al., 2009; Pookulangara & Koesler, 2011).

Fuzzy Method in the Tourism Industry

To cope with the difficulty of how to classify our opinions exactly, Zadeh (1965) proposed fuzzy set theory, which

was introduced to manage the uncertainty, imprecision or vagueness of such data. It enables the representation of vague data through fuzzy numbers. Moreover, fuzzy theory allows the application of mathematical operations and programing to the fuzzy domain. A fuzzy set is a class of objects with a continuum of grades of membership.

Nowadays, according to Gonzalez et al. (2002), fuzzy logic has already been successfully applied to simplify decision-making in environments characterised by uncertainty and imprecision. In fact, the theory has been extended by many authors, working in such diverse fields. Fu, this application is still an extremely limited tool for management in tourism context (Xiang & Formica, 2007). Furthermore, managers are not able to analyse all factors at the same time. They often analyse the factors individually or some (but not all) simultaneously. Therefore, computerised support for the evaluation of factors affecting purchase intention would greatly contribute toward successful social media management.

A fuzzy cognitive map (FCM) is a dynamic system. It is expressed by a matrix which is composed of nodes (C_i) (where i = 1, . . . ,n) representing concepts (Kheirandish et al., 2017). The edges represent the relationships between nodes (W_{ij}) W: $(C_i, C_j) \rightarrow W_{ij}$. Edges can have two type of connection, positive (+) or negative (-) (Dickerson & Kosko, 1994). The value of each edge is a function whose values are often between 0 and 1 or −1 and 1 inclusively (Xirogiannis & Glykas, 2004). The adjacency matrix allows to represent the different relationships between factors.

$$A = \begin{pmatrix} \cdots & \cdots & \cdots \\ \cdots & w_{ij} & \cdots \\ \cdots & \cdots & \cdots \end{pmatrix}; \; w_{ij} \in [-1, +1] | \forall i, j$$

The positive value of an edge means a positive relationship between two nodes. A negative value shows a negative relationship between the nodes. A '0' in the adjacency matrix means that a causal relation does not exist, indicating the absence of causality. Furthermore, the weight diagonal of the matrix always has '0' value because causality is not self-reflexive (Spirtes et al., 2000).

Furthermore, FCM is not only able to convert qualitative knowledge into quantitative structure (Jetter & Kok, 2014) but also enables testing of forecasting scenarios (Papageorgiou et al., 2017). This capacity to create new scenarios is one of the best characteristics of FCM. Thus, for touristic products, FCM can be used to understand the possible influence on purchase intention of adopter category scenarios.

The process of acceptance a new IT depends on users characteristics (Kavak & Demirsoy, 2009). Thus, while some individuals adopt a new technology in the first phase, others individuals take more time to do so (Roger, 1983). Early adopters are very important because they often adopt an IT innovation quicker than others (Rogers & Shoemaker, 1971). Therefore, it is necessary to know the characteristics of each type of IT adopter and to analyse the antecedents of purchase intention using and creating an integrated model with contributions from IDT theory (Rogers, 1983).This could facilitate the identification of individuals who are the first to try the new IT and could help to accelerate its diffusion process.

THE STUDY

The present study uses a fuzzy method which has several advantages, such as scenario building. The FCM was constructed in the following stages:

Step 1: Selecting the Experts

Definitions of experts include aspects as knowledge and experience (Kennedy, 2004). Regarding to knowledge, it can be broadly understood as the possession of a higher degree of information and understanding in a specific area. Experience, though quite important, is contentious, because it may be quite difficult to determine whether years of experience the sole criterion upon which experts are judged is. Therefore, this paper concentrated on both knowledge and experience to select the experts of the panel. All experts in the study had more than five years of experience in social commerce in the tourism sector and they had a great knowledge of the research topic.

The optimal group size and heterogeneity depends on the specific characteristics of the study. In fact, the definition of expert influences the sample size necessary to ensure the validity of the result. Nonetheless, a number of experts between 10 and 20 seems to be a good panel size (Okoli & Pawlowski, 2004). Table 1 shows the characteristics of the 20 experts who have participated in this study.

Table 1: Panel of Experts

Number of experts	20
Average social commerce experience	5
Job category	
Marketing director	4
Community manager	4
Commercial director	2
General director	7
Deputy manager	3

Step 2: Identifying Preliminary Nodes

Different factors (55) were identified from the literature review. However, not all of them could affect purchase intention and not all the factors can be applied to the context of social media. Besides, we found that some studies identified the same or similar factors. Thus, we removed duplicates and any factors that did not have an impact on this specific area of study. Finally, we selected 15 factors, which are the nodes of the study. Table 2 shows all factors considered at each stage (literature review, preliminary and final selections).

Table 2: FCM Nodes of the Literature

Purchase intention	Purchase intention (PI)
Behavioral intention	
Participation intention	
Intention to buy	
Purchase decision	
Purchase motivation	
Trust	Trust (TRT)
Perceived value	Perceived value (PV)
Perceived service quality	
Perceived usefulness	
Utility	
Perceived benefit	
Expected value	
Effort expectancy	
Social present	Reputation (RPT)
Reputation	
Brand company	
Company's size	
Brand image	
Information quality	Information quality (IQ)
Information detail	
Perceived security	Perceived security (PS)
Transaction safety	
Perceived risk	
Security policy	
Assurance seal	
Security of sensitive information	
Word-of-mouth referrals	Word-of-mouth referrals (WMR)
Recommendation and referrals	
Ratings and reviews	
Forums and communities referrals	
Perceived privacy	Perceived privacy (PP)
Privacy policy	
Internet privacy concerns	
Economic feasibility	Economic feasibility (EF)
Economic incentive	
Convenience	
Transaction cost	
Effort cost	
Low price	
Financial advantage	
Time saving	Time saving (TS)
Perceived difficulty of use	Perceived difficulty of use (PDU)
Perceived easy of use	
Easy of buying	
Hedonic motivation	Hedonic motivation (HM)
Enjoyment	
Intertainment motive	
Social influence	Social influence (SI)
Lack of purchase experience	Lack of purchase experience (LPE)
Customer previous behaviour	
Internet shopping experience	
Customer previous experience	
Closeness	Closeness (CLS)
Familiarity with the social media	

A pilot study was conducted to check previous factors by three social commerce experts. Each expert made amap including factors with influence on purchase intention. We firstly showed them the list of factors included in the literature. We also gave them the necessary information on how to create their own FCM. We explained that first of all they should select the factors that they thought influence purchase intention. The preliminary list did not influence the expert's opinion because experts could add further elements that were not included in the list. Even so, they could not use the whole preliminary list. Some experts added 4 further nodes to the study. Consequently, the final FCM consists of 19 nodes, of which 11 refer to perceptions of social media and its use (P) and 8 represent user characteristics (C) (Table 3).

Table 3: FCM Final Nodes

Id	Nodes	Definition	Supporting Literature	Origin
P1	Purchase Intention (PI)	The intention to use e-commerce to purchase a product in the future.	San Martín & Herrero (2012)	LR
P2	Trust (TRT)	A general belief in an online seller that results in a behavioral intention.	Gefen (2000)	LR
P3	Perceived Value (PV)	The consumer's assessment of benefits against costs when shopping with an online seller.	Zeithaml (1988)	LR
P4	Reputation (RPT)	Is a characteristic which defines how well known a company is.	Ray et al. (2011)	LR
P5	Information Quality (IQ)	The consumers's perception of how complete and accurate the online information can be.	Kim et al. (2008)	LR
P6	Perceived Security (PS)	The consumers' general perception of how the online seller has considered the determinants of security as verification, authentication, encryption, protection and non-repudiation.	Kim et al. (2008)	LR
P7	Word-of-Mouth Referrals (WMR)	Consumer's experiences and views conveyed through written words based on internet technologies.	Sun et al. (2006)	LR
P8	Perceived Privacy (PP)	The consumer's general perception of how the online seller has considered the confidential of the information during the online purchasing.	Kim et al., (2008)	LR
P9	Economic Feasibility (EF)	An individual's expectation that s-commerce provides price-effective communication and information exchange opportunities.	Kim & Park (2013)	LR
P10	Time Saving (TS)	An individual's expectation that using s-commerce provides time saving.	Amaro & Duarte (2015)	LR
P11	Engagement (ENG)	Repeated interactions between a customer and an organization that strengthen the emotional, psychological or physical investment that the customer has in the organization.	Hollebeek et al. (2014)	P
P12	Culture (CLT)	Uuncertainty avoidance is the degree to which members of a culture feel threatened by uncertain or unknown situations and individualism is the extent to which the ties between individuals are loose.	Hofstede (2011)	P
P13	Habit (HBT)	A mediator between satisfaction and continuance intention.	Limayem et al. (2007)	P
P14	Personal Innovativeness (PIN)	The degree of innovation of a person.	Agarwal & Prasad (1998)	P
C1	Perceived Difficulty of Use (PDU)	The degree to which purchasing travel online is perceived to be difficult.	Amaro & Duarte (2015)	LR
C2	Hedonic Motivation (HM)	The degree to which a person believes that using multimedia on demand is of interest, and such person also assumes that a certain amount of enjoyment is associated with such usage.	Wang et al. (2012)	LR
C3	Social Influence (SI)	The extent to which consumers perceive that important others believe they should use a particular technology; and facilitating conditions refer to consumers' perceptions of the resources and support available to perform a behavior.	Brown & Venkatesh 2005; Venkatesh et al. 2003	LR
C4	Lack of Purchase Experience (LPE)	Amount of time that a consimer has used the internet in the past to purchase products or services	Kuhlmeier&Knight, 2005	LR
C5	Closeness (CLS)	The trust customers have in Facebook and in their Facebook Friends.	Gefen, 2000; Ayeh et al. (2013)	LR

LR: Literature review P: Panel experts.

Step 3: Building the FCMs

A FCM is generally designed by experts because they have sufficient knowledge and experience in the specific field. After identifying the nodes and the relationships between them, each expert has to evaluate the different relationships. Therefore, when experts have to assign a value, they have to consider three problems. First, the W_{ij} intensity, to evaluate how strong "i" is in "j" with a number between [-1, 1]. Also, the sign (+) or (-) of W_{ij}, to show the direction of the connection. Finally, the causality relationship must be considered.

Having solicited the experts' opinions, it was necessary to form a consensus between them. Various methods could be used to create consensus. Experts' consensus is usually calculated using an arithmetic mean in a multi-criteria decision method (Ma et al., 2011). Therefore, this paper uses

FCM with mean to represent experts' consensus. The mean is able to avoid the possible impact of extreme values and it can be calculated on negative values which is necessary in this research. In order to calculate the mean, we suppose the equal importance of each expert. Therefore, we consider that the weights of their opinions are equal for the means to build the matrix. Table 4 shows the adjacency augmented matrix representing the final FCM that contains 33 edges. This matrix represents the different relationships between the factors of the study by means. The matrix was built adding the adjacency matrix of each expert because consensus does not require that experts change their judgement as the Delphi methodology does (Bueno & Salmeron, 2008).

As an example of adjacency augmented matrix, let two FCMs with common nodes. Starting from each adjacency matrix.

$$A^{Expert1} = \begin{matrix} A \\ B \\ C \end{matrix} \begin{pmatrix} 0.4 & 0 & -0.1 \\ 0 & 0 & 0.2 \\ 0 & 0 & 0 \end{pmatrix}$$

$$A^{Expert2} = \begin{matrix} A \\ C \\ D \end{matrix} \begin{pmatrix} 0 & 0.4 & 0 \\ 0.9 & 0 & 0 \\ 0 & 0.1 & 0 \end{pmatrix}$$

The adjacency augmented matrix will be built as follows.

$$A^{Aug} = \begin{matrix} A \\ B \\ C \\ D \end{matrix} \begin{pmatrix} 0.2 & 0 & 0.05 & 0 \\ 0 & 0 & 0.1 & 0 \\ 0.45 & 0 & 0 & 0 \\ 0 & 0 & 0.05 & 0 \end{pmatrix}$$

In this adjacency augmented matrix the first column and row are composed by the cause and effect nodes, respectively. Each cell shows the influence of one variable on another. The relationships between the variables can be positive, negative or no relationship. A positive relationship means that values would change in the same directions, whereas a negative relationship means thatvalues would change in different directions. However, the majority of connections are positive, in other words, most of the values would change in the same direction. Standardised effects range from −0.75 to 1.00. The lowest and highest causal effects are found on the path from perceived difficulty of use to hedonic motivation and from information quality to trust. Fig. 1 shows a graphic representing the FCM.

Table 4: Adjacency Augmented Matrix

ID	CLS	CLT	EF	HBT	HM	IQ	PIN	LPE	PDU	PI	PP	PS	PV	RPT	SI	TRT	TS	WMR	ENG
CLS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.62	0.00	0.98	0.00
CLT	0.00	0.00	0.00	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.00
EF	0.00	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HBT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.75	0.00	0.00
HM	0.00	0.00	0.00	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0,00	0.00	0.00	0.88	0.00
IQ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.96	0.93	0,00	1.00	0.00	0.50	0.90
PIN	0.00	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LPE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.10	0.00	0.00	-0.32	0.00	0.00	0.00
PDU	0.00	0.00	0.00	0.00	-0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.75	0.00	0.00	0.00	0.00	0.00	0.00
PI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00
PS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68	0.00	0.00	0.00
PV	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RPT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.95	0.00	0.00	0.86	0.00	0.00	0.00
SI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.95	0.00
TRT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00	0.00	0.00
WMR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.98	0.75	0.90	0.00	0.00	0.00
ENG	0.00	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.90	0.00	0.00	0.00	0.00	0.00

Each cell shows one fuzzy weight (ω_{ij}). This represents the intensity of the relationships between two nodes (i and j).

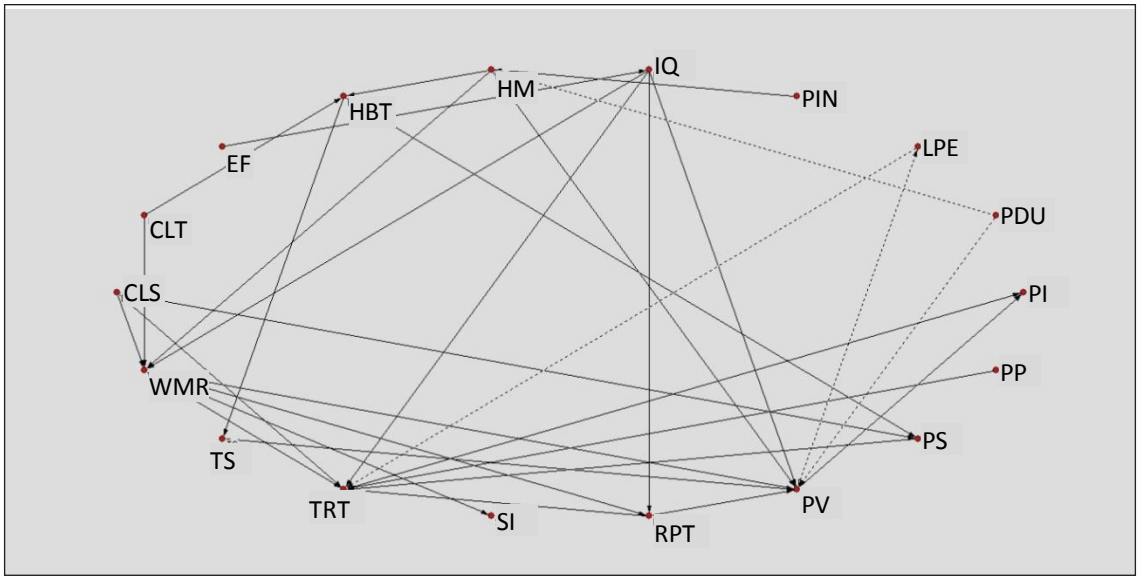

Fig. 1: Relationships between the Nodes in the FCM

The FCM model represents the factors which affect the purchase intention towards touristic products in the context of social media, and the relationships between them. The model also makes it possible to estimate the existing impact on purchase intention for tourist products of the characteristics of the users towards whom Facebook is directed.

To understand the dimension of purchase intention, Pearson's correlation coefficient was used, which illuminates the correlation between the variables of the model. The scale of the Pearson's correlation coefficient is from −1.00 to +1.00.

Step 4: Validation

Validation is necessary to create a complex system (Cobelli & Carson, 2008). First, the validation process should be performed during the creation of the model, which requires the active collaboration of the experts during the modelling process. Then, once the building of model has been finished, the process should be checked by designers.

RESULTS

Results show that perceived value (0.76) and trust (0.80) are significant variables to explain purchase intention in a social media context. Aditional relationships have also been identified. Information quality (0.96), reputation (0.95) and time saving (0.90) can improve the perceived value. Word-of-mouth referrals (0.50) and hedonic motivation (0.50) were other factors which affect perceived value positively. On the other hand, lack of purchase experience (−0.10) and the perceived difficulty of use of social media (−0.75) negatively influence on perceived value.

When considering trust, the expert panel regards information qualityas the primary factor (1.00), which can in turn produce a direct influence on the remaining factors: reputation (0.93), engagement (0.90) and word-of-mouth referrals (0.50). Moreover, word-of-mouth referrals (0.90), reputation (0.86), perceived security (0.68), closeness (0.62) and perceived privacy (0.62) are positively related to trust. Conversely, experts believe that lack of purchase experience (−0.32) is negatively related to trust.

Closeness (1.00) and habit (0.50) have a positive impact on perceived security. On the other hand, word-of-mouth referrals (0.98), information quality (0.93) and engagement (0.90) have shown a positive influence on reputation. Lastly, closeness (0.98), social influence (0.95), hedonic motivation (0.88), information quality (0.50) and culture (0.30) directly affect to word-of-mouth referrals.

The values of the balanced matrix have been automatically calculated through the values of the adjacency augmented matrix (Table 5). This matrix shows the room for improvement of each node. For instance, purchase intention has an average of 0.811 where 1 is the desired level. Therefore, the average gap, which shows the room for improvement and is calculated as the distance from 1, has a value of 0.188. Trust has the highest gap value (0.951). It indicates that trust does not need to be greatly improved. At the opposite end of the scale, hedonic motivation has the lowest value (0.444). This means that hedonic motivation should be the most important concept for managers aiming to improve purchase intention. In order to improve hedonic motivation, firms should be aware that, although contemporary consumers are becoming more receptive towards using social media to purchase a touristic product or service, it remains quite important to

ensure that consumers do enjoy visiting a firm's social media channels. It is also positive if consumers like the idea of using social media to purchase a touristic product or service; therefore, firms should make efforts to ingrain this attitude.

Table 5: Results - Balanced Matrix

Id	Nodes	
P1	Purchase Intetion	0.811
P2	Trust	0.951
P3	Perceived Value	0.913
P4	Reputation	0.895
P5	Information Qulality	0.739
P6	Perceived Security	0.697
P7	Word-of-Mouth Referrals	0.883
P8	Perceived Privacy	0.500
P9	Economic Feasibility	0.500
P10	Time Saving	0.623
P11	Engagement	0.660
C1	Culture	0.500
C2	Habit	0.672
C3	Personal Innovativeness	0.500
C4	Perceived Difficulty of Use	0.500
C5	Hedonic Motivation	0.444
C6	Social Influence	0.659
C7	Lack of Purchase Experience	0.500
C8	Closeness	0.500

In summary, the results show the current challenges for hotel managers: how to improve trust and perceived value for travellers. Thus, for managers the results can the process easier by highlighting the most important factors that they need to improve.

To study the differences between the two types of IT adopters and analyse whether innovativeness is a strong or weak node, we designed 'what-if' scenarios and simulated each one.

The type of adopter categories is based on the speed that a person adopts a new idea compared with others. Thus, to get an IT adoption process to take place the innovation has to be embraced by early adopters. To analyse that, we have defined the value of each node in each initial state vector for each scenario. In scenario 1, we present an early adopter who is open to change and is unafraid of risks. In scenario 2, we simulate the opposite case, a late adopter who is afraid of risks.

Table 6 shows the values of the nodes in the initial state vectors. This simulation is intended to show how the acceptance of innovations in social media affects purchase intention. For this reason, two scenarios are used. First, scenario 1 represents an early adopter in C1, C2, C3, C5, C6 and C8 are computed with a value of 1, and C4 and C7 with the value 0. Scenario 2 simulates the influence on purchase intention of late adopters and it has the opposite values. This process can help to explain how the the degree of innovation has an influence on purchase intention and its antecedents in a social media context.

Table 6: Simulations' Results

Id	Nodes	Scenario 1	Results Simulation 1	Scenario 2	Results Simulation 2
P1	Purchase Intention	0	0.819	0	0.791
P2	Trust	0	0.973	0	0.889
P3	Perceived Value	0	0.959	0	0.806
P4	Reputation	0	0.903	0	0.865
P5	Information Quality	0	0.739	0	0.739
P6	Perceived Security	0	0.817	0	0.500
P7	Word-of-Mouth Referrals	0	0.969	0	0.591
P8	Perceived Privacy	0	0.500	0	0.500
P9	Economic Feasibility	0	0.500	0	0.500
P10	Time Saving	0	0.679	0	0.500
P11	Engagement	0	0.660	0	0.660
C1	Culture	1	1.000	0	0.000
C2	Habit	1	1.000	0	0.000
C3	Personal Innovativeness	1	1.000	0	0.000
C4	Perceived Difficulty of Use	0	0.000	1	1.000
C5	Hedonic Motivation	1	1.000	0	0.000
C6	Social Influence	1	1.000	0	0.000
C7	Lack of Purchase Experience	0	0.000	1	1.000
C8	Closeness	1	1.000	0	0.000

Considering the scenarios effects, the differences among the nodes of the model are shown in Table 7. Table 7 shows how purchase intention and its determinants are affected by the degree of innovation of a social media user and the degree of intensity.

Although most of the nodes exhibit strong contrasts, the highest difference between early and late adopters is found in the nodes word-of-mouth referrals and perceived security. By contrast, user's characteristics show few influence on reputation, purchase intention, and trust. Economic feasibility, information quality, perceived privacy and engagement have not been influenced by the degree of user innovativeness. It means that the weight of these nodes is not affected by the type of IT adopter.

Table 7: Differences between Scenarios

	Early - Late Adopter
Purchase Intention	0.028
Perceived Security	0.317
Perceived Value	0.152
Reputation	0.037
Trust	0.083
Time Saving	0.179
Word-of-Mouth Referrals	0.378

CONCLUSIONS

Our findings confirm that purchase intention of tourist products using social media directly depends on trust and perceived value. More concretely; the results show that the main antecedent of purchase intention is trust. However, although other studies found that trust is an antecedent of purchase intention, it is not the principal antecedent for the whole referenced studies. Regarding to perceived value, it is also found as an antecedent of purchase intention. It means that the more people trust in social media, the more they purchase through social media.

Results show that the main antecedents of perceived value are, in order of relevance, information quality, reputation, time saving, word-of-mouth referrals and hedonic motivation. Conversely, lack of purchase experience and the perceived difficulty of use of social media affect perceived value negatively.

Regarding to trust, the results demonstrate that the main antecedents of trust are, in order of relevance, information quality, word-of-mouth referrals, reputation, perceived security, closeness and perceived privacy. On the other hand, experts believe that lack of purchase experience is negatively related to trust. In order words, the previous experience strongly predicts trust. The information quality is the strongest antecedent of trust and it coincides with the findings of previous researches. It means that the greater the consumers' perception of the quality of the information offered in social media, the greater will be the perceived trust in social commerce.

From a managerial perspective, this research has several implications for hotel marketers and hospitality practitioners. First, this study has shown how purchasing decisions can be affected in a social commerce context. The knowledge of the antecedents of purchase intention of touristic products services in a social commerce context is quite useful for managers and hotel marketers who design marketing strategies. Therefore, tourism managers should carefully consider these factors in order to increase consumers' purchase intention. For example, managers can be successful in social commerce by gaining and maintaining trust.

Regarding to perceived value, as information quality is the factor that most affect it directly tourism managers should be aware of it and take actions to increase the quality of the information provided through social media. Moreover, according to the results, it can be found that information quality is influenced by economic feasibility and engagement positively. Regarding to economic feasibility, managers should offer free extra services or promotions and discounts for customers to increase information quality. Considering the influence of engagement in information quality, we strongly recommend managers to constantly engage with customers, answering their questions through social media and posting.

Regarding to trust, the results support that to increase the level of trust, tourism managers need to try to improve the strongest predictors of it which are, in order of relevance, information quality, word-of-mouth referrals and reputation. As we have already advice for trust, managers should consider the information quality, taking care of the information provided in social media. Regarding to word-of-mouth referrals, it is known that word-of-mouth referrals is an important antecedent of trust that managers also must pay attention. We should take into consideration the consumer reviews through social media, especially fake reviews because customers pay more attention to negative reviews for their future stay in a hotel (Lee et al., 2017).

Therefore, it is quite important for firms to manage social platforms effectively when implementing promotions and communication strategies to attract more tourists. This is even more clearly necessary when it is considered that in many countries economic growth has increased opportunities for the tourist sector, but also brought competition and associated challenges. We agree with Filieri et al. (2015) that maintaining the quality of their information is a major challenge that companies need to confront.

Moreover, the study makes important contributions in the tourism context in relation to marketing strategy and purchase intention. It shows that managers could focus their efforts in those factors (such as perceived privacy, lack of purchase experience, economic feasibility or engagement) with a high potential for improvement.

However, the main managerial implication of the study lies in the differences between early and late adopters. There are great differences in purchase intention, trust, perceived value, perceived security and time saving. Therefore, social media managers may recognise the distinction when developing marketing strategies on social commerce. This means that consumer's characteristics must be taken into consideration by managers. In fact, hotels must satisfy both type of users of IT (early and late adopter). Therefore, they should create different marketing strategies for each other. Thus, the findings can enable more effective marketing measures that are adapted to both types of users. Considering that this classification has never been analysed in the social media context by previous researchers, it could represent a significant advance for hotel marketers. The results of both scenarios suggest that managers should focus their strategies in late adopter because the room for improvement is greater. For example, managers must take actions to improve purchase intention, trust, perceived value, reputation, perceived security, word-of-mouth referrals, social influence and time saving for late adopters. Clearly it is quite important that tourism managers understand this before deciding their marketing strategies.

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