Uncovering the antecedents of trust in social commerce: an application of the non-linear artificial neural network approach

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Abstract

Purpose – The internet creates ample opportunities to start a mobile social commerce business. The literature confirms the issue of customer trust for social commerce businesses is a challenge that must be addressed. Hence, this study aims to examine the antecedents of trust in mobile social commerce by applying linear and non-linear relationships based on partial least squares structural equation modeling and artificial neural network model.

Design/methodology/approach – This study applied a non-linear artificial neural network approach to provide a further understanding of the determinants of trust in mobile social commerce based on a non-linear and non-compensatory model. Besides, a questionnaire was distributed to 340 social commerce customers in Malaysia.

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Findings – The conceptual framework for investigating trust in mobile social commerce has various advantages and contributions to predicting consumer behavior. The results of the study showed there is a positive and significant relationship between social support, presence and unified theory of acceptance and use of technology2 (UTAUT2). In addition, UTAUT2 has fully mediated the relationship between social support, presence and trust in social commerce. Finally, the results concluded the relationship between UTAUT2 and trust in social commerce would be stronger when the diffusion of innovation and innovation resistance is high and low, respectively.

Research limitations/implications – The current study provides a novel perspective on how customers can trust social m-commerce to provide real solutions to managers of encouraging e-marketing among consumers.

Practical implications – This paper shows how businesses can develop trust in social m-commerce in Malaysian markets. The findings of this study probably could be extended to other businesses in Asia or other countries. Because trust in social e-commerce has a dynamic role in consumer behavior and intention to purchase.

Originality/value – This study provided a new perspective on mobile social commerce and paid more attention to an investigation of such emerging commerce. The originality of this study is embodied by investigating an integrated model that included different theories that presented new directions of trust in mobile social commerce through social and behavioral determinants.

Keywords Social presence theory, Social support theory, UTAUT2, Diffusion of innovation theory, Innovation resistance theory, Trust in m-social commerce

Paper type Research paper

Introduction

The increasing use of social technologies and social networking sites (SNSs) has improved significantly since their introduction and demonstration any signs of fading. SNSs have provided businesses and individuals the option to explore new buying and selling methods, monetizing online social interaction, in tandem with advancement of information and communication technology (ICT). Consumers have also grasped the benefits of using social information and experiences to help them make purchasing decisions (Matthes *et al.*, 2020; Masood *et al.*, 2020). Social commerce (also known as social shopping websites) has evolved to integrate the strength of social networking websites with purchasing as businesses and consumers continue to profit from the momentum of social network usage and development of ICT (Kim *et al.*, 2019; Vahedi and Zannella, 2021). This new type of e-commerce is evolving in a unique way by using Web 2.0 features that improve the online purchasing experience (e.g. efficient product search, tailored recommendations and reviews). Social commerce is probably more significant than traditional e-commerce because of the larger reach and personal touch given by Web 2.0 technology (Bernal-Jurado *et al.*, 2017).

In both research and practice, social commerce has risen in importance. It was described as "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). It evaluates the business value of social media-enabled commercial activities, such as branding, consumer services and corporate value (Liang and Turban, 2011; Kim and Kim, 2018; Abdelsalam *et al.*, 2020). Digital marketing has grown in popularity as a place to get a lot of information about products and services from both marketing and volunteers (Lin *et al.*, 2019; Tam *et al.*, 2020). Therefore, customers are progressively turning to social commerce for product knowledge and engaging in social-media-enabled commercial activities like customer reviews, posting, suggestions and discussion. During the purchasing process, for instance, 45% of customers interact with product reviews. As a result, social commerce represents a new avenue for consumers to obtain user-generated information that is useful for product appraisals and purchases (Goh *et al.*, 2013; Hajli and Sims, 2015; Han *et al.*, 2018).

Businesses can use social commerce to deepen their interactions with their customers and establish connections, which is critical for gaining a competitive edge and increasing efficiency (Lin *et al.*, 2019). The majority of social commerce studies have concentrated on social media-based social commerce. For instance, several studies indicated that social support and association quality play significant roles in determining social commerce intention in a detailed social commerce research context – that is, social media (Liang and Turban, 2011; Zhang *et al.*, 2016; Yahia *et al.*, 2018).

In the information systems discipline, trust has been considered mainly to comprehend consumer behavior that leads to e-commerce outcomes (Bhattacherjee, 2002; Ba *et al.*, 2003; Kim and Benbasat, 2009; Yahia *et al.*, 2018; Tam *et al.*, 2020). Such studies have shown that consumer trust is important for e-vendors to drive consumer online transactions. Consumer trust has typically been evaluated from a variety of viewpoints, considering that an e-commerce transaction may include various facets, such as organizations, customers, products and web technology. Thus, social commerce can be seen as a sort of relational service model in which trust is crucial to determine the value of user-company relationships and as a result, in achieving commercial consequences (Yahia *et al.*, 2018; Lin *et al.*, 2019). Likewise, other research suggests that social commerce comprises a range of social, commercial and technological aspects (Huang and Benyoucef, 2015; Hadi *et al.*, 2018; Tam *et al.*, 2020). From this standpoint two main issues must be considered. First, theoretically previous trust studies have failed to be considered to understand the nature and antecedents of consumer trust in social commerce would provide more insight into the social commerce phenomenon and its business outcomes. Second, practically, most of the previous studies investigated trust in social commerce by conducting linear relationships based on partial least squares structural equation modeling (PLS-SEM). However, the non-linear and non-compensatory relationships of trust in m-social commerce were neglected. Therefore, the objective of this study is to extend the unified theory of acceptance and use of technology2 (UTAUT2), to understand the trust in m-social commerce. Importantly, we have extended the UTAUT2 by adopting the diffusion of innovation theory and innovation resistance theory (IRT) which are crucial toward trust in m-social commerce. This study adopted a dual-stage PLS-SEM and artificial neural network (ANN) method to predict the uncovering of the antecedents of trust in mobile social commerce.

Literature review

Social support theory

Literature suggests that the concept of social support has been investigated both from a theoretical perspective and from a research perspective (Cohen and Syme, 1985). In spite of this, a number of researchers are not in agreement on how to define the concept and how to measure it (Barrera, 1986). The first category of social support refers to belonging to a group or social network, as well as a belief that one is valued and taken care of (Cobb, 1976). The second one refers to social support as a person's belief that the needs are met and the required information has been sorted out (Kim *et al.*, 2008). The last category refers to those social networks such as family, peers, institutions and organizations through which individual access social support (Shumaker and Brownell, 1984). Social support consists of many sub-concepts such as support networks, supportive behaviors and subjective judgment of support (Hupcey, 1998), informational support (Wills, 1991), tangible (House and Kahn, 1985), emotional (Langford *et al.*, 1997) and belongingness (Wills, 1991). The information aspect is to provide guidance, advice or useful information to support users. Tangible support is providing monetary support or provision of goods. Emotional component refers to forwarding sympathy, care, love, affection and trust. While belongingness refers to sharing social space and social activities. Crocker and Canevello (2008) defined social support as a kind of psychological perception or

physical help one receives from his/her surrounding social networks. Social support theory proposes social support influence individuals' emotional and behavioral response. Therefore, the social support theory argues that social support is the result of one's effective engagement with and mobilization of social networks. Individuals perceive that their needs can be sufficiently addressed through their effective interaction with their social networks (Lakey and Cohen, 2000). Sarason *et al.* (1990) has presented three views of social support including "interpersonal connected nesses," "disaggregated social provisions" and "the sense of support." The first view of "interpersonal connectedness accentuates that social network's structure is important to define individual's adjustment to that network." It states that social network's structure (network size, network density, etc). inspires the way individuals are interconnected and are affected by these interactions. However, there are studies which suggest that network characteristics are not necessarily relevant to one's physical and psychological well-being. There are certain important issues which influence the ways social support leads to positive outcomes (DeLongis and Holtzman, 2005). The second view of "disaggregated social provision" is concerned with the disaggregation of "social support structure" and its supportive components. It postulates that individuals need specific support under specific circumstances. This view further narrates that social support can only be effective and beneficial when it aligns with the actual specific needs of support recipient, for example, financial support will not work when an individual is needed of emotional support (Tam *et al.*, 2011). The third view of social support, sense of support, proclaims that a distinction should be made between the support actually provided to an individual and that individual's perception about the potential support available to him/her. The relevant studies show that it is more about support perception that is closely associated with the outcomes (e.g. health, job commitment) than the actual support. For example, if an individual does not perceive support availability, he/she may not even intend to receive support (Norris and Kaniasty, 1996). The third view generally, prescribes how an individual "sense" the support. It is quite possible that potentially available support might not be sufficient to fulfill the needs of recipient. This view further offers that the significant role of perceived support is largely dependent upon the "internal cognitive representation of self, important others and the nature of interpersonal relationships" (Hupcey, 1998). This is pertinent to mention that the actual delivery of supportive behavior might not constitute the essence of social support; rather, it is one's belief about the availability of support is actual ingredient of social support (Sarason *et al.*, 1990).

Social presence theory

Researchers in the field of information and communication technologies are always interested in knowing that how and why do individuals develop a sense of "being their" (social presence) (Scarpetta, 2008). The social presence theory has been derived from the interpersonal communication and symbolic interaction theories in the field of psychology. Though the concept is closely related to virtual mediated communication, but it has roots in non-mediated communication. Researchers have defined the concept varyingly but the main theme of "being their" among all remain the same (Tu and McIsaac, 2002). According to Arbaugh (2008) and his colleagues the social presence in terms of individual' ability to identify and communicate with others for development of interpersonal relation through the projection of his/her personality in a mediated communication context. On the other hand, Remesal and Colomina (2013) and Eneizan *et al.* (2019b) describe social presence as a group interactional process, which promotes group cohesiveness through collective feelings of community and a sense of collective and individual efficacy in a supportive learning environment. Shin (2013) defined it as "a feeling of being in the company of someone and the perceptual illusion of non-mediation."

The social presence theory is widely used in the studies in the field of mediated communication, the advancement of studies relevant to the effectiveness and user satisfaction of communication technologies. Social presence refers to "degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships" (Short *et al.*, 1976). Thus, the theory denotes that perception of being a "real person" in a virtual and communication technology-mediated virtual environment [communication] ascribes the meaning of social presence. They further narrated that the sense of social presence is largely dependent on the quality of communication medium that determines the ways of interaction in virtual environments. The ability of medium to convey facial expression and other embodied gestures is significant to social presence. Social presence has also been defined through two distinct concepts of "intimacy" (Argyle and Dean, 1965) and "immediacy" (Wiener and Mehrabian, 1968; Eneizan *et al.*, 2019c). Intimacy refers to "closeness" of interaction. A higher level of intimacy is dependent on the communication medium. For example, video communication contributes higher to intimacy than the audio communication. Immediacy refers to the communication behavior between the individuals or individuals and objects in a virtual communication that intends to increase "closeness" in virtual communication. One can transmit immediacy or non-immediacy both through verbal and nonverbal ways.

Unified theory of acceptance and use of technology2

Today's organizations are largely dependent on information technology to deal with challenges of rapid technological changes those influence businesses (Vankatesh *et al.*, 2003) introduces a technology adoption model called UTAUT based on earlier technology adoption models such as technology acceptance model (TAM) and theory of planned behavior (TPB). UTAUT sufficiently explains behavioral variances toward technology use. Different models explaining users' behavioral intention and technology adoption are available (Chang, 2012). Among these are theory of reasoned action (TRA), TAM, TPB and UTAUT. These models account for the number of similar factors which influence behavioral intentions and technology use and are well-supported by the enormous amount of research. Among all the UTAUT is unique and integrated model which several other theories/models of technology acceptance and adoption (Raman and Don, 2013).

The original UTAUT accounted for various determinants of behavioral intention of technology use. These include performance expectancy, effort expectancy and social influence. These directly influence behavioral intentions, while behavioral intention and facilitating conditions influence technology use (Oh and Yoon, 2014). UTAUT also mentioned contingencies (gender, age, experience and voluntariness of use) which moderate the influence of the mentioned determinants on behavioral intention and use of technology. Performance expectancy refers to the extent one would believe that using information technology would be helpful in attaining substantial reward. Effort expectancy refers to the extent of ease by using information technology. Social influence is one's perception that "others" believe that he/she should use information technology. Facilitating conditions refer to organizational technical infrastructure that facilitates technology use (Workman, 2014). Later on, Venkatesh(2021) extended UTAUT and proposed a new model called UTAUT2, which includes three more factors in addition to already existed ones. These are hedonic motivation, price value and habit. UTAUT explains 70% variance in behavioral intention toward technology use, whereas UTAUT2 accounts for 74% variance in behavioral intentions toward technology use concerning different moderators across cultures.

Diffusion of innovation theory

Diffusion of innovation theory attempts to explain how, why and at what average new ideas and technology spread through cultures (Al-Jabri and Sohail, 2012). Diffusion of innovation theory is basically built on how specific features of a technology consolidate or prevent it using by different users, it has been applied to all innovations (products, practices and ideas; Mohd *et al.*, 2016; Jabbar *et al.*, 2020). There are two wide groups of activities in the innovation process: initiation and implementation. Diffusion is a process via which a new practice (innovation) is to deliver over time amongst members of a social system. The decision to accept, adopt and use involvement is not an immediate action, but a process containing four phases, namely, dissemination, adoption, implementation and maintenance (Dingfelder and Mandell, 2011; Min *et al.*, 2019; Hamid *et al.*, 2021). The research on the diffusion of innovations formally began in 1943 with a study by Bryce Ryan and Neal Gross, from the area of rural sociology, on the diffusion of hybrid corn in Iowa (Rogers, 2003). The diffusion of innovation theory had spread in that time to many various areas and thousands of studies support its principles (Rogers, 2003; Rogers, 2004). Rogers (2003) was the most distinguished developer of diffusion of innovation theory. Also, Rogers had characterized the people of a social system into five groups based on their reaction toward and innovation: innovators, early adopters, earlier majority, later majority and laggards. On the other hand, Scott and McGuire (2017) proposed five features that impact the rate of adoption of an innovation: relative advantage, compatibility, complexity, trial ability and observability (Yusuf and Derus, 2013; Abbas *et al.*, 2021).

Diffusion of innovation theory discussed that the invention or innovation is not just following the technological competency itself but also following up the collaborative process. The understanding of new technological progress depends on the features and social class of the adopters. Furthermore, it discusses that the inventor is considered as the target audience founded on their present needs and marketing their new product based on the rating proposed in this theory (Sartipi, 2020). The theory had applied in many academic areas which include anthropology, communication, geography, sociology, marketing, political science, public health, technology and economics (Murray, 2009).

Innovation resistance theory

Nowadays, the world is living in resistance actions every day and everywhere. When these actions target innovations, companies sometimes face substantial challenges. The understanding of how innovation resistance actions are structured and spread appears to be major for companies to avoid or react to large-scale resistance (Al-Abrrow *et al.*, 2019a; Hietschold *et al.*, 2020). The IRT presents a theoretical framework for customer resistance; the theory assists in recognizing the resistance-oriented behavior of costumer (Sadiq *et al.*, 2021). Moreover, innovation resistance could be explained as behavior-driven from rational thinking and decision-making concerning the adoption and usage of innovation because of the possible changes imparted by alterations to the present situation and deviations from the present belief system (Szmigin and Foxall, 1998).

The presentation of resistance had the possibility to set the functional monarchies of a technology in the instant context of current work practices, it could be viewed as a fundamental mechanism to better sensed how users actually and are could respond to new technology innovations (Mohd Ishak and Newton, 2016). Resistance might accord when the innovation obstructs established routines, habits, traditions and norms or causes conflicts with consumers' views, values and faith of consumers. It is indicated that most people are disinclined to change and this bearing of maintaining the status looks more ideal and rational. Innovation can bring changes to formed habits, beliefs and/or values of the

consumers, which may lead in consumers' resistance to the innovation (Al-Abrrow *et al.*, 2019b; Ma and Lee, 2019). Costumer resistance could play a distinguished role in structuring the success or failure of innovations. The changes that happened in people's life and behavior due to the use of innovation could drive resistance-oriented behavior amongst users (Kaur *et al.*, 2020).

The reason that caused users to resist innovation is due to the barriers produced by the change and conflicts impacted by innovation. These barriers can be categorized into functional barriers and psychological barriers. Usage barrier, value barrier and risk barrier belong to the functional barrier. Classical barrier and image barrier belong to psychological barriers (Lian *et al.*, 2012). Generally, innovation resistance can be categorized into two special forms:

(1) Active innovation resistance demonstrates a negative behavior figuration resulting from functional and psychological barriers that follow the intended new product evaluation.

(2) Passive innovation resistance demonstrates an elaboration to resist innovations because of a person's inclination to resist change and situation, which means the satisfaction that already forms rather unconsciously prior to new product evaluation (Heidenreich and Kraemer, 2016).

Trust in m-social commerce

Online social networks and social commerce, depending on the internet for their functionality. Predominately, because of the remote nature of the internet caused by a deficiency of face-to-face conversation, people might depend on other people's experiences to make their own (Sharma *et al.*, 2020). Therefore, people sometimes believe the internet is a medium of information collecting and depend on ratings, reviews in forums and communities and personal views and referrals to set trust in unknown parties (Alhamdi *et al.*, 2019; Al-Tit *et al.*, 2020). Trust is a substantial concept in m-commerce and it can help to find an important positive result, such as purchase intention, electronic word of mouth, loyalty and revisit intention, people might be feeling worried about online transactions due to various risks (Esmaeili *et al.*, 2015). Trust can initiate a comfortable environment so that people feel less worried about the risks associated the use of m-commerce (Lin *et al.*, 2019). Hence, trust is considered as a person's dependence on another, with the anticipation that the latter's opinion and decisions are sensible and reliable, other researchers confirm the emotional part of the trust, believing it to be the result of a people's emotion-driven from beliefs to a seller (Lin *et al.*, 2017).

Trust is important to reduce uncertainty and risk in online business transactions, building trust in m-commerce businesses is critical and rely on SNS where users can share a various amount of information (Beyari and Abareshi, 2018). With the growth of m-commerce, the internet spread tremendous commercial information into consumer's faces, in this status consumer's look to take recommendations/advice from the one whom they trust before making the decision of an online purchase (Chen *et al.*, 2014). It is conclusive to study trust in the context of m-commerce because it connects to the sharing of information between people in m-commerce. People's approval of m-commerce is specified by trust and social simile between sites (Alhulail *et al.*, 2018). In addition, as trust theory had been used to explain social behavior in social science, it must be suitable for use in studying m-commerce (Liang and Turban, 2011; Fadhil *et al.*, 2021).

The relationship between the social presence theory and unified theory of acceptance and use of technology2

Similar to social support, the literature describing relationship between social presence and UTAUT is rare. Due to this dearth of literature, we rely on other studies that discuss UTAUT components within the context of virtual environment. In virtual environment, transactions are performed primarily through website pages of companies (Cai *et al.*, 2019; Abdulaali *et al.*, 2019). This interaction can be considered like a physical interaction between buyer and a seller where website is an artificial other individuals. This web interaction creates trust. A greater social presence of the web provides with more information for transaction transparency and to prevent suspect behaviors. Website social presence helps to reduce the distance between buyers and sellers that led to the trust formation between both (Hassanein and Head, 2007; Al-Abrrow *et al.*, 2019c; Naji *et al.*, 2019).

Studies have been conducted to explore social presence in business-to-consumer e-commerce. They have been argued that lack of social presence may hinder the online businesses due to the absence of human interaction and lack of trust. Drawing from social psychology social presence is the ability of communication medium to allow users to experience himself and others as psychologically present and connected. Studies have shown that greater sense of social presence can be attained through providing imagination of interactions with other individuals on e-commerce websites (Lah *et al.*, 2013). Social presence can be induced into shopping websites by adding rich content and socially aligned images. In this way, social presence positively affects the trust and enjoyment in using e-commerce websites. Social presence gives a sense of social warmth and injects hedonic motivation for online shopping. Research on technology adoption suggests that factors like customers' anxiety to technology, readiness to adopt technology, perceived performance satisfaction of technology use are major to influence new technology adoption (Kinard *et al.*, 2009).

Social presence is a key predictor of consumers' behavioral intention to use virtual malls. The result also indicated that the influence of social presence on using virtual shopping malls is magnified with the enhanced perception of security (Shin and Shin, 2011). It was also found that social presence has a positive effect on consumers' perception of security in virtual shopping malls and thereby reduces the perceived risk of shopping through virtual malls. The influence of social presence on enjoyment (hedonic motivation) and intention to use of a robot and screen agent by older people (Heerink *et al.*, 2008). Social presence is one major determinant of enjoyment, which leads to technology acceptance. It is usual that humans do not perceive digital and electronic gadgets as "social being" and considered them as "embodied." The extent of such perception is called social presence (Rossi *et al.*, 2020).

The real-time interaction on social media can enhance levels of social presence and the users with more sense of perception of social presence are more likely to be connected and engage with others (Dunlap and Lowenthal, 2009). This increase connectedness and engagement cause users' perception to influence others and thus results into more satisfaction with Twitter. This ultimately leads to habit formation on Twitter use. The results of the study confirmed the proposition that social presence of Twitter services significantly influences users' Twitter satisfaction which forms their habit of Twitter use. The study believed that satisfactory Twitter use experience increases the users' tendency to involve in repeating the same activity of Twitter usage which is called habit formation in Twitter. These findings support *H1*:

H1. The social presence theory would be positively correlated to UTAUT2.

The relationship between the social support theory and unified theory of acceptance and use of technology2

The original UTAUT model includes four major determinants of behavioral intentions toward technology adoption and technology use. These include performance expectancy, effort expectancy, social influence and facilitating conditions. Earlier we defined social presence as a sense of being real/there in CMC. Literature significantly lacks studies, which specifically determine the effect of social support on four determinants as described in UTAUT. However, there are fewer studies to investigate the impact of social support on major factors to technology adoption and use. Accordingly, we present these studies to deduce our hypotheses (Al-Hujran *et al.*, 2015; AL-Abrrow *et al.*, 2021a).

Social support is always intended to facilitate the support recipients. Similarly, perceptions about social support develop positive emotions and attitudes. Social media platforms provide a kind of social support by offering users with helpful and valuable information which are likely to facilitate users in their online shopping decisions. Similarly, supportive information enhances users "trust level while using various online platforms (Heaney and Israel, 2008). Connection and emotional support from other members build customers" trust in social commerce (Chen and Shen, 2015). Hence, the impact of social support in building trust and purchase intentions in regard to social commerce. The two components of social support (emotional, information) are positively related to trust which led to buyers' purchase intensions. It has been found that social support (information support) enhance trust in online shopping (Makmor *et al.*, 2018). Because of information support, buyers believe that someone who has direct experience with product is there for providing information that ultimately enhance their trust. Earlier studies have found that social support is vital to build customers' trust in an online environment. Advice from peers and others on online platform enhance customers' trust level (Rossi, 2015; AL-Abrrow *et al.*, 2021b).

Ryan and Xenos (2011) and Clayton *et al.* (2013) describes that Facebook use is directly related to feelings of loneliness and anxiety. Socially anxious individuals use Facebook to counter their anxiety and feelings of loneliness. Facebook help individuals to seek and establish more social connections and thus to reduce risk of anxiety and loneliness. This perceived social support could be useful in relieving anxiety-related stress. In other words, online social support is significant to mitigate the perceived risk of one's psychological well-being. The study also found that social support from friends and important others tends to increase Facebook use among adolescents. This means that continuous social support increases the likelihood of repeated Facebook use (habit). On the other hand, social support from family reduces the habitual use of Facebook. This means that social support from family has potential role to protect adolescents from engagement is unsafe Facebook activities. We can call these unsafe Facebook activities as perceived risk of technology use. The findings of study regarding family support leads to assume that social support is significant to reduce perceived risk of technology use. These findings support *H2*:

H2. The social support theory would be positively correlated to UTAUT2.

In the past few years, UTAUT2 has presented mainly for demonstrating technology acceptance from the customers' perspective other than the organizational use. Also, the UTAUT2 has investigated factors that affect users' acceptance of mobile payment uses and mobile learning acceptance that shares comparable technological characteristics with social m-commerce (Abed *et al.*, 2015). Various fields of social commerce had been examined such as social m-commerce characteristic development, buying behavior, trust and adoption. Which had produced applications of different theories, theoretical models and constructs for

understanding factors leading to or preventing the adoption of social commerce (Sarker *et al.*, 2020a).

There have been many scholars in the past that have tried to explore the importance of trust when it comes to the choice of online channels for shopping and payment, but this is still not an obvious construct in the UTAUT2 framework (Singh and Matsui, 2017). Alalwan *et al.* (2017) proposed a study that investigates the factors that influence behavioral intention and adoption of mobile banking. The proposed model has assimilated factors from the extended (UTAUT2) along with trust in mobile banking. While Eneizan *et al.* (2019a) aimed to reveal the predictors for the customer's behavior with consideration to the acceptance of m-commerce, by using the UTAUT2 model, with the addition of two variables trust and risk, to understand the customer's behavior with regards to the adoption of m-commerce. Furthermore, trust becomes quite fundamental when it's related to monetary value and even more essential when the transactions are completed in the network, due to m-commerce include financial transactions that are mobile phone-based amongst consumers, trust is becoming a vital factor. Furthermore, the trust had proved to be a salient predictor of intention to adopt the technology. While Widyanto *et al.* (2020) analyze the predecessors of behavioral intention to use e-commerce platforms. the researchers had developed the UTAUT2 model by combining perceived security and trust to better demonstrate the endogenous variable. Social influence, hedonic motivation and trust are directly and significantly influenced behavioral intention, while effort expectancy, perceived security and performance expectancy had an indirect relationship with behavioral intention. Based on Slade *et al.* (2014) findings on m-payment, m-banking and m-commerce adoption of UTAUT2 was extended with self-efficacy, innovativeness, trialability, perceived risk and trust. These findings support *H3*:

H3. The UTAUT2 would be positively correlated to trust in M-social commerce.

The mediation role of unified theory of acceptance and use of technology2

The UTAUT method is a flexible technique to conceptualize m-commerce acceptance, as it investigates the adding of additional factors into the conceptual framework of technology acceptance. Many theories had applied to m-commerce in different studies but there was no inclusive review of UTAUT2 for m-commerce (Imtiaz, 2018). Performance and effort expectancies, social influence, trust and perceived risk in the use of m-commerce helped in predicting m-commerce purchases intentions (Blaise *et al.*, 2018). While Kalinić *et al.* (2019), Slade *et al.* (2014) and Marriott *et al.* (2017) tried to develop and evaluate a predictive model of customer satisfaction linked to m-commerce and the willingness to recommend this service to others based on the UTAUT2 model, trust was found to be the most important driver of customer satisfaction, followed up by performance expectancy and perceived value (Lin and Theingi, 2019). Kwofie and Adjei (2019) added an external factor (trust) to the constructs of the UTAUT2 model. Many Previous researchers Kalinić *et al.* (2019), Slade *et al.* (2014), Marriott *et al.* (2017), Blaise *et al.* (2018) and Alnoor *et al.* (2021b) have been acknowledged the importance of trust in m-commerce adoption.

In addition, to backing a more precise prediction of using m-commerce in developing countries, must adding important determinants such as social presence and social support (Ding *et al.*, 2019). Jiang *et al.* (2019) had examined how does information support moderates the relationship between different social presence dimensions and trust in social m-commerce. Also, the influence of consumers' trust in online merchants was examined on shopping intentions based on information support and social presence theory. Nowadays, people are socially interacting with each other through the internet. These social interactions, which set up the base of social m-commerce. The evolution of social media has created several social

functions for its users. One of them is social support, which had received attention in social m-commerce research in the past few years (Ooi *et al.*, 2018). In social m-commerce time, people share their knowledge, experiences and information about the products and services with each other, which provides a supportive environment in an online context (Hajli, 2014). Hence, Liang and Turban (2011) had proposed a study that drawn on social support theory, relationship quality and social media concept also propose a model to explain the role of social factors that affect the relationship between quality and social m-commerce intention. Social m-commerce reintroduces the social perspective of m-commerce, which increases the status of social presence in the online environment. These findings support *H4*:

H4. The UTAUT2 will mediate the relationship between social presence theory, social support theory and trust in social m-commerce.

The moderator roles of diffusion of innovation and innovation resistance

There are several scholars that theoretically and empirically explored the effects of users on the innovation process. They had discussed lead-user innovation perspective assists the company to reduce the risk of failure and raise trust associated with presenting new products to the market (Tolba and Mourad, 2011). Yahaya *et al.* (2016) presented a pilot study of the research that employed the use of diffusion of innovation theory as a moderating variable to detect the effect of the perceived attribute of innovation that involved relative advantage, compatibility, complexity and perceived risk beside awareness and customer's involvement. The tendency of adopting an innovative behavior is considered as a direct factor, as well as a moderator, which structured the attitude and the precepts that influence behavior (Alnoor *et al.*, 2021b). Furthermore, innovators and early adopters, their decision to use innovation is mostly led by their inveterate innovativeness, thus little is wanted to encourage them to adopt the behavior (Al-Jabri and Sohail, 2012). Otherwise, those who are less open to using an innovation are more likely to be affected by other attributes and social pressure. While the type of organization using innovations and their area is more efficient moderators of the focal relationships than the kind of innovation and the stage of adoption (Damanpour, 1991; Albahri *et al.*, 2021a).

People's resistance to change is a key factor underlying the failure of the innovative system and products in companies, Shahbaz *et al.* (2019) and Abdullah *et al.* (2021) had proven to negatively moderate the relationship between intention to use and actual use of new innovative systems and products. Scholars explored that many new products fail because of people's resistance to innovation. Heidenreich and Kraemer (2015) tried to improve the negative influence of innovation resistance by examining the moderating role of perceived stimulation for innovation resistance and proposed the first empirical evidence that innovation resistance prevents both people's tendencies to attract in innovative behavior and actual new product adoption. The reason for people's resistance against the purchase of eco-friendly products is the IRT (Alnoor, 2020; Sadiq *et al.*, 2021). However, environmental worry amongst people refers to the negative influence of value and image barriers that minimize peoples' intention to purchase new items, while health concerns minimize the affecting of tradition and risk and increase trust. Through emphasizing the important impact of perceived value in changing the mindset of people from resistance to intention to use. Also, suggested the critical role of innovation diffusion, media usage, subjective norms and word-of-mouth in overcoming resistance and improving people's intention to adopt m-commerce services (Srivastava and Singh, 2020). Nevertheless, there is a lack of research on IRT and diffusion of innovation theory, its one reason why many innovative products fail to be accepted. Because changes in many cases caused by innovation break the psychological balance of a person and people either make

psychological rebalancing or resist changes and innovation to address this imbalance (Albahri *et al.*, 2021b; Ju and Lee, 2021). These findings support *H5* and *H6*:

H5. The relationship between social presence theory and trust in m-social commerce will be stronger when diffusion of innovation theory is high.

H6. The relationship between social support theory and trust in m-social commerce will be stronger when IRT is low.

Research methodology

In line with the aim of the current study as mentioned previously (Figure 1). More than 1,000 customers using social commerce apps were targeted by using the filter question "Do you use a social media app for social commerce." Moreover, from 1,000 people 340 customers are dealing with social media applications for commerce purposes in Malaysia. Hence, 340 questionnaires were collected in Malaysia. The target sample has experience in online buying through social media including Instagram, Facebook and Twitter. To achieve the aim of this study of conducting linear and non-linear relationships to predict the antecedents of trust in social m-commerce, PLS-SEM and ANN were adopted to provide evidence regarding the readiness and trust of the target sample for the adoption of social m-commerce. A five-point Likert scale was used ranked from strongly agree (5) to strongly disagree (1).

The demographics profiles were age, gender, education level and internet experience were measured by using six close-ended questions. Hence, the respondents were representing 66% of males and 34% of females. The population of social m-commerce customers is defined as Malaysian working adults with ages ranging from 18 to 64 years old. The customers with a high school and diploma represented the majority at a rate of 37%, while the percentage of customers with a bachelor's degree was 31% of the sample, masters, 20% and doctorates were 12%. Regarding internet experience 24% of the respondents were between 15 and 24 years, 33% between 25 to 34 years, 29% between 35 to 44 years, 10% between 45 to 54 years and 45% between 55 and 64 years old, respectively.

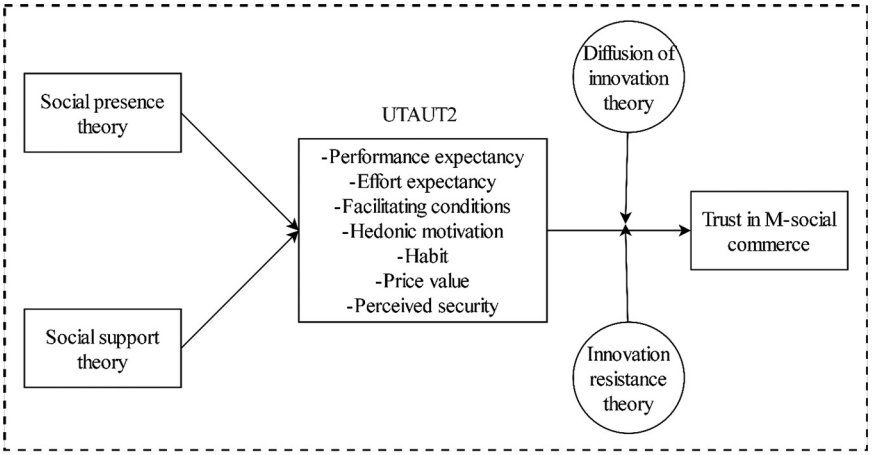

Figure 1. Conceptual framework

Source: Authors based on literature analysis

To provide contributions to the literature and practitioners, several measurements that have high reliability in social business studies have been relied upon. This section explained the measurement of study that used. The following scales measured the six constructs. The questionnaire involves 38 items based on five Likert scales. The social presence was measured using the Leong *et al.* (2020) scale, which consists of three items. The social support was measured using the Leong *et al.* (2020) scale. This variable consisted of three items. On the other hand, UTAUT2 was adopted as a second-order construct by using the Alalwan *et al.* (2017) and Morosan and DeFranco (2016) scale, which consists of 21 items divided into seven dimensions (performance expectancy, effort expectancy, facilitating conditions, hedonic motivation, habit, price value, perceived security). Diffusion of innovation construct was measured using Min *et al.* (2019) scale which includes three-items. Innovation resistance construct was measured using the Hyunwoo (2009) three-item scale. Finally, trust in mobile social commerce measurement developed by adopting Ng (2013) scale which includes five items.

Data analysis and results

To conduct causal and nonlinear relationships this section has two steps. The first step involves an assessment of measurement model and assessment of structural model. The second step performed non-linear relationships based on the ANN method.

Common method bias

To confirm the gathered data did not have common method bias we used two significant methods procedural and statistical remedies. The first method was accomplished by informing the respondents that their personal information and identities are beclouded and there is no need to give absolute right or wrong answers they just need to answer frankly (Abubakar, 2018). Furthermore, we used several types of scales in the instrument. For instance, gender had measured by using a nominal scale, age, education level and internet experience had measured by using a categorical scale. All attitudinal measures were took using five-point Likert interval scales. We utilized Harman's single factor and common latent factor analysis to confirm the data did not have a common method bias (Alhumaid *et al.*, 2021). Hence, Harman's single factor shown the variance rates are less than 50%. Thus, there is no concern about common method bias.

Assessment of the partial least squares structural equation modeling path model results

This study had adopted the PLS-SEM method to test the causal relationships. To assessment of measurement the convergent validity and the discriminant validity were examined. The convergent validity can be measure through composite reliability (CR), factor loading and average variance extracted (AVE). Table 1 shows the results of convergent validity.

Table 1 shows all loading factors were greater than 0.7. Therefore, there is no issue with the items that were used in the survey. In addition, CR and AVE were greater than 0.70 and 0.5, respectively. Furthermore, there is no concern about convergent validity. On the other hand, to examine the discriminant validity this study adopts the Fornell–Larcker method. Table 2 illustrated the result of this method. Fornell–Larcker's criterion had been applied to measure the discriminant validity. Such method could be estimated through comparing the value of the variance acquired by the construct and the shared variance with other constructs. Thus, the levels of the square root of the AVE are more than the relevant inter-correlation degree.

CR

No.	Items	Loading	Cronbach's alpha	CR	AVE
Social presence theory			0.872	0.893	0.771
1	There is interaction between customers in the e-commerce network	0.785			
2	Human warmth in the e-commerce network is high	0.724			
3	There is communication between customers and sellers in e-commerce	0.79			
Social support theory			0.735	0.782	0.677
1	Help and suggestions are provided by some people on the e-commerce site	0.783			
2	Encouragement is given by some people on the e-commerce site	0.768			
3	Some people on the e-commerce site have expressed interest about my concern	0.842			
UTAUT2			0.784	0.859	0.713
Performance expectancy			0.735	0.713	0.836
1	I find e-commerce useful in everyday life	0.836			
2	The use of e-commerce increases the chances of accomplishing the tasks that interest me	0.725			
3	The use of e-commerce helps to complete tasks at a high speed	0.923			
Effort expectancy			0.776	0.863	0.615
1	Learning how to use e-commerce is easy for me	0.792			
2	Interactive with e-commerce is clear and understandable	0.758			
3	I find e-commerce easy to use	0.710			
Facilitating conditions			0.737	0.853	0.625
1	I have the materials to use e-commerce	0.774			
2	I have the necessary knowledge to use e-commerce	0.765			
3	E-commerce is compatible with the electronic technologies that are used	0.783			
Hedonic motivation			0.793	0.814	0.634
1	Using e-commerce is fun	0.736			
2	Use of e-commerce is very entertaining	0.795			
3	The use of e-commerce is beautiful	0.727			
Habit			0.783	0.739	0.676
1	E-commerce has become a habit for me	0.746			
2	I'm addicted to using e-commerce	0.793			
3	I must use e-commerce to complete transactions	0.724			
Price value			0.735	0.728	0.662
1	E-commerce has a better price	0.759			
2	E-commerce has a good value	0.709			
3	E-commerce provides good value	0.748			
Perceived security			0.790	0.746	0.628
1	Electronic commerce systems are secure systems through which sensitive information can be sent	0.783			
2	I feel safe to provide personal information when using e-commerce	0.779			
3	I am not worried about the information that provide when using mobile e-commerce	0.912			
Innovation resistance theory			0.748	0.724	0.693
1	E-commerce services are hard to use	0.794			

Table 1. Results of measurement model

(*continued*)

No.	Items	Loading	Cronbach's alpha	CR	AVE
2	E-commerce services do not offer rewards	0.738			
3	I am afraid the battery of electronic devices will run out or the connection will be lost when using e-commerce services	0.891			
Diffusion of innovation			0.758	0.757	0.698
1	Compared to traditional commerce, e-commerce improves the quality of my task in ordering needs	0.784			
2	The mobile e-commerce application fits perfectly in the way I want to order needs	0.825			
3	I can see the benefits of using a mobile e-commerce application right away	0.796			
Trust in mobile social commerce			0.738	0.884	0.628
1	The mobile social commerce is reliable	0.778			
2	I trust that mobile social commerce will keep my interests in mind	0.893			
3	Mobile social commerce will deliver on the promises	0.724			
4	I believe in the data provided by mobile social commerce	0.776			
5	Social commerce users want you to know it delivers on the promises	0.791			

Table 1.

	1	2	3	4	5	6
1. Social presence	0.878					
2. Social support	0.234	0.823				
3. UTAUT2	0.548	0.093	0.844			
4. Diffusion of innovation	0.319	0.624	0.130	0.835		
5. Innovation resistance	0.264	0.323	0.429	0.420	0.832	
6. Trust in m-social commerce	0.191	0.263	0.117	0.259	0.289	0.792

Table 2.
Discriminant validity of constructs

The findings indicate that the AVE value was higher than the correlation value for each variable measuring a distinct sub-concept. Hence, such results indicate that all scales had discriminant validity.

Assessment of structural model

This study had developed six hypotheses to uncover the antecedents of trust in mobile social commerce. Assessment of structural model used to demonstrate the causal relationships among all constructs. Based on the hypotheses testing, we used a bootstrapping method on PLS-SEM to estimate the statistical significance, by using 1,000 (one-tailed, 0.05; 340 case data) bootstrap re-sampling was used (Hair *et al.*, 2017). At the 0.05 significance level, the *t*-value for the one-tailed test must be equal to or higher than 1.645 (Hair *et al.*, 2017; Atshan *et al.*, 2021). Figure 2 and Table 3 explains the assessment of structural model.

Table 3 and Figure 2 confirm all hypotheses are accepted. Moreover, this study presented interesting results that could contribute to the literature and practitioners to solve the problems of e-commerce adoption by customers and firms. PLS-SEM techniques provided a test of causal

CR

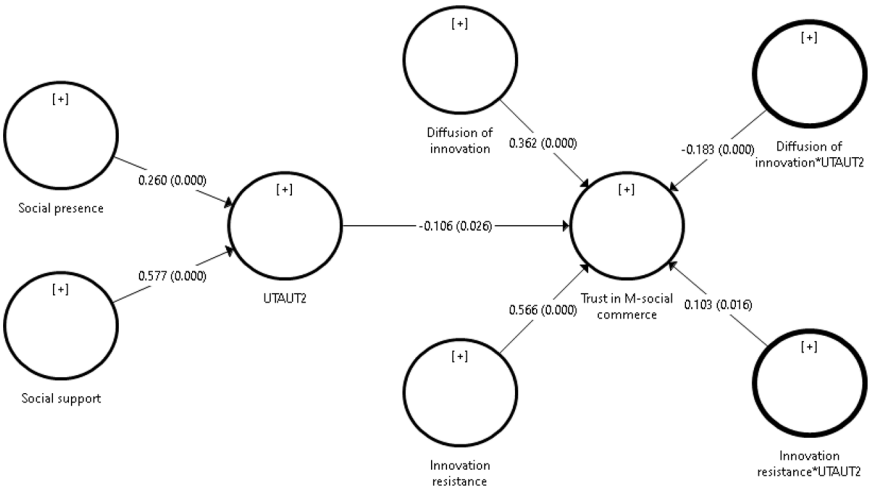

Figure 2.
Assessment of structural model

Table 3.
Path coefficients and hypotheses testing

Direct and indirect path	Original sample	Sample mean	SD	*t*-statistics	*p*-values	Result
Social presence → UTAUT2	0.260	0.259	0.050	5.215	0.000	Supported
Social support → UTAUT2	0.577	0.579	0.049	11.852	0.000	Supported
UTAUT2 → Trust in M-social commerce	−0.106	−0.107	0.047	2.235	0.026	Supported
Social presence → UTAUT2→Trust in M-social commerce	−0.027	−0.027	0.013	2.160	0.031	Supported
Social support → UTAUT2→Trust in M-social commerce	−0.061	−0.062	0.029	2.105	0.036	Supported
Diffusion of innovation*UTAUT2 → Trust in M-social commerce	−0.183	−0.187	0.044	4.200	0.000	Supported
Innovation resistance*UTAUT2 → Trust in M-social commerce	0.103	0.107	0.043	2.413	0.016	Supported

relationships that supported the proposed hypotheses. However, such a technique fails to conduct non-linear relationships. Therefore, for the validate the results of the PLS-SEM and to determine the non-linear relationships artificial intelligence analysis has been adopted as explained in the following discussion.

Artificial neural network

An ANN is a counterpart of the human brain as it learns knowledge by continuous training procedures and stores acquired knowledge as synaptic weights (Leong, *et al.*, 2020). Through moderating these weights with activation function, the error that happened between the real output and the wanted output is continued in a backward way and this procedure is renewed to achieve the desired results (Hew *et al.*, 2019). ANN approach had been used in many fields of studies including m-commerce, m-entertainment, aviation, m-music, retailing, marketing, manufacturing and mobile credit card. In this study, we adopted an integrated PLS-SEM and ANN approach in uncovering the antecedents of trust in mobile social commerce. The purpose of integrating the PLS-SEM with ANN is to demonstrate the

nonlinear and non-compensatory relationships between the used constraints. In addition, ANN is able to find the linear and nonlinear correlations between all variables and presents high accurate results (Alhumaid *et al.*, 2021).

In ANN analysis, every neuron calculates its output based on the number of stimulations acquired from an input vector, *x*. *Wji* designates the weights linking input component-*i* to the hidden neuron-*j*, while the weights that linked the hidden neuron-*j* to the output neuron-*k* is demonstrated by *Vkj*. The real input neuron had calculated by the weighted-sum of its inputs and the output of the neuron *(yi)*. More specifically, for the *j*-th hidden neuron (Vărzaru and Bocean, 2021):

$$net_j^h = \sum_{i=1}^{N} Wji\ x_i \ \ and \ \ Y_i = f\left(net_j^h\right) \tag{1}$$

For the k-th output neuron:

$$net_k^0 = \sum_{j=1}^{J+1} V_{kj} y_j \ \ and \ \ o_k = f\left(net_k^0\right) \tag{2}$$

Equation (3) showed the sigmoid function reaction with the parameter λ that assists to control the slope of the function. Thus, through the training procedure for a specific input pattern, the outputs which is o_k will be produced to match the desired response of each neuron d_k. then, the weights will be modified to decrease the error and to forward the next pattern. The output layer weights V will compute through the weight adjustment formula with equation (4) and with the equation (5) will compute the hidden layer weights W. Where o_{pk} indicates the desired output of neuron and o_{pk} indicates the real output of neuron-k for input pattern-p. All these weights will be continuously modified in this method until the sum square of error is minimized using equation (6) (Leong *et al.*, 2019):

$$f\ (net) = \frac{1}{1 + e^{-\lambda\, net}} \tag{3}$$

$$V_{kj}(t+1) = v_{kj}(t) + c\lambda\,(d_k - \ o_k)o_k(1 - o_k)y_i(t) \tag{4}$$

$$W_{ji}(t+1) = W_{ji}(t) + \ c\lambda^2\ y_j\left(1 - y_j\right)x_i\ \ (t)\left(\sum_{k=1}^{k}(d_k - \ o_k)o_k(1 - \ o_k)V_{kj}\right) \tag{5}$$

$$SSE = \frac{1}{2P}\sum_{p=1}^{p}\sum_{k=1}^{k}\left(d_{pk} - \ o_{pk}\right)^2 \tag{6}$$

We used multilayer perceptrons with a "feed-forward back-propagation" algorithm where the significant predictors from PLS path analysis are used as the input neurons also, a sigmoid function was applied to activate the output and hidden layer. Table 4 illustrated the RMSE values based on tenfold.

The result of sensitivity analysis shows 80% of the variance in behavioral intention to use m-social commerce is predicted by the input neurons. Based on the sensitivity analysis (Table 4) calculates the normalized importance (NI) of all input neurons by dividing the mean importance with the highest importance and expressed in percentage. Table 5 shows the normalized importance.

Hence, normalized importance was indicated UTAUT2 is the most powerful predictor for intention to use m-social commerce (NI = 100%), followed by innovation resistance (NI =

Table 4.
RMSE values

	Input neurons: SP, SS Output nodes: UT						Input neurons: UT, DI, IR Output nodes: TMC						
	Training			Testing			Training			Testing			
Neural network	N	SSE	RMSE	N	SSE	RMSE	N	SSE	RMSE	N	SSE	RMSE	Total
1	246	129	0.636	67	10.6	0.823	209	144	0.883	104	15.3	0.973	313
2	275	136	0.839	38	11.6	0.863	284	145	0.841	29	16.7	0.874	313
3	209	147	0.528	104	13.7	0.619	237	134	0.835	76	15.4	0.996	313
4	276	196	0.894	37	15.9	0.672	265	155	0.884	48	13.9	0.627	313
5	215	130	0.884	98	11.2	0.657	261	143	0.783	52	12.4	0.665	313
6	206	127	0.947	107	21.5	0.773	277	144	0.673	36	11.3	0.875	313
7	224	139	0.739	89	32.7	0.792	210	194	0.892	103	16.8	0.774	313
8	275	156	0.893	38	14.8	0.894	238	143	0.883	75	18.6	0.79	313
9	256	120	0.789	57	17.5	0.884	291	146	0.855	22	12.4	0.535	313
10	235	197	0.894	78	14.7	0.782	240	143	0.892	73	11.5	0.679	313
Mean		148	0.804		16.4	0.776		149	0.842		14.4	0.779	
SD		27.8	0.13		6.6	0.097		16.5	0.069		2.5	0.152	

Note: SP = social presence; SS = social support; UT = UTAUT2; TMC = trust in M-social commerce; DI = diffusion of innovation; IR = innovation resistance; N = number of data; SSE = sum square of error, RMSE = root mean square of error

Table 5.
Sensitivity analysis with normalized importance

	Relative importance				
Neural network	SP	SS	UT	DI	RI
1	0.151	0.241	0.215	0.157	0.236
2	0.205	0.210	0.101	0.282	0.203
3	0.195	0.255	0.222	0.154	0.174
4	0.187	0.231	0.205	0.177	0.200
5	0.172	0.272	0.204	0.141	0.211
6	0.160	0.234	0.246	0.080	0.280
7	0.182	0.206	0.214	0.178	0.219
8	0.147	0.206	0.257	0.125	0.266
9	0.162	0.200	0.225	0.170	0.243
10	0.228	0.217	0.249	0.084	0.223
Mean relative importance	0.183	0.214	0.313	0.056	0.234
Normalized importance (%)	58.4%	68.4%	100.0%	18.1%	75.0%

75%), social support (NI = 68.4%), social presence (NI = 58.4%) and diffusion of innovation (NI = 18.1%). This is further supported by the total contribution of the input neurons (Figure 3 and Table 6).

A coefficient of determination (R^2) is vital condition for the analysis of the structural model in PLS-SEM. The R^2 explains the number of variations in a dependent variable by the independent variables (F. Hair *et al.*, 2014). The R^2 ranges between the values of 0.000 to 1.000. A zero value indicates there is no perfect relationship between the constructs. An R^2 value of 1.000 indicates a perfect relationship, either positive or negative. This study has only one endogenous variable. The R^2 for this study is 0.76. Hence, such a result implies the five exogenous variables, combined in the model were able to explain about 0.76% of the variations in the dependent variable based on PLS-SEM. On the other hand, the ANN analysis indicated R square 99%. The ANN results confirmed the important of the social presence, social support, UTAUT2, diffusion of innovation and innovation resistance to enhance the trust in m-social commerce.

Discussions

The aim of this study is to uncover the antecedents of trust in mobile social commerce adopting dual stages PLS-SEM and ANN model. Besides, this study strained to explore the solutions to reduce the negative impact of social by focusing on interest in adjusting customer behavior attitudes especially trust through social presence theory, social support

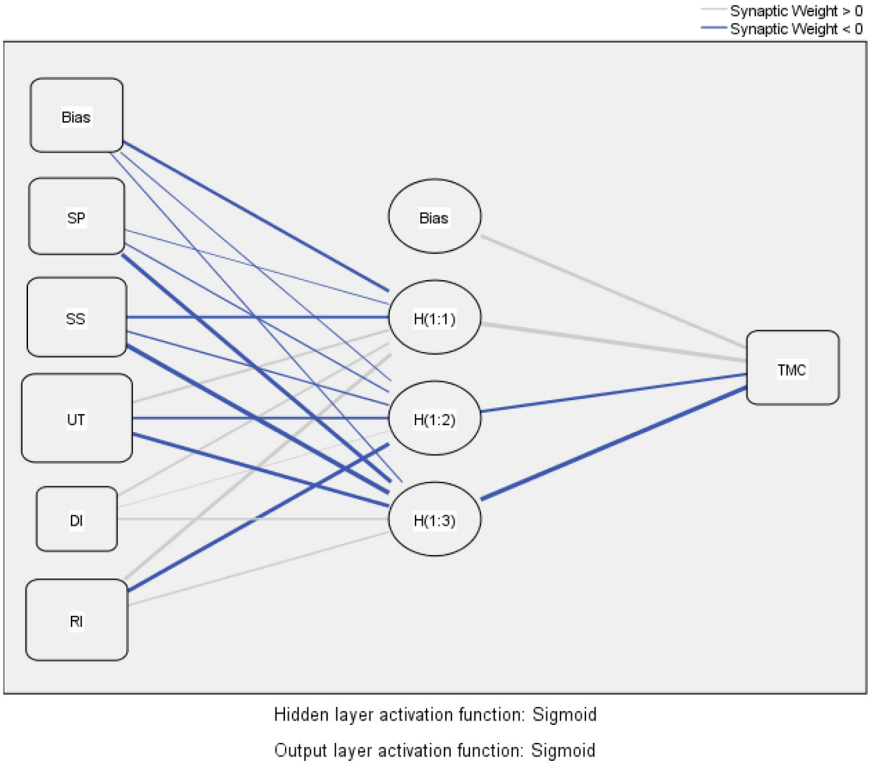

Figure 3.
Total contribution of hidden layer

		Predicted		
		Hidden layer 1		Output layer
Predictor	H(1:1)	H(1:2)	H(1:3)	TMC
Input layer				
(Bias)	−0.630	−0.029	−0.032	
SP	−0.020	−0.075	−0.973	
SS	−0.584	−0.159	−1.774	
UT	0.475	−0.577	−0.766	
DI	0.407	0.002	0.357	
RI	0.717	−0.783	0.160	
Hidden layer 1				
(Bias)				0.685
H(1:1)				1.230
H(1:2)				−0.628
H(1:3)				−1.329

Table 6.
Parameter estimates

theory, UTAUT2, diffusion innovation, innovation resistance. Moreover, customers can modify their behavior and complete their m-commerce purchases positively. This was highlighted by focusing on the Malaysian markets and how customers are responding to the social m-commerce experience. The results of this study indicated there are relationships between social support, present and trust in social m-commerce. In addition, the UTAUT2 has fully mediate the relationship between social support, present and trust in social m-commerce. On the other hand, the relationship between UTAUT2 and trust in social m-commerce was stronger when diffusion of innovation is high. However, the relationship between UTAUT2 and trust in social m-commerce was stronger when innovation resistance is law. This argument was supported by previous studies (Li and Yeh, 2010; Imtiaz, 2018; Kalinic *et al.*, 2019; Sarkar *et al.*, 2020b; Widyanto *et al.*, 2020).

Arguments assert social m-commerce is one of the essential parts of Malaysian markets. However, due to the services provided to customers, trust may affect the intent to purchase, which may lead to the abandonment or neglect of social m-commerce firms. Social m-commerce firms play an important role in the markets and economies of countries. Hence, the antecedents of trust in social m-commerce have been investigated to examine research hypotheses through social presence, social support, UTAUT2, diffusion innovation and innovation resistance on customer behavior and mobile purchasing decision making. The results of PLS-SEM regarding of this study explained the combination of social commerce and m-commerce indicates that social commerce can shape consumer trust in social commerce. Accordingly, positive attitudes toward m-commerce outcomes are developed from a consumer perspective. The results confirm the significant positive impact of social presence theory, social support theory and UTAUT2 on trust and purchase intention in the context of online m-commerce. On the other hand, diffusion of innovation theory and IRT positive impact on social m-commerce. Drawing upon the extended model of UTAUT2 this study highlights the nature of the online purchase environment of the social commerce marketplace by presenting and a set of former trusting issues: technology, e-payment, infrastructures, perception of others and interaction with sellers. The structural model with the mediated and moderated variables help to draw the full picture in which both social and factors shaping customer's trust and purchase behaviors. The weak trust could affect

customers' satisfaction which affected their intention of online purchases. Thus, changing their positive attitudes toward social m-commerce to negative. The Malaysian market will have different reactions to social m-commerce.

For ANN model, the results shown the performance expectancy, effort expectancy, facilitating conditions, hedonic motivation, habit, price value and perceived security have high normalized importance as antecedents of trust in mobile social commerce in the Malaysian context. Moreover, the more complex social commerce is, the more customers distrust m-social commerce. In addition, innovation resistance affects trust in social commerce. Technology acceptance factors increase trust in social commerce, lead to the formation of positive attitudes and increase loyalty and positive behavioral intentions. Such factors increase intentions to use social commerce by building long-term relationships. Customers' perception of innovation and less resistance to technology increases the sense of security and not losing confidential data when dealing with electronic transactions. Accordingly, technological complexities and privacy-related issues should be reduced in Malaysian firms. In addition, the lack of awareness programs for the use of social commerce during the complete closure reduces the distrust of customers in such commerce. This argument supported by Nilashi *et al.* (2015), Hillman and Neustaedter (2017) and Sarkar *et al.* (2020b).

Theoretical implications

This study makes several contributions to the existing literature. First, we develop the context of social commerce by developing trust in mobile social commerce by combining the UTAUT2 model as a mediator with social presence theory and social support theory. The adopted UTAUT2 model as a mediation construct contributed to the literature because there is limited research on incorporating such a model as moderation to understand the level of trust in e-commerce adoption. This study used an integrated model in terms of using different social theories, which provides a new direction of trust in mobile social commerce through social and operational determinants that were neglected in previous studies. The social and innovative context has significant implications for creating trust in social mobile commerce. Because the users focus more on value and usage. The literature on e-commerce is enormous and comprehensively describes the factors that determine the success of such commerce and explaining the readiness of customers to adopt social m-commerce. Therefore, very few studies have been conducted on the adoption of social commerce conducted through a set of virtual online sites for the purchase of products or services, which, in turn, is carried out mostly by mobile phone within the stream of market research with linear and non-linear relationships. Literary contribution is to bridge the literature gap in a context as unique as Malaysia. Malaysia is a developing country that is steadily using e-business. Therefore, in order to identify the most important factors that will develop the adoption of social e-commerce in the Malaysian context, such studies should be conducted.

Second, this study makes a significant contribution by identifying two moderators which are the diffusion of innovation theory and IRT and test its effects on customers' purchases decision-making in m-commerce. The resistance to innovation can be considered one of the most important obstacles that stand in the way of the willingness of individuals in general to adopt and adopt mobile phones or any of the modern technologies in social commerce or the adoption of online commerce in general. Because it is the result of individuals' opposition to any change that occurs on the current practices that they are accustomed to, it could represent a conflict or difference with his knowledge or with the way previous commercial transactions were conducted, whether it was actual or imagined in both cases, which greatly affects the intention of individuals in their adoption of the new change (Chen and Kuo, 2015;

Ram and Sheth, 1989). As every innovation has a state of change that it brings about from the previous method used and therefore the point of resistance stems from its connection with the ambiguity accompanying the new innovation first and second because it is linked to changing what has been accustomed to and that individuals find simple and comfortable because dealing with it has become simply an obvious matter that does not require a new intellectual effort (Elmhamdii *et al.*, 2011). Consequently, most individuals often prefer explicit behavior and the transactions they used to do and show resistance to innovation on an ongoing basis due to the presence of perceived psychological or physical risks that can enhance that resistance, although the goal of almost any innovation is clear to overcome the limitations associated with the old methods or to improve them better.

These elements are crucial because the innovation process lead-user innovation perspective assists the company to reduce the risk of failure and raise trust associated with presenting new products to the market (Yahaya *et al.*, 2016). Thus, by employing the use of diffusion of innovation theory as a moderating variable to detect the effect of the perceived attribute of innovation that involved relative advantage, compatibility, complexity and perceived risk besides awareness and customer's involvement. Similarly, the diffusion of innovation theory relates to the tendency to adopt innovative behavior reorganizes attitudes and the principles influence behavior. Therefore, analyzing the moderator shows the type of organization using innovations and their contexts is the more efficient moderator of the focal relationships than the type of innovation and the stage of adoption.

Managerial implications

The model of this study on the basis of the dual stages PLS-SEM and ANN present the implications of practitioners in the field of social commerce to develop the construct of social commerce. Social commerce business managers strive to maintain consumer trust in social m-commerce by highlighting important social commerce elements on their e-commerce sites. Therefore, consumer trust in social commerce must be improved by paying attention to the factors of acceptance of technology that have indicated the highest degree of importance. To create consumer trust and boost sales, managers of social commerce firms need to reduce resistance to innovation and negative customer reactions to new products and services. Many developed countries have successfully adopted social m-commerce long ago. Hence, social m-commerce has become an important part of many western markets. However, many developing countries like Malaysia have struggled in adopting social m-commerce due to the increasing number of cases of extortion and cyber theft. Therefore, managers should enhance the perceived security of using social commerce by displaying customer reviews and ratings.

The consumer's sense of social presence can be increased through the development of websites toward social presence. Social commerce is a product of the spread and development of modern technologies represented by social media (Liang and Turban, 2011), in a new way that created harmony and dynamic interaction between users and made them an integral part of the virtual community. Then it seems that this social interaction between users is appropriate and very desirable by individuals and they constantly strive to maintain this interaction. As there are emotional motives and reasons that push individuals in this direction. From another point of view, this interaction in fact develops social relations between individuals and some prominent personalities who represent major leaders and representatives of large groups of individuals who are used. Given the great influence that representatives of groups and major leaders leave on the behavior of individuals, the interest in representatives and leaders of the president is likely to be reflected in this Indirectly influencing the way individuals perceive social commerce and reduce their stress from

perceived risks around new innovations in the use of mobile phones in social commerce practices. As well as being the standard and the main control for the behavior of individuals, which imposes psychological pressure on them toward choosing the type of products and the method of conducting business transactions used by the leaders.

Thinking about how to build trust and satisfaction and how to develop it is critical for sellers in mobile commerce by going back to the important statement that customers are the heart of the business. Increased customer trust and satisfaction can result in a larger customer base. Managers should encourage customers by offering gifts and prizes to the customers who deal frequently with social firms. Practitioners must provide a collaborative and customized online environment via the mobile phone to customers. Meanwhile, long-term firms' managers must think about their brand and competitiveness because it may take many years of long-term strategic planning before effectively increasing customer satisfaction and creating customer trust. The results of this study motivate Malaysian policymakers to create competitive advantages based on customer trust regardless of low cost or high quality at a high price. The study model has the potential to be a model for future researchers and practitioners, especially in Malaysia due to it may enhance consumer protection. Finally, the government could undertake steps to protect m-commerce transaction security by establishing a certification authority (which verifies seller and buyer identities, evaluates transactions, security measures and provides digital certificates to those who fulfill the stated security criteria). Hence, the government can construct and implement a legal and judicial framework that establishes minimum transparency, impartiality and timeliness norms and obligations.

Research limitation and future direction

Although all hypotheses were accepted in this study, this study contains some limitations that affected proceed this paper easily. First, it was challenging to collect data from the targeted sample using the questionnaire tool because of the procedures of quarantine due to the spread of COVID-19. Second, the model was examined only with the data collected from Malaysian markets. Thus, the adopting of social m-commerce is restrained by many obstacles that handicap the expansion of social m-commerce in Malaysia, such as payment methods, trust, infrastructures. The results obtained from this study should help vendors in concentrating their attention on the factors such as privacy, quality and cost, then initiating and developing trust in m-commerce services in Malaysia.

This paper proposes various more research directions as follows. First, we have proposed and tested trust social m-commerce through a non-linear artificial neural network approach. Future research could examine our concept in different markets and cultural contexts. Second, the customer behavior attitude could be found positively and negatively affect social m-commerce adoption. Also, social presence theory, social support theory, UTAUT2, diffusion of innovation theory, IRT are suitable perspectives for online community research. Thus, scholars can explore the customer behavior attitude in online commerce communities by using the UTAUT2 perspective. Finally, we have presented the use of social technologies is sufficient for online trust forming. Future research can consider the nature of the social aspects by adopting different social theoretical perspectives.

Conclusion

In spite of a great body of research on trust in social m-commerce exists, very little research has been conducted in the Asia countries in general and on Malaysian markets in specific. Malaysia as a developing country is facing a deficiency of studies on customers' behavior attitude with social m-commerce. The aims of this study were to innovate a new model by

combining the UTAUT2 model as a mediator with social presence theory and social support theory, also with other two popular theories used as moderators which are diffusion of innovation theory, IRT. The results of the study provide some indication to support the presented new model. The customer's behavior attitude such as trust is an important factor for the adoption of social mobile commerce in Malaysia. Hence, implementing technology such as m-commerce should consider the local culture of the country. Finally, the results of the study showed there is a positive and significant relationship between social support, presence and UTAUT2. In addition, UTAUT2 has fully mediated the relationship between social support, presence and trust in social commerce. Finally, the results concluded the relationship between UTAUT2 and trust in social commerce would be stronger when the diffusion of innovation and innovation resistance is high and low, respectively. This study provides academics and managers with a fundamental comprehension and explanation of how to treats the issue of the impact of trust in social m-commerce.

References

Abbas, S., Hadi, A.A., Abdullah, H.O., Alnoor, A., Khattak, Z.Z. and Khaw, K.W. (2021), "Encountering Covid-19 and perceived stress and the role of a health climate among medical workers", *Current Psychology*, Vol. ahead-of-print No. ahead-of-print, pp. 1-14.

Abdelsalam, S., Salim, N., Alias, R.A. and Husain, O. (2020), "Understanding online impulse buying behavior in social commerce: a systematic literature review", *IEEE Access*, Vol. 8, pp. 89041-89058.

Abdulaali, A.R., Alnoor, A. and Eneizan, B. (2019), "A multi-level study of influence financial knowledge management small and medium enterprises", *Polish Journal of Management Studies*, Vol. 19 No. 1, pp. 21-31.

Abdullah, H., Ismail, I., Alnoor, A. and Yaqoub, E. (2021), "Effect of perceived support on employee's voice behaviour through the work engagement: a moderator role of locus of control", *International Journal of Process Management and Benchmarking*, Vol. 11 No. 1, pp. 60-79.

Abed, S.S., Dwivedi, Y.K. and Williams, M.D. (2015), "Consumers' perceptions of social commerce adoption in Saudi Arabia", *Conference on e-Business, e-Services and e-Society*, Springer, Cham, pp. 133-143.

Abubakar, A.M. (2018), "Linking work-family interference, workplace incivility, gender and psychological distress", *Journal of Management Development*, Vol. 37 No. 3, pp. 226-242.

Al-Abrrow, H., Alnoor, A. and Abbas, S. (2019a), "The effect of organizational resilience and CEO's narcissism on project success: organizational risk as mediating variable", *Organization Management Journal*, Vol. 16 No. 1, pp. 1-13.

Al-Abrrow, H., Alnoor, A., Ismail, E., Eneizan, B. and Makhamreh, H.Z. (2019b), "Psychological contract and organizational misbehavior: exploring the moderating and mediating effects of organizational health and psychological contract breach in Iraqi oil tanks company", *Cogent Business and Management*, Vol. 6 No. 1, pp. 1-28.

Al-Abrrow, H., Ali, J. and Alnoor, A. (2019c), "Multilevel influence of routine redesigning, legitimacy and functional affordance on sustainability accounting: Mediating role of organizational sense-making", *Global Business Review*, Vol. ahead-of-print No. ahead-of-print, pp. 1-26.

Al-Abrrow, H., Al-Maatoq, M., Alharbi, R.K., Alnoor, A., Abdullah, H.O., Abbas, S. and Khattak, Z.Z. (2021a), "Understanding employees' responses to the COVID-19 pandemic: the attractiveness of healthcare jobs", *Global Business and Organizational Excellence*, Vol. 40 No. 2, pp. 19-33.

Al-Abrrow, H., Fayez, A.S., Abdullah, H., Khaw, K.W., Alnoor, A. and Rexhepi, G. (2021b), "Effect of open-mindedness and humble behavior on innovation: mediator role of learning", *International Journal of Emerging Markets*, Vol. ahead-of-print No. ahead-of-print.

Alalwan, A.A., Algharabat, R.S., Baabdullah, A.M., Rana, N.P., Raman, R., Dwivedi, R. and Aljafari, A. (2019), "Examining the impact of social commerce dimensions on customers' value cocreation: the mediating effect of social trust", *Journal of Consumer Behaviour*, Vol. 18 No. 6, pp. 431-446.

Albahri, A.S., Alnoor, A., Zaidan, A.A., Albahri, O.S., Hameed, H., Zaidan, B.B. and Yass, A.A. (2021a), "Based on the multi-assessment model: towards a new context of combining the artificial neural network and structural equation modelling: a review", *Chaos, Solitons and Fractals*, Vol. 153, pp. 1-17.

Albahri, A.S., Alnoor, A., Zaidan, A.A., Albahri, O.S., Hameed, H., Zaidan, B.B. and Yass, A.A. (2021b), "Hybrid artificial neural network and structural equation modelling techniques: a survey", *Complex and Intelligent Systems*, Vol. ahead-of-print No. ahead-of-print, pp. 1-21.

Alhamdi, M., Noor, R.M.A.S., Abdulla, M., Alnoor, A. and Eneizan, B. (2019), "How does financial analysis influence the firm's failure of Iraqi private sector?", *The Journal of Social Sciences Research*, Vol. 5 No. 9, pp. 1321-1328.

Al-Hujran, O., Al-Debei, M.M., Chatfield, A. and Migdadi, M. (2015), "The imperative of influencing citizen attitude toward e-government adoption and use", *Computers in Human Behavior*, Vol. 53, pp. 189-203.

Alhulail, H., Dick, M. and Abareshi, A. (2018), "The influence of word of mouth on customer loyalty to social commerce websites: trust as a mediator", *In International Conference of Reliable Information and Communication Technology*, Springer, Cham, pp. 1025-1033.

Alhumaid, K., Habes, M. and Salloum, S.A. (2021), "Examining the factors influencing the mobile learning usage during COVID-19 pandemic: an integrated SEM-ANN method", *IEEE Access*, Vol. 9, pp. 102567-102578.

Al-Jabri, I.M. and Sohail, M.S. (2012), "Mobile banking adoption: application of diffusion of innovation theory", *Journal of Electronic Commerce Research*, Vol. 13 No. 4, pp. 379-391.

Alnoor, A. (2020), "Human capital dimensions and firm performance, mediating role of knowledge management", *International Journal of Business Excellence*, Vol. 20 No. 2, pp. 149-168.

Alnoor, A.M., Al-Abrrow, H., Abdullah, H. and Abbas, S. (2020), "The impact of self-efficacy on employees' ability to accept new technology in an Iraqi university", *Global Business and Organizational Excellence*, Vol. 39 No. 2, pp. 41-50.

Alnoor, A., Abdullah, H.O., Al-Abrrow, H., Wah Khaw, K., Al-Awidi, I.A., Abbas, S. and Omrane, A. (2021b), "A fuzzy Delphi analytic job demands-resources model to rank factors influencing open innovation", *Transnational Corporations Review*, Vol. ahead-of-print No. ahead-of-print, pp. 1-15.

Al-Tit, A.A., Omri, A. and Hadj, T.B. (2020), "The driving factors of the social commerce intention of Saudi Arabia's online communities", *International Journal of Engineering Business Management*, Vol. 12, p. 1847979019899746.

Arbaugh, J.B. (2008), "Does the community of inquiry framework predict outcomes in online MBA courses?", *International Review of Research in Open and Distributed Learning*, Vol. 9 No. 2, pp. 1-21.

Argyle, M. and Dean, J. (1965), "Eye-contact, distance and affiliation", *Sociometry*, Vol. 28 No. 3, pp. 289-304.

Atshan, N.A., Al-Abrrow, H., Abdullah, H.O., Khaw, K.W., Alnoor, A. and Abbas, S. (2021), "The effect of perceived organizational politics on responses to job dissatisfaction: the moderating roles of self-efficacy and political skill", *Global Business and Organizational Excellence*, Vol. 42 No. 2, pp. 1-12.

Ba, S., Whinston, A.B. and Zhang, H. (2003), "Building trust in online auction markets through an economic incentive mechanism", *Decision Support Systems*, Vol. 35 No. 3, pp. 273-286.

Barrera, M. (1986), "Distinctions between social support concepts, measures and models", *American Journal of Community Psychology*, Vol. 14 No. 4, pp. 413-445.

Bernal-Jurado, E., Mozas-Moral, A., Fernández-Uclés, D. and Medina-Viruel, M.J. (2017), "Explanatory factors for efficiency in the use of social networking sites – the case of organic food products", *Psychology and Marketing*, Vol. 34 No. 12, pp. 1119-1126.

Beyari, H. and Abareshi, A. (2018), "The interaction of trust and social influence factors in the social commerce environment", *in International Conference of Reliable Information and Communication Technology*, Springer, Cham, pp. 931-944.

Bhattacherjee, A. (2002), "Individual trust in online firms: scale development and initial test", *Journal of Management Information Systems*, Vol. 19 No. 1, pp. 211-241.

Blaise, R., Halloran, M. and Muchnick, M. (2018), "Mobile commerce competitive advantage: a quantitative study of variables that predict m-commerce purchase intentions", *Journal of Internet Commerce*, Vol. 17 No. 2, pp. 96-114.

Cai, J., Yang, H.H. and Gong, D. (2019), "Understanding undergraduates' adoption of flipped learning: integrating UTAUT and social presence", *In International Conference on Blended Learning*. Springer, Cham, pp. 9-21.

Chang, A. (2012), "UTAUT and UTAUT 2: a review and agenda for future research", *The Winners*, Vol. 13 No. 2, pp. 10-114.

Chao, C.M. (2019), "Factors determining the behavioral intention to use mobile learning: an application and extension of the UTAUT model", *Frontiers in Psychology*, Vol. 10, p. 1652.

Chen, J. and Shen, X.L. (2015), "Consumers' decisions in social commerce context: an empirical investigation", *Decision Support Systems*, Vol. 79, pp. 55-64.

Chen, J., Shen, X.L. and Chen, Z.J. (2014), "Understanding social commerce intention: a relational view", *2014 47th HI International Conference on System Sciences*, IEEE, pp. 1793-1802.

Clayton, R.B., Osborne, R.E., Miller, B.K. and Oberle, C.D. (2013), "Loneliness, anxiousness and substance use as predictors of Facebook use", *Computers in Human Behavior*, Vol. 29 No. 3, pp. 687-693.

Cobb, S. (1976), "Social support as a moderator of life stress", *Psychosomatic Medicine*, Vol. 38 No. 5, pp. 300-314.

Crocker, J. and Canevello, A. (2008), "Creating and undermining social support in communal relationships: the role of compassionate and self-image goals", *Journal of Personality and Social Psychology*, Vol. 95 No. 3, p. 555.

Damanpour, F. (1991), "Organizational innovation: a meta-analysis of effects of determinants and moderators", *Academy of Management Journal*, Vol. 34 No. 3, pp. 555-590.

DeLongis, A. and Holtzman, S. (2005), "Coping in context: the role of stress, social support and personality in coping", *Journal of Personality*, Vol. 73 No. 6, pp. 1633-1656.

Ding, Y., Akter, M. and Rahman, M.M. (2019), "Influence of trust and social presence in M-commerce adoption intention in Bangladesh: an empirical study", *N. Am. Acad. Res*, Vol. 2 No. 12, pp. 232-248.

Dingfelder, H.E. and Mandell, D.S. (2011), "Bridging the research-to-practice gap in autism intervention: an application of diffusion of innovation theory", *Journal of Autism and Developmental Disorders*, Vol. 41 No. 5, pp. 597-609.

Dunlap, J.C. and Lowenthal, P.R. (2009), "Instructional uses of Twitter", Chapter: 8, pp. 45-50.

Elmhamdi, A., Tsvetkov, D., Danziger, I.J. and Kordi, A. (2011), "Photometric evolution of SNe Ib/c 2004ao, 2004gk, and 2006gi", *The Astrophysical Journal*, Vol. 731 No. 2, pp. 1-10.

Eneizan, B., Mohammed, A.G., Alnoor, A., Alabboodi, A.S. and Enaizan, O. (2019a), "Customer acceptance of mobile marketing in Jordan: an extended UTAUT2 model with trust and risk factors", *International Journal of Engineering Business Management*, Vol. 11, p. 1847979019889484.

Eneizan, B., Mohammed, A.G., Alnoor, A., Alabboodi, A.S. and Enaizan, O. (2019b), "Customer acceptance of mobile marketing in Jordan: an extended UTAUT2 model with trust and risk factors", *International Journal of Engineering Business Management*, Vol. 11, pp. 1-10.

Eneizan, B.M., Abdelqader Alsakarneh, A.A., Al-Kharabsheh, K.A., Hadi, A.L. and Alnoor, A. (2019c), "An investigation into the relationship between emotional labor and customer satisfaction", *Central European Management Journal*, Vol. 27 No. 4, pp. 23-47.

Esmaeili, L. Mutallebi, M. Mardani, S. and Golpayegani, S.A.H. (2015), "Studying the affecting factors on trust in social commerce", arXiv preprint arXiv:1508.04048.

Fadhil, S.S., Ismail, R. and Alnoor, A. (2021), "The influence of soft skills on employability: a case study on technology industry sector in Malaysia", *Interdisciplinary Journal of Information, Knowledge and Management*, Vol. 16, pp. 255-283.

F. Hair, J., Jr, Sarstedt, M., Hopkins, L. and G. Kuppelwieser, V. (2014), "Partial least squares structural equation modeling (PLS-SEM): an emerging tool in business research", *European Business Review*, Vol. 26 No. 2, pp. 106-121.

Goh, K.N., Chen, Y.Y., Lai, F.W., Daud, S.C., Sivaji, A. and Soo, S.T. (2013), "A comparison of usability testing methods for an e-commerce website: a case study on a Malaysia online gift shop", *in 2013 10th International Conference on Information Technology: New Generations*, IEEE, pp. 143-150

Hadi, A.A., Alnoor, A. and Abdullah, H.O. (2018), "Socio-technical approach, decision-making environment and sustainable performance: role of ERP systems", *Interdisciplinary Journal of Information, Knowledge and Management*, Vol. 13, pp. 397-415.

Hair, J.F., Hult, G.T.M., Ringle, C. and Sarstedt, M. (2017), *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*, 2d ed., Sage, London and Thousand Oaks, CA.

Hajli, M.N. (2014), "The role of social support on relationship quality and social commerce", *Technological Forecasting and Social Change*, Vol. 87, pp. 17-27.

Hajli, N. and Sims, J. (2015), "Social commerce: the transfer of power from sellers to buyers", *Technological Forecasting and Social Change*, Vol. 94, pp. 350-358.

Hamid, R.A., Albahri, A.S., Alwan, J.K., Al-Qaysi, Z.T., Albahri, O.S., Zaidan, A.A., Alnoor, A. and Zaidan, B.B. (2021), "How smart is e-tourism? A systematic review of smart tourism recommendation system applying data management", *Computer Science Review*, Vol. 39, pp. 1-18.

Han, H., Xu, H. and Chen, H. (2018), "Social commerce: a systematic review and data synthesis", *Electronic Commerce Research and Applications*, Vol. 30, pp. 38-50.

Hassanein, K. and Head, M. (2007), "Manipulating perceived social presence through the web interface and its impact on attitude towards online shopping", *International Journal of Human-Computer Studies*, Vol. 65 No. 8, pp. 689-708.

Heaney, C.A. and Israel, B.A. (2008), "Social networks and social support", *Health Behavior and Health Education: Theory, Research and Practice*, Vol. 4, pp. 189-210.

Heerink, M., Kröse, B., Evers, V. and Wielinga, B. (2008), "The influence of social presence on acceptance of a companion robot by older people", *Journal of Physical Agents*, Vol. 2 No. 2, pp. 33-40.

Heidenreich, S. and Kraemer, T. (2015), "Passive innovation resistance: the curse of innovation? Investigating consequences for innovative consumer behavior", *Journal of Economic Psychology*, Vol. 51, pp. 134-151.

Heidenreich, S. and Kraemer, T. (2016), "Innovations – doomed to fail? Investigating strategies to overcome passive innovation resistance", *Journal of Product Innovation Management*, Vol. 33 No. 3, pp. 277-297.

Hew, K.F., Lan, M., Tang, Y., Jia, C. and Lo, C.K. (2019), "Where is the 'theory' within the field of educational technology research?", *British Journal of Educational Technology*, Vol. 50 No. 3, pp. 956-971.

Hietschold, N., Reinhardt, R. and Gurtner, S. (2020), "Who put the 'NO' in innovation? Innovation resistance leaders' behaviors and self-identities", *Technological Forecasting and Social Change*, Vol. 158, pp. 1-21.

Hillman, S. and Neustaedter, C. (2017), "Trust and mobile commerce in North america", *Computers in Human Behavior*, Vol. 70, pp. 10-21.

House, J. and Kahn, R. (1985), "Measures and concepts of social support", in Cohen, S. and Syme, S.L. (Eds), *Social Support and Health*, Academic Press, New York, NY, pp. 83-108.

Huang, Z. and Benyoucef, M. (2015), "User preferences of social features on social commerce websites: an empirical study", *Technological Forecasting and Social Change*, Vol. 95, pp. 57-72.

Hupcey, J.E. (1998), "Social support: Assessing conceptual coherence", *Qualitative Health Research*, Vol. 8 No. 3, pp. 304-318.

Imtiaz, S. (2018), "The studies of unified theory of acceptance and use of technology (UTAUT) in M-Commerce context", *International Journal of Information Communication Technology and Digital Convergence*, Vol. 3 No. 1, pp. 42-56.

Jabbar, A.K., Almayyahi, A.R.A., Ali, I.M. and Alnoor, A. (2020), "Mitigating uncertainty in the boardroom: analysis to financial reporting for financial risk COVID-19", *The Journal of Asian Finance, Economics and Business*, Vol. 7 No. 12, pp. 233-243.

Jiang, L., Cheng, Y., Yang, L., Li, J., Yan, H. and Wang, X. (2019), "A trust-based collaborative filtering algorithm for E-commerce recommendation system", *Journal of Ambient Intelligence and Humanized Computing*, Vol. 10 No. 8, pp. 3023-3034.

Ju, N. and Lee, K.H. (2021), "Perceptions and resistance to accept smart clothing: moderating effect of consumer innovativeness", *Applied Sciences*, Vol. 11 No. 7, p. 3211.

Kalinic, Z., Marinkovic, V., Molinillo, S. and Liébana-Cabanillas, F. (2019), "A multi-analytical approach to peer-to-peer mobile payment acceptance prediction", *Journal of Retailing and Consumer Services*, Vol. 49, pp. 143-153.

Kaur, P., Dhir, A., Singh, N., Sahu, G. and Almotairi, M. (2020), "An innovation resistance theory perspective on mobile payment solutions", *Journal of Retailing and Consumer Services*, Vol. 55, p. 102059.

Kim, D. and Benbasat, I. (2009), "Trust-assuring arguments in B2C e-commerce: Impact of content, source, and price on trust", *Journal of Management Information Systems*, Vol. 26 No. 3, pp. 175-206.

Kim, N. and Kim, W. (2018), "Do your social media lead you to make social deal purchases? Consumer-generated social referrals for sales via social commerce", *International Journal of Information Management*, Vol. 39, pp. 38-48.

Kim, D.J., Ferrin, D.L. and Rao, H.R. (2008), "A trust-based consumer decision-making model in electronic commerce: the role of trust, perceived risk, and their antecedents", *Decision Support Systems*, Vol. 44 No. 2, pp. 544-564.

Kim, M.J., Lee, C.K. and Contractor, N.S. (2019), "Seniors' usage of mobile social network sites: applying theories of innovation diffusion and uses and gratifications", *Computers in Human Behavior*, Vol. 90, pp. 60-73.

Kinard, B.R., Capella, M.L. and Kinard, J.L. (2009), "The impact of social presence on technology based self-service use: the role of familiarity", *Services Marketing Quarterly*, Vol. 30 No. 3, pp. 303-314.

Kwofie, M. and Adjei, J.K. (2019), Understanding the factors influencing mobile commerce adoption by traders in developing countries: evidence from Ghana. *In International Working Conference on Transfer and Diffusion of IT*, Springer, Cham, pp. 104-127.

Lah, N.S., Hussin, A.R. and Dahlan, H.M. (2013), "Improving B2C e-commerce trust through social presence factors", *Journal of Information System Research and Innovation ISSN*, Vol. 1 No. 2, pp. 2289-1358.

Lakey, B. and Cohen, S. (2000), "Social support theory and measurement", in Cohen, S., Underwood, L.G. and Gottlieb, B.H. (Eds), *Social Support Measurement and Intervention: A Guide for Health and Social Scientists*, Oxford University Press, pp. 29-52

Langford, C.P.H., Bowsher, J., Maloney, J.P. and Lillis, P.P. (1997), "Social support: a conceptual analysis", *Journal of Advanced Nursing*, Vol. 25 No. 1, pp. 95-100.

Leong, L.Y., Jaafar, N.I. and Ainin, S. (2018), "Understanding Facebook commerce (f-commerce) actual purchase from an artificial neural network perspective", *Journal of Electronic Commerce Research*, Vol. 78 No. 1, pp. 160-173.

Leong, L.Y., Hew, T.S., Ooi, K.B. and Chong, A.Y.L. (2020), "Predicting the antecedents of trust in social commerce – a hybrid structural equation modeling with neural network approach", *Journal of Business Research*, Vol. 110, pp. 24-40.

Leong, L.Y., Hew, T.S., Ooi, K.B., Lee, V.H. and Hew, J.J. (2019), "A hybrid SEM-neural network analysis of social media addiction", *Expert Systems with Applications*, Vol. 133, pp. 296-316.

Li, Y.M. and Yeh, Y.S. (2010), "Increasing trust in mobile commerce through design aesthetics", *Computers in Human Behavior*, Vol. 26 No. 4, pp. 673-684.

Lian, J.W., Liu, H.M. and Liu, I.L. (2012), "Applying innovation resistance theory to understand user acceptance of online shopping: the moderating effect of different product types", *Computer Technology and Application*, Vol. 3 No. 2, pp. 188-193.

Liang, T.P. and Turban, E. (2011), "Introduction to the special issue social commerce: a research framework for social commerce", *International Journal of Electronic Commerce*, Vol. 16 No. 2, pp. 5-14.

Lin, Z. and Theingi, H. (2019), "Extended utaut2 model on factors influencing of mobile commerce acceptance in Yangon", *Myanmar. AU-GSB e-Journal*, Vol. 12 No. 2, pp. 3-18.

Lin, J., Yan, Y. and Chen, S. (2017), "Understanding the impact of social commerce website technical features on repurchase intention: a Chinese Guanxi perspective", *Journal of Electronic Commerce Research*, Vol. 18 No. 3, p. 225.

Lin, X., Wang, X. and Hajli, N. (2019), "Building e-commerce satisfaction and boosting sales: the role of social commerce trust and its antecedents", *International Journal of Electronic Commerce*, Vol. 23 No. 3, pp. 328-363.

Ma, L. and Lee, C.S. (2019), "Understanding the barriers to the use of MOOCs in a developing country: an innovation resistance perspective", *Journal of Educational Computing Research*, Vol. 57 No. 3, pp. 571-590.

Makmor, N., Alam, S.S. and Aziz, N.A. (2018), "Social support, trust and purchase intention in social commerce era", *Int. J. Supply Chain Manag*, Vol. 7 No. 5, pp. 572-581.

Marriott, H.R., Williams, M.D. and Dwivedi, Y.K. (2017), "What do we know about consumer m-shopping behaviour?", *International Journal of Retail and Distribution Management*, Vol. 45 No. 6, pp. 568-586.

Masood, A., Feng, Y., Rasheed, M.I., Ali, A. and Gong, M. (2020), "Smartphone-based social networking sites and intention to quit: self-regulatory perspective", *Behaviour and Information Technology*, Vol. 40 No. 11, pp. 1055-1071.

Matthes, J., Karsay, K., Schmuck, D. and Stevic, A. (2020), "'Too much to handle': impact of mobile social networking sites on information overload, depressive symptoms, and well-being", *Computers in Human Behavior*, Vol. 105, pp. 1-11.

Min, S., So, K.K.F. and Jeong, M. (2019), "Consumer adoption of the uber mobile application: insights from diffusion of innovation theory and technology acceptance model", *Journal of Travel and Tourism Marketing*, Vol. 36 No. 7, pp. 770-783.

Mohd, H.A., Al-Tawfiq, J.A. and Memish, Z.A. (2016), "Middle east respiratory syndrome coronavirus (MERS-CoV) origin and animal reservoir", *Virology Journal*, Vol. 13 No. 1, pp. 1-7.

Mohd Ishak, S.S. and Newton, S. (2016), "An innovation resistance factor model", *Construction Economics and Building*, Vol. 16 No. 3, pp. 87-103.

Morosan, C. and DeFranco, A. (2016), "It's about time: revisiting UTAUT2 to examine consumers' intentions to use NFC mobile payments in hotels", *International Journal of Hospitality Management*, Vol. 53, pp. 17-29.

Murray, C.E. (2009), "Diffusion of innovation theory: a bridge for the research-practice gap in counseling", *Journal of Counseling and Development*, Vol. 87 No. 1, pp. 108-116.

Naji, M.A., Mousrij, A., Cillo, V. and Chierici, R. (2019), "Measuring the maintenance performance through fuzzy logic and analytical hierarchy process", *International Journal of Managerial and Financial Accounting*, Vol. 11 Nos 3/4, pp. 290-319.

Ng, C.S.P. (2013), "Intention to purchase on social commerce websites across cultures: a cross-regional study", *Information and Management*, Vol. 50 No. 8, pp. 609-620.

Nilashi, M., bin Ibrahim, O., Ithnin, N. and Sarmin, N.H. (2015), "A multi-criteria collaborative filtering recommender system for the tourism domain using expectation maximization (EM) and PCA – ANFIS", *Electronic Commerce Research and Applications*, Vol. 14 No. 6, pp. 542-562.

Norris, F.H. and Kaniasty, K. (1996), "Received and perceived social support in times of stress: a test of the social support deterioration deterrence model", *Journal of Personality and Social Psychology*, Vol. 71 No. 3, p. 498.

Oh, J.C. and Yoon, S.J. (2014), "Predicting the use of online information services based on a modified UTAUT model", *Behaviour and Information Technology*, Vol. 33 No. 7, pp. 716-729.

Ooi, K.B., Hew, J.J. and Lin, B. (2018), "Unfolding the privacy paradox among mobile social commerce users: a multi-mediation approach", *Behaviour and Information Technology*, Vol. 37 No. 6, pp. 575-595.

Ram, S. and Sheth, J.N. (1989), "Consumer resistance to innovations: the marketing problem and its solutions", *Journal of Consumer Marketing*, Vol. 6 No. 2, pp. 5-14.

Raman, A. and Don, Y. (2013), "Preservice teachers' acceptance of learning management software: an application of the UTAUT2 model", *International Education Studies*, Vol. 6 No. 7, pp. 157-164. doi: 10.5539/ies.v6n7p157.

Remesal, A. and Colomina, R. (2013), "Social presence and online collaborative small group work: a socio constructivist account", *Computers and Education*, Vol. 60 No. 1, pp. 357-367.

Rogers, E.M. (2003), *Diffusion of Innovations*, Free Press, New York, NY, p. 551.

Rogers, E.M. (2004), "A prospective and retrospective look at the diffusion model", *Journal of Health Communication*, Vol. 9 No. 1, pp. 13-19.

Rossi, M. (2015), "The role of venture capital funds in financing innovation in Italy. Constraints and challenges for innovative small firms", *International Journal of Globalisation and Small Business*, Vol. 7 No. 2, pp. 162-180.

Rossi, M., Festa, G., Fiano, F. and Giacobbe, R. (2020), "To invest or to harvest? Corporate venture capital ambidexterity for exploiting/exploring innovation in technological business", *Business Process Management Journal*, Vol. 26 No. 5, pp. 1157-1181.

Ryan, T. and Xenos, S. (2011), "Who uses facebook? An investigation into the relationship between the big five, shyness, narcissism, loneliness, and facebook usage", *Computers in Human Behavior*, Vol. 27 No. 5, pp. 1658-1664.

Sadiq, M., Adil, M. and Paul, J. (2021), "An innovation resistance theory perspective on purchase of eco-friendly cosmetics", *Journal of Retailing and Consumer Services*, Vol. 59, p. 102369.

Sarason, I.G., Sarason, B.R. and Pierce, G.R. (1990), "Social support: the search for theory", *Journal of Social and Clinical Psychology*, Vol. 9 No. 1, pp. 133-147.

Sarker, P., Hughes, D.L. and Dwivedi, Y.K. (2020a), "Extension of Meta-UTAUT for examining consumer adoption of social commerce: towards a conceptual model", *Advances in Digital Marketing and eCommerce*, Springer, Cham, pp. 122-129.

Sarkar, K., Khajanchi, S. and Nieto, J.J. (2020b), "Modeling and forecasting the COVID-19 pandemic in India", *Chaos, Solitons and Fractals*, Vol. 139, pp. 1-16.

Sartipi, F. (2020), "Diffusion of innovation theory in the realm of environmental construction", *Journal of Construction Materials*, Vol. 1 No. 4, pp. 2-4.

Scarpetta, F. (2008), "Practices to display social presence: a study in a shared mediated environment", *PsychNology Journal*, Vol. 6 No. 1, pp. 27-59.

Scott, S. and McGuire, J. (2017), "Using diffusion of innovation theory to promote universally designed college instruction", *International Journal of Teaching and Learning in Higher Education*, Vol. 29 No. 1, pp. 119-128.

Shahbaz, M., Gao, C., Zhai, L., Shahzad, F. and Hu, Y. (2019), "Investigating the adoption of big data analytics in healthcare: the moderating role of resistance to change", *Journal of Big Data*, Vol. 6 No. 1, pp. 1-20.

Sharma, S., Singh, G., Pratt, S. and Narayan, J. (2020), "Exploring consumer behavior to purchase travel online in Fiji and Solomon Islands? An extension pf the utaut framework", *International Journal of Culture, Tourism and Hospitality Research*, Vol. 15 No. 2, pp. 227-247.

Shin, D.H. (2013), "Defining sociability and social presence in social TV", *Computers in Human Behavior*, Vol. 29 No. 3, pp. 939-947.

Shin, D.H. and Shin, Y.J. (2011), "Why do people play social network games?", *Computers in Human Behavior*, Vol. 27 No. 2, pp. 852-861.

Short, R.V. (1976), "Definition of the problem-the evolution of human reproduction", *Proceedings of the Royal Society of London. Series B. Biological Sciences*, Vol. 195 No. 1118, pp. 3-24.

Shumaker, S.A. and Brownell, A. (1984), "Toward a theory of social support: closing conceptual gaps", *Journal of Social Issues*, Vol. 40 No. 4, pp. 11-36.

Singh, M. and Matsui, Y. (2017), "How long tail and trust affect online shopping behavior: an extension to UTAUT2 framework", *Pacific Asia Journal of the Association for Information Systems*, Vol. 9 No. 4, p. 2.

Slade, E.L., Williams, M.D. and Dwivedi, Y.K. (2014), "Devising a research model to examine adoption of mobile payments: an extension of UTAUT2", *The Marketing Review*, Vol. 14 No. 3, pp. 310-335.

Srivastava, S. and Singh, N. (2020), "From resistance to acceptance: role of moderating and mediating variables in intention to use mobile payment services", *International Journal of Technology Marketing*, Vol. 14 No. 4, pp. 377-402.

Szmigin, I. and Foxall, G. (1998), "Three forms of innovation resistance: the case of retail payment methods", *Technovation*, Vol. 18 Nos 6/7, pp. 459-468.

Tam, C., Loureiro, A. and Oliveira, T. (2020), "The individual performance outcome behind e-commerce: integrating information systems success and overall trust", *Internet Research*, Vol. 30 No. 2, pp. 439-462.

Tam, C.L., Lee, T.H., Har, W.M. and Pook, W.L. (2011), "Perceived social support and self-esteem towards gender roles: contributing factors in adolescents", *Asian Social Science*, Vol. 7 No. 8, pp. 49-58.

Tolba, A.H. and Mourad, M. (2011), "Individual and cultural factors affecting diffusion of innovation", *Journal of International Business and Cultural Studies*, Vol. 5, p. 1.

Tu, C.H. and McIsaac, M. (2002), "The relationship of social presence and interaction in online classes", *American Journal of Distance Education*, Vol. 16 No. 3, pp. 131-150.

Vahedi, Z. and Zannella, L. (2021), "The association between self-reported depressive symptoms and the use of social networking sites (SNS): a meta-analysis", *Current Psychology*, Vol. 40 No. 5, pp. 2174-2189.

Vankatesh, V., Morris, M.G., Davis, G.B. and Davis, F.D. (2003), "User acceptance of information technology: toward a unified view", *Mis Quarterly*, Vol. 27 No. 3, pp. 425-478.

Vărzaru, A.A. and Bocean, C.G. (2021), "A two-stage SEM–artificial neural network analysis of mobile commerce and its drivers", *Journal of Theoretical and Applied Electronic Commerce Research*, Vol. 16 No. 6, pp. 2304-2318.

Venkatesh, V. (2021), "Adoption and use of AI tools: a research agenda grounded in UTAUT", *Annals of Operations Research*, Vol. 308 Nos 1/2, pp. 1-12.

Widyanto, H.A., Kusumawardani, K.A. and Septyawanda, A. (2020), "Encouraging behavioral intention to use mobile payment: an extension of Utaut2", *Jurnal Muara Ilmu Ekonomi Dan Bisnis*, Vol. 4 No. 1, pp. 87-97.

Wiener, M. and Mehrabian, A. (1968), *Language within Language: Immediacy, a Channel in Verbal Communication*, Ardent Media, New York.

Wills, T.A. (1991), "Social support and interpersonal relationships", in Clark, M.S. (Ed.), *Prosocial Behavior*, Sage Publications, pp. 265-289.

Workman, M. (2014), "New media and the changing face of information technology use: the importance of task pursuit, social influence and experience", *Computers in Human Behavior*, Vol. 31, pp. 111-117.

Yahaya, S., Hamid, I.A., Fauzi, A., Idris, B. and Haji-Othman, Y. (2016), "Adoption of Islamic banking products and services in Nigeria: an application of diffusion of innovation theory", *Science and Technology*, Vol. 2, pp. 264-273.

Yahia, I.B., Al-Neama, N. and Kerbache, L. (2018), "Investigating the drivers for social commerce in social media platforms: importance of trust, social support and the platform perceived usage", *Journal of Retailing and Consumer Services*, Vol. 41, pp. 11-19.

Yusuf, M.B.O. and Derus, A.M. (2013), "Measurement model of corporate zakat collection in Malaysia: a test of diffusion of innovation theory", *Humanomics*, Vol. 29 No. 1, pp. 61-74.

Zhang, K.Z., Benyoucef, M. and Zhao, S.J. (2016), "Building brand loyalty in social commerce: the case of brand micro blogs", *Electronic Commerce Research and Applications*, Vol. 15, pp. 14-25.

Further reading

Afaeli, S. (1990), "Interaction with media: para-social interaction and real interaction", in Ruben, B.D. and Lievrouw, L.A. (Eds), *Information and Behavior*, Transaction Books, New Brunswick, NJ, Vol. 3, pp. 125-181.

Chang, H.C. (2010), "A new perspective on Twitter hashtag use: diffusion of innovation theory", *Proceedings of the American Society for Information Science and Technology*, Vol. 47 No. 1, pp. 1-4.

Chao, C.M. (2019), "Factors determining the behavioral intention to use mobile learning: an application and extension of the UTAUT model", *Frontiers in Psychology*, Vol. 10, p. 1652.

Laireiter, A. and Baumann, U. (1992), "Network structures and support functions: theoretical and empirical analyses", *The Meaning and Measurement of Social Support*, Hemisphere, New York, NY, Washington, DC.

Lu, B., Fan, W. and Zhou, M. (2016), "Social presence, trust and social commerce purchase intention: an empirical research", *Computers in Human Behavior*, Vol. 56, pp. 225-237.

Ong, J.W., Poong, Y.S. and Ng, T.H. (2008), "3G services adoption among university students: diffusion of innovation theory", *Communications of the IBIMA*, Vol. 3 No. 16, pp. 114-121.

Sung, E. and Mayer, R.E. (2012), "Five facets of social presence in online distance education", *Computers in Human Behavior*, Vol. 28 No. 5, pp. 1738-1747.

Wang, C. and Zhang, P. (2012), "The evolution of social commerce: the people, management, technology and information dimensions", *Communications of the Association for Information Systems*, Vol. 31 No. 1, p. 5.

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