

## **Connecting the Dots: Haptic Imagery's Sequential Impact via Serial Mediation in Social Commerce Applications**

Sin-Er Chong

School of Business and Economics, Universiti Putra Malaysia

Jalan Universiti 1, Serdang, 43400, Malaysia

Tel: +603-97697609

Email: sinerchong@gmail.com

Siew-Imm Ng

School of Business and Economics, Universiti Putra Malaysia

Jalan Universiti 1, Serdang, 43400, Malaysia

Tel: +603-97697573

Email: imm\_ns@upm.edu.my

Norazlyn Kamal Basha

School of Business and Economics, Universiti Putra Malaysia

Jalan Universiti 1, Serdang, 43400, Malaysia

Tel: +603-97697675

Email: norazlyn@upm.edu.my

Xin-Jean Lim

Business School, Sun Yat-Sen University

Shenzhen Campus, 518107, Shenzhen, China

School of Business and Economics, Universiti Putra Malaysia

Jalan Universiti 1, Serdang, 43400, Malaysia

Tel: +603-97697675

Email: lim.xinjean@yahoo.com

### ***Abstract***

By integrating the Theory of Interactive Media Effects (TIME) and flow theory, this research investigates the influence of haptic imagery on users' experiences and behavioural intentions within the context of Social Commerce Applications (SCAs). This research delves into the mediating role of immersion and the intricate serial mediation dynamics involving immersion and social media fatigue, elucidating their role in the link between haptic imagery and users' continuance intention. A purposive sampling technique was employed to gather data from 410 users of SCAs in Malaysia via offline and online data collection methods. The collected data underwent analyses using partial least squares-structural equation modelling (PLS-SEM). The findings revealed that haptic imagery was positively associated with immersion, negatively associated with social media fatigue, and positively associated with continuance intention among users of SCAs. Immersion emerges as a crucial mediator, sequentially linking haptic imagery to social media fatigue and subsequently to continuance intention. The study pioneers research into the influence of haptic imagery in the context of SCAs, contributing to the underexplored research gaps in social commerce continuance literature. The study unravels the intricate relationships between haptic imagery, user experiences, and behavioural intentions, shedding light on the serial mediation mechanisms in shaping users' continuance intention. This pioneering approach facilitates a novel understanding of technology-mediated user behaviour.

**Keywords:** haptic imagery, immersion, social media fatigue, continuance intention, social commerce, theory of interactive media effects, flow theory

**Acknowledgements:** The authors would like to express their appreciation to the Research Management Centre of Universiti Putra Malaysia (GPB/2021/9696700) for financially supporting this research.

**Copyright:** *The Author(s) - This paper is published by the International Journal of Business Science and Applied Management under a Creative Commons Attribution 4.0 International Licence. Our journal is an open access resource which means that all content is freely available without charge. Users are allowed to read, download, copy, distribute, print, search, or link to the full texts of the articles, or use them for any other lawful purpose, without asking prior permission from the publisher or the author. For more information about this paper and our journal visit our website.*

*Submitted: 2024-03-25 / Accepted: 2024-07-07 / Published: 2024-07-23*

## **1 INTRODUCTION**

Social commerce applications (SCAs), at the intersection of social media and e-commerce, have witnessed substantial growth and transformation in recent years (Chiu et al., 2022). Amidst the surge of advanced technology and the prevalence of mobile gadgets, the landscape of online commerce has rapidly moved from computers to mobile applications. This shift has energized the growth of mobile commerce, leading numerous internet firms to pivot toward SCAs in response to the growing impact of social media (Wang et al., 2023). The impact of social media is profound, extending across various domains such as supply chains and logistics (Papagiannidis et al., 2019), in addition to its significant role in social commerce. The rapid rise of SCAs in Southeast Asia, particularly in Malaysia, is exemplified by TikTok Shop's emergence as a competitive force challenging established e-commerce players like Shopee and Lazada (Tech Wire Asia, 2023). Given the challenges encountered by e-commerce players, it is imperative for SCAs to proactively strategize to ensure sustained user continuance. From a business standpoint, comprehending ways to incentivize consumers' desire to use SCA represents a crucial strategy to gain a competitive edge and unlock economic potential (Liu et al., 2019).

The surge in online shopping driven by the COVID-19 pandemic has spurred researchers to investigate online consumer behaviours, aiming to provide insights for retailers seeking to attract a larger consumer base and elevate their sales strategies (Tan et al., 2023). Moreover, the continuance intention to utilize SCAs remains understudied even though scholars have been emphasizing the point that the sustained usage intention in social commerce serves as a strong indicator of social commerce sustainability (Hu et al., 2022; Osatuyi & Qin, 2018). Chiu et al. (2022) also emphasized the need for further research to explore the factors driving continuance intention using an integrated framework. Hence, there arises a necessity to investigate various factors influencing consumers' continuance intention in SCAs. In this setting, integrating interactive elements within these platforms has revolutionized consumer behaviour, offering novel avenues for engagement and transactions (Nandi et al., 2021). The role of sensory experiences, particularly haptics, has emerged as a pivotal determinant shaping user perceptions and interactions within SCAs (Racat & Plotkina, 2023). Haptic imagery, characterized by its tactile and sensory attributes, goes beyond the visual realm, offering users an immersive and tangible experience (Huang & Liao, 2017). It refers to the mental visualization of touch. Haptic technologies represent pioneering sensory tools capable of enhancing consumers' online shopping journeys. For instance, haptic technologies in fashion and luxury redefine online tactile experiences, employing computational systems to emulate the sense of touch (Ornati & Kalbaska, 2022).

These innovational technologies address the lack of physical interaction in online shopping by integrating haptically enriched content, virtual prototyping, and multisensory brand promotions in mixed or virtual reality. By integrating haptic data across the value chain, from design to merchandising, they add valuable layers to online commerce (Silva et al., 2021). One application involves integrating haptic feedback to simulate touch-enabled product exploration (Hadi & Valenzuela, 2020). For instance, in an electronics-focused SCA, users can virtually interact with gadgets, feeling the textures, buttons, and features through haptic feedback. This immersive experience not only allows users to explore products in detail but also increases their confidence in making informed purchase decisions. Another application lies in incorporating haptic feedback to facilitate sensory-enhanced communication (Racat & Plotkina, 2023). Through haptic-enabled messaging features, users can convey emotions and sensations beyond text, fostering richer interpersonal interactions and strengthening bonds. These examples highlight how haptic imagery can revolutionize the SCA landscape, offering users engaging and sensory-rich experiences while navigating and interacting within the platform.

Yet, the impact of integrating haptics on user behaviour during SCA usage remains largely unexplored (Racat & Plotkina, 2023). While numerous studies delve into purchase behavioural intentions (Tian & Lee, 2022; Vazquez et al., 2023; Wang & Huang, 2023), there remains a scarcity of research conducted specifically within the context of sustained usage within SCAs. A research gap persists when it comes to elucidating how haptic imagery can effectively stimulate user engagement and contribute to sustained intention within SCAs. Drawing on Park and Ha's (2021) argument that consumer engagement is a pivotal element for brand loyalty, our research emphasizes the significance of enhancing user involvement in the context of SCAs. To achieve this, one potential avenue is to augment user immersion, as this has been identified as a key factor influencing continued app usage in this research.

Beyond spotlighting the direct impact of haptic imagery on continuance intention, understanding the potential enhancement of immersion via haptic imagery and the consequential alleviation of social

media fatigue have emerged as crucial considerations. In the context of SCAs, the coalescence of immersion and social media fatigue represent pivotal factors shaping user experiences. Immersion, renowned for its capacity to engage users through multisensory stimuli, catalyzes enriched interactions (Huang & Liao, 2017; Tian & Lee, 2022). Based on flow theory, an earlier study exposes significant psychological processes, like immersion, through which the communication style impacts customer behaviour in live-streaming commerce (Liao et al., 2023). However, the looming challenge of social media fatigue poses a potential impediment, impacting user retention and sustained engagement within these platforms (Sunil et al., 2022). Researchers have also discovered that immersive experiences result from various stimuli (Bao & Yang, 2022; Zhou, 2020), can mitigate social media fatigue, a factor that exhibits a correlation with discontinuance intention (Lin et al., 2020). These findings recommend the notion of a serial mediation effect, wherein immersion and social media fatigue sequentially mediate continuance intention, stemming from the influence of haptic imagery. This research pioneers the investigation into the mediating role of immersion and the sequential mediation of immersion coupled with social media fatigue, marking a novel exploration within SCA studies.

To address the gaps aforementioned, this study aims to achieve several objectives. Firstly, leveraging the Theory of Interactive Media Effects (TIME) by Sundar et al. (2015), the research seeks to examine how haptic imagery influences immersion, social media fatigue, and continuance intention. TIME posits that the features of a communication medium, alongside the source and content of messages, significantly influence user experience and interaction. Specifically, the characteristics of the media interface or its affordances act as cues that trigger various psychological responses, leading to cognitive or affective reactions from users (Ivanov et al., 2023). Given this framework, TIME is particularly suited for this study as it provides a comprehensive understanding of how interactive elements, such as haptic imagery, enhance user experiences and shape behaviours within SCAs. Secondly, the study aims to explore the effects of immersion on social media fatigue and continuance intention as well as the mediating role of immersion in this context based on flow theory. Flow theory, pioneered by Csikszentmihalyi (1975), is highly relevant to understanding the underlying mechanism of immersion. It is particularly well-suited to explaining immersion in this study because it provides a framework for understanding the psychological processes underlying user experience. It posits that individuals experience a state of optimal psychological functioning when they are fully absorbed in an activity. In the context of SCAs, immersion can be seen as a manifestation of flow, where users become deeply engaged in the online shopping experience, leading to enhanced continuance intention.

Lastly, this study attempts to examine the serially mediated relationship of immersion and social media fatigue between haptic imagery and continuance intention. This investigation aims to uncover the underlying mechanisms inherent in this unique model from fresh vantage points by integrating TIME and flow theory, representing the inaugural endeavour to integrate the two theories within the realm of SCAs. This effort also responds to the call by Chiu et al. (2022) to examine the factors affecting continuance intention from an integrated perspective. By examining the interplay between media features and user responses, the integration of TIME and flow theory helps elucidate the mechanisms through which haptic imagery fosters user immersion, reduces social media fatigue and ultimately influences continuance intention. Through a deeper exploration of these interconnected factors, this study not only contributes to the theoretical foundations of sensory marketing and user behaviour within social commerce but also offers practical insights for platform design and marketing strategies. Understanding how haptic imagery engenders continued user engagement and mitigates potential fatigue in SCAs involves substantial implications for businesses, marketers, and platform developers seeking to optimize user experiences and sustain user participation.

## **2. LITERATURE REVIEW AND THEORETICAL BACKGROUND**

### **2.1 Overview of Social Commerce Continuance Research**

Studies into social commerce commenced in the previous decade, witnessing a significant surge in research articles as technological advances unfolded (Zhao et al., 2023). Researchers have placed significant emphasis on understanding factors that drive social commerce behavioural intentions such as purchase intention (Akram et al., 2021; Busalim et al., 2023; Chen et al., 2018; Doha et al., 2019; Lin & Wang, 2022; Liu et al., 2016; Molinillo et al., 2021), social commerce intention (Cheng et al., 2019; Liang et al., 2011; Molinillo et al., 2018; Tuncer, 2021; Zhang et al., 2014), and positive electronic word-of-mouth intention (Busalim et al., 2023; Herrando et al., 2018; Mikalef et al., 2017; Molinillo et al., 2020, 2021). However, the continuance intention of consumers within the social commerce context has been relatively overlooked by researchers (Osatuyi and Qin, 2018). On top of that, researchers have highlighted the importance of users' continuance intention as a crucial indicator of success and sustainability in the social commerce landscape (Hu et al., 2022). Consequently, it is

imperative to explore the underlying factors that drive users' continuance intention to engage with social commerce platforms (Chiu et al., 2022).

As shown in Table 1, we conducted a review of past and current research within the context of social commerce continuance. From there, we noticed four significant research gaps that this research attempted to address. First, numerous studies have mostly employed the theoretical lens of social-based theories such as Social Support Theory, motivation-based theories, the Expectation Confirmation Model and the Stimulus-Organism-Response Model. Hence, a notable gap remains in leveraging theoretical frameworks from a technological perspective to elucidate the factors influencing users' sustained engagement with these platforms. Recognizing the vital role of technology in delivering optimal user experiences in the context of social commerce, as argued by Leong et al. (2023), employing a technology-based theoretical framework has become imperative to comprehensively understand the factors driving users' continuance intention on these platforms. Therefore, the current study employs TIME as the primary underpinning theory as it explains how interactive technological media actively engages users and influences their experiences and behaviours.

Second, past studies have predominantly investigated social-related factors, such as social support, social gratification, and social interaction. Additionally, researchers have explored informational-related factors, including informational support, information privacy, information quality, information usefulness and adoption, and informational influence. Furthermore, general technological-related factors, such as website quality, perceived usefulness, perceived ease of use, service quality, and customization have been investigated. However, specific technological factors have been overlooked, especially interactive-related factors like haptic imagery. Haptic imagery involves integrating tactile sensations into digital interfaces, allowing users to virtually feel and interact with on-screen elements as if they were physical objects. By providing touch-based feedback, this technology enhances the sense of realism and immersion in digital experiences, enabling users to perceive textures, vibrations, and physical sensations when interacting with virtual elements (Ivanov et al., 2023). Recently, Chong et al. (2024) emphasized the need to explore the impact of haptic imagery, as a technological factor, on users' immersive experience and continuance intention. Hence, there persists a gap to address as researchers have highlighted the relevance and influence of interactive technological factors on social commerce behavioural intention (Lim et al., 2022). Despite the effective integration of these technologies in mobile apps (Racat & Plotkina, 2023), their effectiveness and relevance in social commerce studies remain relatively underexplored. Addressing this gap would benefit SCAs and revolutionize the broader landscape of interactive technologies, influencing user engagement and interaction in various online platforms.

Third, while scholars have generally focused on factors that can positively drive continuance intention in social commerce, an aspect that has been neglected is the investigation of factors that can negatively influence user experience and continuance intention. Notably, only Rashid et al. (2017) examined the negative effect of perceived risk on perceived enjoyment, attitude towards use, and social commerce continuance intention. It is evident that in the context of social commerce continuance research, factors that can drive negative impact have been largely overlooked. To address this research gap, we identified social media fatigue as a relevant yet understudied factor in the social commerce context. Social media fatigue, also known as social media exhaustion, is a subjective perception of tiredness from social media use, widely believed to drive discontinuous usage intention within social media contexts (Fu et al., 2020; Lin et al., 2020). Given the integration of SCAs within social media platforms (Leong et al., 2023), examining the impact of social media fatigue on continuance intention becomes crucial. Yu et al. (2024) have also pointed out that there is only limited research conducted on how the antecedents of social media participation affect social commerce continuous usage intention. Hence, we attempted to explore the impact of social media fatigue on SCAs' continuance intention.

Fourth, previous studies have often overlooked the underlying mechanisms through which technological factors influence user behaviour in social commerce (Ornati and Kalbaska, 2022). The existing research has primarily centered on investigating the direct relationship between antecedents and social commerce intentions, disregarding the potential enhancement in predictive capacity if the underlying mechanisms guiding continuance intention were considered (Tian and Lee, 2022; Hu et al., 2022; Chong et al., 2023). While researchers have widely examined the mediating role of satisfaction, the mediating role of immersion has been understudied in the context of social commerce continuance research. Based on flow theory, immersion (also known as flow experience) has been found to significantly mediate the effect of external stimuli on social commerce intention (Tuncer, 2021). Hence, there is a distinct need to uncover the underlying mediating role of immersion between the antecedents and continuance intention to enhance our understanding of the mechanisms contributing to the intention to continue using SCAs.

Note: The evidence from the relevant literature is presented in Table 1.

**Table 1: Overview of social commerce continuance research**

<b>Authors &amp; Timeline</b>	<b>Independent Variables</b>	<b>Mediator</b>	<b>Dependent Variables</b>	<b>Theory</b>
Liang et al. (2011)	Social support (Informational and emotional support), and website quality (system and service quality)	Relationship quality (trust, satisfaction, and commitment)	Social commerce intention and continuance intention	Social Support Theory
Hajli et al. (2015)	Perceived value, social support, subjective norms, attitude, perceived behavioural control	-	Continuance participation intention and behaviour	Theory of Planned Behaviour and Social Support Theory
Hew et al. (2016)	Concern for social media information privacy, perceived usefulness, and confirmation	Continuance intention to use mobile social commerce and satisfaction	Brand loyalty	Expectation Confirmation Model
Rashid et al. (2017)	Perceived trust, perceived usefulness, perceived ease of use, perceived enjoyment, and perceived risk	Attitude towards use	Continuance intention	Technology Acceptance Model
Osatuyi & Qin (2018)	Social, hedonic, and utilitarian gratifications	Satisfaction	Continuance intention and addictive use	Uses and Gratifications Theory and Motivational Models
Osatuyi & Turel (2018)	Subjective and collective norm	-	Continuance use intention	Social Identity Theory and Social Impact Theory
Osatuyi et al. (2020)	Confirmation	Perceived usefulness and satisfaction	Continuance intention	Expectation Confirmation Theory
Molinillo et al. (2021)	Information quality, service quality, rewards and recognition, and customization	Perceived value	Repurchase intention, positive eWOM intention, and customer engagement behaviour intention	Stimulus-Organism-Response Model
Chiu et al. (2022)	Confirmation, argument quality, and source credibility	Satisfaction, information usefulness, and information adoption	Continuance intention	Expectation Confirmation Model and Information Adoption Model
Hu et al. (2022)	Source credibility and social interaction	Perceived enjoyment, perceived usefulness, informational and emotional social support	Continued social commerce intention	Motivation Theory and Social Support Theory
Qu et al. (2023)	Perceived ease of use, perceived usefulness, and social interactivity	Utilitarian and hedonic shopping value	User stickiness	Stimulus-Organism-Response Model
Yu et al. (2024)	Informational influence factor, interpersonal trust, perceptions of friends' knowledge	Confirmation, perceived usefulness, and satisfaction	Continuance intention	Expectation Confirmation Model

*Source: Authors' compilation*

## **2.2 Theory of Interactive Media Effects (TIME) and Flow Theory**

To unravel the role of haptic imagery in this context, we leveraged a comprehensive research framework by integrating the perspectives of TIME into the domain of flow theory. TIME, introduced by Sundar et al. (2015), serves as a fundamental theoretical framework shaping research endeavours aimed at comprehending the interplay between interactive media and user behaviour, specifically focusing on how particular technological aspects prompt shifts in human psychology and behaviours. It goes beyond the traditional notion of media being solely channels for communication. Instead, it highlights how interactive media actively engages users and influences their experiences and behaviours. In essence, the attributes embedded within the media interface act as cues triggering diverse psychological responses in consumers, encompassing both cognitive and affective reactions (Ivanov et al., 2023). TIME's profound emphasis on interactivity resonates powerfully with our exploration of the effects of haptic imagery within SCAs. It illuminates a transformative landscape where digital interfaces cease to be mere channels and instead become dynamic tools shaping user experiences (Sundar et al., 2015). Just as TIME redefines the notion of media by accentuating interactivity's pivotal role, our study on haptic imagery in social commerce ventures beyond conventional paradigms. This synergy between TIME's focus on interactive media effects and our inquiry into haptic imagery's impact fortifies our quest to decipher how sensory stimulation shapes user behaviour and perceptions in the vibrant context of SCAs.

TIME also posits that the nature of user engagement hinges on the mediator involved in a given interaction, emphasizing how various predictors influence user engagement and subsequent outcome behaviours (Sundar et al., 2015). Drawing on TIME, Lee et al. (2020) discovered that telepresence, signifying the immersion state, mediated the connection between media attributes and favourable consumer attitudes, subsequently influencing the adoption intention of AR-based mobile applications. It is essential to recognize the substantial intermediary function of consumers' immersive experiences. For instance, Javornik (2016) agreed that users' psychological reactions stemming from affordances can be manifested as immersive experiences, subsequently influencing emotional, cognitive, and behavioural responses toward these applications. TIME suggests that the way individuals respond to media is impacted by the technological aspects of the source, specifically through users' immersive experiences that represent user absorption. Hence, our research delves into the concept of immersion as a mediator—a psychological state characterized by deep involvement and absorption within an activity or environment. This mediator, supported by flow theory, serves as a crucial link between haptic imagery and user intentions, reflecting TIME's assertion that user engagement depends on the mediator present during interactions.

Flow theory, grounded in psychology, elucidates the concept of immersion as a mental state characterized by intense focus and complete engagement in an activity. This theory, proposed by Csikszentmihalyi (1975), explores optimal human experiences that foster a state of heightened concentration and enjoyment. Javornik (2016) believed that immersion is impactful as it reflects the depth of the involvement and absorption users feel during interactions. For instance, Zhou (2020) demonstrated that immersion acts as a mediator between stimuli and outcomes like social purchase and sharing intentions within social commerce environments. Bao and Yang (2022) expanded on this and highlighted how an immersive experience similarly mediates the relationship between stimuli and the urge to impulsively buy during online shopping. Additionally, Liao et al. (2023) shed light on the mediating role of immersion between communication styles and user behavioural outcomes, particularly in the context of purchase intention during live-streaming shopping events. Lin et al. (2020) contributed to this discourse by highlighting the role of flow experience in mitigating social media fatigue and discontinuance intentions, hinting at the sequential mediation via immersion.

The integration of TIME and flow theory offers an apt theoretical framework for this study, allowing for an exploration of haptic imagery as a predictive factor. This framework models how haptic imagery influences consumers' experiences and perceptions within SCAs, consequently shaping their intentions to continue engaging with these platforms. The aforementioned findings collectively emphasize the centrality of immersion as a mediator between various stimuli and consequential consumer behaviours, aligning with our study's focus on understanding how immersion interacts with haptic imagery in shaping continuance intention within SCAs. This includes examining its effects on social media fatigue in delineating the sequential mediation pathway between haptic imagery and continuance intention. This aims to bridge the research gap by emphasizing its role in shaping user experiences within SCAs, aligning with TIME's overarching principles regarding user engagement in interactive media contexts.

### **3. HYPOTHESIS DEVELOPMENT AND RESEARCH FRAMEWORK**

#### **3.1 Effects of Haptic Imagery**

Deciphering individuals' tactile preferences in everyday situations has been a focal point in the realms of haptic science, engineering, and marketing (Brakus et al., 2009; Ujitoko et al., 2022). Haptic technologies are advanced computational applications crafted to mimic the sense of touch artificially because touch plays a profound role in shaping our emotions, thoughts, and actions, even influencing decisions like purchasing apparel online (Ornati & Kalbaska, 2022). In contrast to conventional visual and auditory cues, haptic imagery introduces a tactile component to the user interface, fostering a multisensory engagement that emulates the sense of touch (Goncalves et al., 2020). Scholars have found that advanced virtual try-on apps incorporating haptic imagery features have the potential to induce user immersion (Ivanov et al., 2023). Commonly defined as the simulation of tactile experiences in a digital environment, haptic imagery holds significance in improving the overall user experience by delivering a heightened level of immersion and a more lifelike interaction (Huang & Liao, 2017). Introducing haptic stimuli into a virtual environment is expected to yield a more immersive, cohesive, and credible experience, potentially elevating the sense of presence even further (Goncalves et al., 2020).

It is postulated that haptic imagery, through its integration of tactile feedback and immersive experiences, will alleviate social media fatigue. Research in smartphone settings has demonstrated that haptic interactions, such as tilting, swiping, and shaking during mobile app experiences, contribute to heightened positive affect, increased engagement, and strengthened purchase intentions (Mulcahy & Riedel, 2018; Shi & Kalyanam, 2018). Additionally, the presence of haptic feedback in the interface has been associated with a reduction in social media exhaustion by enhancing attitude and experiential evaluations of the overall interaction (Hadi & Valenzuela, 2020). Incorporating touch in haptic technology can enhance perceived closeness, as seen in devices enabling remote hugs and tactile communication, offering positive online user interactions (Petit et al., 2019). Thus, the incorporation of haptic imagery could potentially mitigate social media fatigue, offering users a more enjoyable experience, positively influencing their interaction with SCAs.

In line with the TIME by Sundar et al. (2015), haptic features as an interactive tool, with the potential to elevate social presence and stimulate interaction, fostering prolonged usage of the media. Moreover, Ivanov et al. (2023) demonstrated that the integration of haptic imagery in online shopping apps enhances users' performance expectancy, fostering perceptions of convenience and effectiveness, ultimately instilling confidence in their app usage decisions. These features empower self-discovery, a crucial factor for the sustained usage by e-shoppers in the future (Huang & Liao, 2017). Technologies that enable sensory experiences, like haptic feedback, may contribute to sustained usage by fostering psychological comfort, trust, positive attitudes, and heightened purchase intention (Racat & Plotkina, 2023). Logically, as users are prompted to integrate the authenticity of the pleasurable experience into their credibility evaluations, they are more likely to continue using the application. Therefore, we propose the following hypotheses:

*H1. Haptic imagery is positively associated with immersion.*

*H2. Haptic imagery is negatively associated with social media fatigue.*

*H3. Haptic imagery is positively associated with continuance intention.*

#### **3.2 Effects of Immersion and Social Media Fatigue**

Drawing on flow theory by Csikszentmihalyi (1975), immersion can be conceptualized as the state of deep concentration and engagement experienced during a flow state. It occurs when individuals are fully absorbed in an activity, experiencing a sense of control, focus, and enjoyment. In the context of haptic imagery in e-shopping, immersion represents the user's complete involvement and absorption in the interactive experience (Huang & Liao, 2017). Theoretically, as users become immersed in the virtual environment, the heightened engagement can divert attention from the potential fatigue associated with excessive social media use because, when immersion occurs, other negative feelings seem to disappear (Hoffman & Novak, 1996). Empirically, this immersive experience, acting as a positive psychological state, counteracts the negative effects of social media fatigue (Lin et al., 2020).

Drawing on the insights from the literature, immersion, often conceptualized as the flow experience, has emerged as a crucial factor in influencing continuance intention. Based on the findings of Al-Maghrabi et al. (2011), perceived enjoyment has been found to be positively related to increasing customer continuance intention in the context of online shopping. This observation carries significant implications for the proposed hypothesis, as it is essential to note that perceived enjoyment is one of the key determinants of immersion based on flow theory (Csikszentmihalyi, 1975, 1990). Similarly, Tian



and Lee (2022) pointed out that individuals who experience immersive experiences are more likely to engage in activities repeatedly, fostering continuous purchase intention on an SCA. Furthermore, Rodríguez-Ardura and Meseguer-Artola (2018) found that flow experience not only directly increases users' engagement with an SCA but also enhances the platform usage intention. This heightened engagement is attributed to the fact that flow demotivates discontinuance decisions (Lin et al., 2020). Herrando et al. (2019) pointed out that flow in social commerce also fosters emotional and behavioural loyalty, driving intentions to return and repurchase. Hence, we propose the following hypotheses:

*H4. Immersion is negatively associated with social media fatigue.*

*H5. Immersion is positively associated with continuance intention.*

In the Stressor-Strain-Outcome framework, prolonged exposure to stressors, such as excessive use and information overload in social media, can lead to strain outcomes (Zhang et al., 2016). Extended exposure to constant connectivity and overwhelming content can induce psychological and emotional strain, marked by exhaustion. Social media fatigue, as a manifestation of strain, results in negative feelings and increased discontinuance intentions (Lin et al., 2020). These detrimental effects contribute to a decline in users' overall satisfaction and positive experiences, subsequently diminishing their intention to continue using social media platforms (Fu et al., 2020). Accordingly, we propose:

*H6. Social media fatigue is negatively associated with continuance intention.*

### **3.3 Mediating Effects of Immersion**

According to flow theory, individuals immersed in an activity lose self-awareness and become engrossed in the moment, leading to heightened enjoyment and focus (Csikszentmihalyi, 1975). As individuals experience this state, their concentration intensifies, enabling them to navigate through challenges effortlessly. Applying this theoretical perspective to the realm of sensory stimulus, haptic imagery can trigger an immersive state, fostering an absorbing and enjoyable user experience (Goncalves et al., 2020). Aligning with TIME by Sundar et al. (2015), the immersive quality induced by sensory cues may divert users' attention from potential stressors and disruptions in the social media environment through absorbed engagement, consequently reducing social media fatigue. Empirically, the immersive quality resulting from haptic imagery features contributes to users perceiving the experience as more authentic, which, in turn, positively impacts their evaluations of credibility (Ivanov et al., 2023). This study aligns with the broader understanding that immersive experiences contribute to sustained user participation and favourable perceptions, shaping the users' commitment to ongoing interaction with the platform (Rodríguez-Ardura & Meseguer-Artola, 2018).

The literature consistently supports the contention that immersion acts as the pivotal link between stimuli and consequential outcomes. For instance, Zhou (2020) discovered that the immersive experience serves as the foundational mechanism mediating the relationship between stimuli, such as social interaction, and ensuing responses, exemplified by social purchase intention and social sharing intention. Ming et al. (2021) further discovered that this experience acts as a mediator between stimuli and impulsive buying behaviour in live-streaming commerce. Liao et al. (2023) also found that immersion plays a mediating role between communication style and customer behaviour in the context of live-shopping. The body of evidence aligns cohesively to emphasize the fact that immersion serves as the underlying mechanism orchestrating the relationship between stimuli and outcomes in the user experience, substantiating its pivotal role in the proposed theoretical framework.

Additionally, Huang and Liao (2017) argued that haptic imagery could potentially induce positive psychological states, fostering immersive experiences. Building on this, Lin et al. (2020) demonstrated that immersive experiences, particularly in the context of social platforms, contribute to a reduction in user fatigue, while this reduced fatigue, as uncovered by Lin et al. (2020), plays an effective role in mitigating discontinuance intention. Consequently, the findings suggest a sequential impact of haptic imagery, immersive experiences, reduced fatigue, and ultimately increased continuance intention, underscoring the interplay between sensory imagery and a series of user experience outcomes in the social platform landscape. Summarizing the above arguments, we hypothesize that:

*H7. Immersion mediates the relationship between haptic imagery and social media fatigue.*

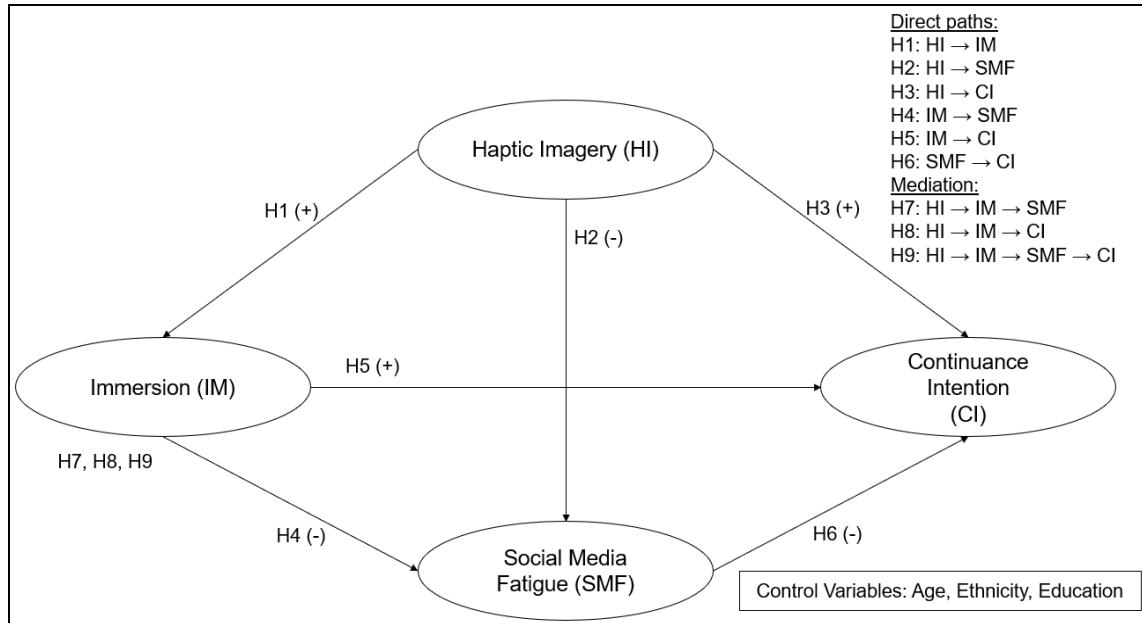
*H8. Immersion mediates the relationship between haptic imagery and continuance intention.*

*H9. Immersion and social media fatigue sequentially mediate the relationship between haptic imagery and continuance intention.*

By integrating TIME and flow theory, the proposed research framework is depicted in Figure 1. Other than the direct impacts of haptic imagery on immersion, social media fatigue, and continuance

intention, the figure also depicts the mediating effects of immersion, along with the serial mediation involving social media fatigue. In line with previous literature highlighting the influence of age, ethnicity, and education as differentiating factors in behavioural intentions (Shiau et al., 2024), we controlled for these three demographic variables in our study.

**Figure 1: Research framework**



Source: Authors' own work

## 4. METHODOLOGY

### 4.1 Measurement Items

All items used for this study were drawn from established and validated scales from the existing literature and adapted to the context of SCA as shown in Table 2. This approach was undertaken to ensure the rigour of the measurements and the reliability of the scale employed in the research. The utilization of both five-point and seven-point Likert scales was implemented as a procedural strategy to minimize common method bias by reducing response set bias and enhancing the precision of the measurements across diverse constructs (Jordan & Troth, 2020). The items about haptic imagery were adapted from the works of Brakus et al. (2009) and Huang & Liao (2017); the items about immersion were adapted from Liao et al. (2023); the items on social media fatigue were adapted from Fu et al. (2020); the items on continuance intention were adapted from Hu et al. (2022). To improve the logical coherence and comprehensibility of the questionnaire, we initiated a pre-test involving three marketing scholars and three marketing practitioners. Subsequently, a pilot study was conducted, engaging 30 SCA users. These steps are to validate the effectiveness of the survey instrument before commencing the main data collection (Liu et al., 2019).

**Table 2: Measurement items of constructs and results of the measurement model assessment**

Construct	Item	Source	Outer Loading	$\alpha$	CR ( $\rho_a$ )	CR ( $\rho_c$ )	AVE
Haptic Imagery	HI1: I find this app interesting in terms of my haptic sense as it creates a realistic feeling of touching products virtually.	Brakus et al. (2009); Huang & Liao (2017)	0.880	0.824	0.830	0.895	0.739
	HI2: I find this app handy as I experience a lifelike sense of touch while navigating the app.		0.835				
	HI3: I can freely adjust the size of the product image on this app by touching the screen.		0.864				
Immersion	IM1: I was deeply engrossed when using this app.	Liao et al. (2023)	0.864	0.883	0.884	0.919	0.740

	IM2: My attention was focused when using this app.		0.866				
	IM3: While browsing this app, I feel that time passes quickly.		0.838				
	IM4: When browsing this app, I often focus too much and forget about other things I have to do.		0.873				
Social Media Fatigue	SMF1: I feel tired from this app's activities.	Fu et al. (2020)	0.920	0.939	0.939	0.956	0.844
	SMF2: I feel drained from activities that require me to use the app.		0.934				
	SMF3: Using this app is a strain for me.		0.916				
	SMF4: I feel burned out from this app's activities.		0.905				
Continuance Intention	CI1: In the future, I am willing to provide my experiences and suggestions when my friends on this app want my advice on buying something.	Hu et al. (2022)	0.859	0.903	0.904	0.928	0.720
	CI2: I am willing to continue sharing my own shopping experience with my friends on this app.		0.872				
	CI3: In the future, I am willing to recommend products that are worth buying to my friends on this app.		0.849				
	CI4: I will consider the shopping experiences of my friends on this app when I want to shop.		0.828				
	CI5: I am willing to continue buying the products recommended by my friends on this app.		0.836				

Notes: Respondents were instructed to answer based on their perceptions of their favourite SCA.

Source: Authors' own work

#### 4.2 Data Collection Method and Descriptive Statistics

This research used purposive sampling to invite Malaysian participants with a recent transaction history on an SCA within the past six months, ensuring a relevant sample (Lim et al., 2019). The utilization of a dual-source data collection approach, combining face-to-face surveys and online surveys, is strategically designed to enhance the robustness and inclusivity of our data by accommodating diverse participant preferences and ensuring comprehensive coverage across various demographic segments (Ji et al., 2023). As an appreciation for their participation, the participants received a voucher valued at RM10, approximately USD 2.15 after completing the questionnaire.

The selection of Malaysia as the research context for this study is justified by several considerations. Firstly, Malaysia represents a dynamic and growing market for SCAs, making it an ideal setting to explore user behaviours and experiences in this evolving digital landscape (Data Reportal, 2023). Additionally, Malaysia's diverse population provides a rich pool of participants, allowing for a more comprehensive examination of the impact of haptic imagery on user experience and continuance intention. Furthermore, the country's technological infrastructure and widespread use of mobile devices make it a relevant context for investigating the role of haptic imagery in the context of SCAs. Lastly, the decision to focus on Malaysia aligns with the global trend of increasing digitalization and activities of SCAs, making the findings of this research potentially applicable to broader contexts beyond the local setting (Data Reportal, 2023). It is anticipated that the findings of this research will contribute not only to the understanding of Malaysian consumers but also offer transferable insights that can benefit other Asian countries experiencing similar technological transformations.

After eliminating cases exhibiting straight-lining, we acquired a total of 410 valid questionnaires. Consistent with the guidelines suggested by Faul et al. (2009), we argue that this sample size is sufficient for rigorous statistical analysis as the minimum sample size calculated is 98 based on the current model. The demographic profile of the participants presented in Table 3 exhibits a diverse and representative sample. 54.15% identified as male and 45.85% as female. Ethnicity-wise, the participant composition in this study demonstrates a broad spectrum of representation. 38.29% identified as Malay,

35.37% as Chinese, 19.27% as Indian, and 7.07% as belonging to other ethnic groups. The age distribution revealed a majority in the 26-30 age group (37.80%), with a gradual decline in participation as age increased. Education levels varied, with 60.49% holding an undergraduate degree, and 11.22% possessing a postgraduate degree. Regarding monthly income, a significant portion (37.56%) fell within the RM2001-RM4000 range. The descriptive statistics on SCA usage reveal a diverse landscape of preferences and activities among respondents. Instagram emerges as the frontrunner, capturing the favour of 16.83% of users, closely pursued by TikTok/DouYin at 15.85%. WhatsApp and Facebook also hold substantial popularity, securing 15.61% and 13.66%, respectively.

**Table 3: Demographic profile (n=410)**

Demographics	Category	Frequency	Percent (%)
Gender	Male	222	54.15
	Female	188	45.85
Ethnicity	Malay	157	38.29
	Chinese	145	35.37
	Indian	79	19.27
	Others	29	7.07
Age	25 years old and below	69	16.83
	26-30 years old	155	37.80
	31-35 years old	97	23.66
	36-40 years old	42	10.24
	41-45 years old	34	8.29
	46 years old and above	13	3.17
Highest Level of Education	Secondary or below	41	10.00
	Diploma	75	18.29
	Undergraduate Degree	248	60.49
	Postgraduate Degree	46	11.22
Monthly Income	Less than RM2000	59	14.39
	RM2001-RM4000	154	37.56
	RM4001-RM6000	125	30.49
	RM6001-RM8000	45	10.98
	RM8001-RM10000	13	3.17
	Above RM10000	14	3.41
Favourite SC app	Instagram	69	16.83
	TikTok/DouYin	65	15.85
	WhatsApp	64	15.61
	Facebook	56	13.66
	XiaoHongShu	54	13.17
	Telegram	40	9.76
	WeChat	28	6.83
	Twitter	18	4.39
YouTube	16	3.90	

Source: Authors' own work

## 5. DATA ANALYSIS AND RESULTS

This research employs a variance-based Structural Equation Modelling (SEM) approach, specifically Partial Least Squares SEM (PLS-SEM), instead of Covariance-Based SEM (CB-SEM). PLS-SEM is recognized as a variance-based SEM method, emphasizing the utilization of all indicators' variances to estimate model relationships, with a particular focus on predicting dependent variables (Hair et al., 2021). In contrast, CB-SEM primarily explains the covariation between indicators and does not prioritize the prediction of dependent variables. CB-SEM is typically employed for theory testing and confirmation, which does not align with the main objective of this study. Given that the primary objective of this study is theory development through the integration of the TIME and flow theory, the analysis is oriented towards testing a theoretical framework from a prediction perspective. Hair et al. (2021) advocated the use of variance-based SEM, particularly PLS-SEM, in cases where researchers aim to explore theoretical extensions of established theories, which aligns with the exploratory nature of this study focused on theory development. Therefore, variance-based SEM is deemed appropriate for this research.

PLS-SEM was chosen as the analytical method due to its suitability in analyzing complex relationships within theoretical models, with a focus on prediction. PLS-SEM is recognized as a widely acclaimed multivariate data analysis method (Cheah et al., 2023). Moreover, PLS-SEM software, such

as SmartPLS 4 used in this research, offers advanced capabilities, including the ability to conduct serial mediation analysis, aligning with the research objective of the current study (Cheah et al., 2023). It also has the latest PLSpredict feature, which can effectively gauge the predictive relevance of the model (Shmueli et al., 2019). PLS-SEM provides robust capabilities for handling data without depending on assumptions about distribution, making it especially advantageous for social science research, where non-normal data distribution is common (Hair et al., 2021). In this study, the result of the multivariate normality test revealed a Mardia’s multivariate kurtosis coefficient of 26.108 ( $p < 0.001$ ), surpassing the threshold limit of 20, indicating non-normal data distribution (Kline, 2023). Given the advice from scholars and the compatibility of PLS-SEM’s features with the goals of this research, PLS-SEM was selected for analysis.

The study implemented strategies to mitigate CMB, including the use of two types of Likert scale in the questionnaire design, expert input, and iterative revisions for clarity and precision (Podsakoff et al., 2024). Harman’s single-factor test was applied, and exploratory factor analysis indicated that the explained variance of the first factor was below the 50% threshold, signifying the absence of significant CMB. Additionally, a full collinearity test was conducted to assess the presence of CMB. The Variance Inflation Factors (VIFs) obtained from the test were all lower than 3.3, confirming that the model is devoid of CMB.

### 5.1 Measurement Model Evaluation

All assessment criteria utilized to appraise the measurement and structural models adhere to the guidelines outlined by Hair et al. (2019). As illustrated in Table 2, the loadings for all items exceeded the recommended threshold of 0.708, aligning with the prescribed criterion. Subsequently, internal consistency was gauged using Cronbach’s alpha ( $\alpha$ ) and Composite Reliability (CR), encompassing  $\rho_a$  and  $\rho_c$ . All values surpassed the recommended limit of 0.7, indicating a high degree of reliability. Furthermore, the constructs exhibited an Average Variance Extracted (AVE) exceeding 0.5, signifying the establishment of convergent validity. The Heterotrait-Monotrait Ratio (HTMT) values, as shown in Table 4, were below the 0.90 threshold, thereby refuting concerns about discriminant validity. The table also provides the results for the Fornell-Larcker Criterion, indicating that the square root of the AVE for each construct (the diagonal line) was greater than the correlations between that construct and all other constructs (off-diagonal values). Both the results of the HTMT and the Fornell-Larcker criterion indicated that discriminant validity has been established (Henseler et al., 2015).

**Table 4: Discriminant validity**

<b>Heterotrait-Monotrait Ratio of Correlations</b>				
	1	2	3	4
1. Continuance Intention (CI)				
2. Haptic Imagery (HI)	0.643 [0.565, 0.714]			
3. Immersion (IM)	0.866 [0.827, 0.881]	0.649 [0.580, 0.711]		
4. Social Media Fatigue (SMF)	0.738 [0.690, 0.782]	0.709 [0.633, 0.779]	0.741 [0.697, 0.781]	
<b>Note:</b> HTMT<0.90, [Confidence interval]				
<b>Fornell-Larcker Criterion</b>				
	1	2	3	4
1. Continuance Intention (CI)	0.849			
2. Haptic Imagery (HI)	0.557	0.860		
3. Immersion (IM)	0.774	0.559	0.860	
4. Social Media Fatigue (SMF)	-0.680	-0.625	-0.675	0.919
<b>Note:</b> The values on the diagonal line are higher than the corresponding correlations between constructs (off-diagonal values)				

Source: Authors’ own work

## 5.2 Structural Model Analysis

### 5.2.1 Direct Effects and Control Effects

The analysis results of assessing the structural model are presented in Table 5. All VIF values remained below 3.3, indicating the absence of significant collinearity among the constructs. The results revealed that haptic imagery was positively associated with immersion (H1:  $\beta=0.559$ ,  $p<0.001$ ) and continuance intention (H3:  $\beta=0.095$ ,  $p<0.05$ ), whereas it was negatively associated with social media fatigue (H2:  $\beta=-0.360$ ,  $p<0.001$ ). As proposed, immersion was found to be negatively associated with social media fatigue (H4:  $\beta=-0.474$ ,  $p<0.001$ ) and positively associated with continuance intention (H5:  $\beta=0.552$ ,  $p<0.001$ ). Other than that, social media fatigue was found to be negatively associated with continuance intention (H6:  $\beta=-0.245$ ,  $p<0.001$ ). Overall, the hypotheses (H1 to H6) garnered support through the utilization of the bootstrapping technique with 10,000 sub-samples, showcasing statistical significance ( $p\text{-value}<0.05$ ,  $t\text{-value}>1.645$  for one-tailed test, confidence interval did not include a zero). The results also indicated that none of the control variables (i.e., Age, Education, and Ethnicity) exerted a significant influence on continuance intention.

Regarding the  $R^2$ , haptic imagery explained 31.2% of the variance in immersion, while haptic imagery and immersion collectively accounted for 54.5% of the variance in social media fatigue. Finally, haptic imagery, immersion, and social media fatigue together explained 65.1% of the variance in continuance intention. In short, the model exhibits substantial explanatory power (Hair et al., 2019) by comprehensively considering the impacts of haptic imagery, immersion, and social media fatigue on continuance intention in SCAs. In assessing the effect sizes, Cohen's (2003) guidelines were followed. Haptic imagery exerts a large effect size on immersion ( $f^2=0.454$ ), a medium effect size on social media fatigue ( $f^2=0.196$ ), and a small effect size on continuance intention ( $f^2=0.015$ ). Moreover, immersion has a medium effect size on social media fatigue ( $f^2=0.339$ ) and a large effect size on continuance intention ( $f^2=0.445$ ). Lastly, social media fatigue yields a small effect size on continuance intention ( $f^2=0.076$ ).

**Table 5: Results of structural model analysis**

Hypotheses	VIF	$\beta$	SD	t-value	p-value	CI	R <sup>2</sup>	f <sup>2</sup>	Decision
<b>Direct effects</b>									
H1: HI→ IM	1.000	0.559***	0.035	15.967	0.000	(0.499, 0.614)	0.312 (IM)	0.454 (L)	Supported
H2: HI→ SMF	1.454	-0.360***	0.050	7.259	0.000	(-0.442, -0.279)	0.545 (SMF)	0.196 (M)	Supported
H3: HI→ CI	1.776	0.095*	0.045	2.115	0.017	(0.023, 0.171)	0.651 (CI)	0.015 (S)	Supported
H4: IM→ SMF	1.454	-0.474***	0.042	11.258	0.000	(-0.542, -0.403)		0.339 (M)	Supported
H5: IM→ CI	1.964	0.552***	0.044	12.418	0.000	(0.478, 0.624)		0.445 (L)	Supported
H6: SMF→ CI	2.278	-0.245***	0.058	4.258	0.000	(-0.338, -0.150)		0.076 (S)	Supported
<b>Control effects</b>									
Age→ CI	1.019	0.020ns	0.030	0.680	0.248	(-0.029, 0.070)			
Education→ CI	1.014	0.035ns	0.027	1.276	0.101	(-0.010, 0.080)			
Ethnicity→ CI	1.034	-0.002ns	0.030	0.081	0.468	(-0.051, 0.046)			
<b>Mediation effects</b>									
H7: HI→ IM→ SMF		-0.265***	0.026	10.365	0.000	(-0.307, -0.223)		0.070 (S)	Supported
H8: HI→ IM→ CI		0.309***	0.031	10.109	0.000	(0.259, 0.360)		0.096 (M)	Supported
H9: HI→ IM→ SMF→ CI		0.065***	0.016	3.957	0.000	(0.039, 0.092)			Supported

Note:  $\beta$ =Path coefficient; SD= Standard deviation; HI=Haptic imagery; IM=Immersion; SMF=Social media fatigue; CI=Continuance intention; ns=non-significant; \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ ; S=Small; M=Medium; L=Large effect size

Source: Authors' own work

### 5.2.2 PLSpredict

PLSpredict results are shown in Table 6. As guided by Shmueli et al. (2019), the Q<sup>2</sup>predict values for indicators of continuance intention were greater than zero, signalling that we could proceed to compare the RMSE values with the naïve LM benchmark. As a result, the majority of indicators yield smaller prediction errors compared to the LM (the majority of the values in the last column are negative values), suggesting a medium level of predictive power.

**Table 6: PLSpredict results**

	Q <sup>2</sup> predict	PLS-SEM_RMSE	LM_RMSE	PLS-SEM_RMSE-LM_RMSE
CI1	0.231	1.413	1.410	0.003
CI2	0.231	1.368	1.372	-0.004
CI3	0.236	1.486	1.489	-0.003
CI4	0.172	1.594	1.602	-0.008
CI5	0.233	1.617	1.616	0.001

Note: CI=Continuance Intention; RMSE=Root Mean Squared Error

Source: Authors' own work

### 5.2.3 Mediating Effects

As Table 5 presents, immersion plays a significant role as the mediator for three mediation paths. First, immersion mediates the relationship between haptic imagery and social media fatigue (H7:  $\beta=-0.265$ ,  $p<0.001$ , confidence intervals did not contain a zero). According to Cohen (1988), the mediating effect of immersion between haptic imagery and social media fatigue exhibits a small effect size ( $f^2=0.070$ ). Second, it mediates the indirect path from haptic imagery to continuance intention (H8:  $\beta=0.309$ ,  $p<0.001$ , confidence intervals did not contain a zero). Moreover, a medium effect size ( $f^2=0.096$ ) is reported for the mediating effect of immersion between haptic imagery and continuance intention. Third, immersion and social media fatigue sequentially mediate the relationship between haptic imagery and continuance intention (H9:  $\beta=0.065$ ,  $p<0.001$ , confidence intervals did not contain a zero). In summary, the hypotheses proposing the mediation paths (H7 to H9) are supported.

## 6. DISCUSSION

The connection between haptic imagery and endogenous constructs like immersion, social media fatigue, and continuance intention has been underexplored in research, especially in the context of SCAs. Consequently, the present study aimed to fill the research gaps by exploring the link between the four constructs. To achieve our research objectives, we integrated the TIME and flow theory to further understand the theoretical backgrounds and we proposed the mediating effects of immersion as well as the serial mediation effect that chains the relationship between haptic imagery and continuance intention through immersion and social media fatigue.

The study primarily highlights the favourable impact of haptic imagery as a significant predictor influencing user immersion, as the effect size was found to be large. Furthermore, we discovered evidence supporting the dual nature of haptic imagery in alleviating social media fatigue and bolstering the intention to continue in the context of SCAs. Ivanov et al. (2023) also echoed a similar perspective, indicating that haptic imagery can enhance performance expectancy, ultimately fostering a sense of decision comfort among users, which implies that users perceive their choice to use the app as a positive and informed decision. Our discovery is also consistent with the arguments of Silva et al. (2021), which emphasized the strategic use of haptic imagery, particularly in the context of online shopping, to foster positive perceptions of product quality and boost purchase intention. Similarly, Goncalves et al. (2020) believed that haptic elements play a pivotal role in influencing users' sense of presence in virtual environments. The engagement of human senses through haptic experiences not only enhances the overall immersive feeling but also contributes to users perceiving the virtual experience as more credible, thereby fostering a deeper engagement with the virtual environment.

Moreover, this study confirmed the effect of immersion in reducing social media fatigue and boosting users' continuance intention of using SCAs. This finding corresponds with prior research, which indicated that immersion can alleviate social media fatigue (Lin et al., 2020). It is also consistent with the principles of flow theory, where immersion displays a positive effect on the repurchase and return intention in the social commerce context (Herrando et al., 2019). On top of that, we integrated the theoretical frameworks of TIME and flow theory to delve into the intricate mechanisms governed by immersion. The outcomes revealed that immersion serves as a crucial mediator, bridging the

association between haptic imagery and both social media fatigue and continuance intention. Furthermore, our study uncovered a sequential mediation pathway, confirming that immersion and social media fatigue collaboratively mediate the relationship between haptic imagery and continuance intention. This result aligns with the substantial emphasis on the influence of immersion in the context of mobile apps (Ming et al., 2021; Zhou, 2020), reinforcing the established notion that immersive experiences significantly contribute to users' intentions to continue using the SCAs.

### **6.1 Theoretical Implications**

The theoretical implications of this study are threefold. Firstly, it extends the existing body of knowledge by pioneering empirical research into the impact of haptic imagery on user experiences and continuance intention in the context of SCAs. This novel exploration provides valuable insights into the underexplored realm of haptic elements in contemporary user interactions with SCAs. This study significantly contributes to the existing literature by addressing the four research gaps highlighted in the literature review. Specifically, we integrated the TIME and flow theory to understand the underlying and uncovered role of haptic imagery in impacting continuance intention. This study makes a significant theoretical contribution by revealing the impact of specific technological factors—namely, haptic imagery—within the SCAs landscape, an area previously overlooked by research that focused only on general technological factors. While prior research has emphasized the importance of haptics in online shopping contexts (Ivanov et al., 2023; Mulcahy & Riedel, 2018; Silva et al., 2021), our study uniquely focuses on evaluating the effectiveness of haptic imagery specifically within the realm of SCAs, in response to the call by Racat and Plotkina (2023) for research specifically targeting mobile commerce. This contributes to the theoretical foundation of haptic knowledge in the context of social commerce, offering valuable insights into this relatively unexplored area.

Second, our study enriches the literature by examining immersion and social media fatigue within the context of SCAs, offering a deeper understanding of user experiences and outcomes. By confirming the impact of immersion on reducing social media fatigue and increasing continuance intention, our study adds depth to the existing literature and empirical support to flow theory. Third, our study advances the integration of TIME and flow theory by unveiling the mediating role of immersion in the influential paths. Additionally, we proposed and tested the serial mediation by connecting the dots, demonstrating that haptic imagery's positive effect leads to immersion, reducing social media fatigue, and ultimately influencing continuance intention. This novel approach expands our understanding of the intricate relationships between technological advancement and user experiences of continuing the usage of SCAs.

### **6.2 Practical Implications**

The research findings have substantial implications for the social commerce context, especially considering the vast potential of SCAs in the economic landscape of Asian markets (WARC, 2023). From a practical standpoint, this study provides valuable insights for developers of SCAs seeking to enhance user retention. The positive impact identified regarding haptic imagery, specifically its influence on immersion, the reduction of social media fatigue, and continuance intention, suggests a strategic opportunity for integrating haptic features into the design of these apps. By prioritizing the creation of immersive and engaging experiences through haptic elements, developers can not only attract users but also contribute to a more positive user journey, catering to the preferences and behaviours of the Southeast Asian market. Understanding the sequential mediation effects, particularly the role of immersion as a bridge between haptic imagery and user behaviour, offers developers a nuanced approach to optimizing the user experience within the social commerce landscape. This knowledge empowers them to make informed decisions, allowing them to tailor the design of SCAs to foster a sense of immersion, alleviate fatigue, and ultimately encourage users in the social commerce market to continue engaging with these platforms.

To leverage these findings, developers and designers of SCAs catering to the Southeast Asian market could contemplate incorporating specific haptic imagery features. For example, introducing tactile product reviews with associated haptic feedback could be an innovative approach. Users would then be able to access reviews and feel the emotions or sentiments expressed in them through haptic cues, creating a more immersive and emotionally engaging environment. Social interactions within the app can also benefit from haptic elements, with the integration of haptic gestures or virtual touches during social engagements, fostering a more immersed and interactive experience for social commerce users. Additionally, strategically placing haptic interactions at key points in the user journey, such as during product exploration or purchasing processes, can enhance the overall experience for users in the social commerce context. Furthermore, the study's focus on the TIME and flow theory contributes to a deeper understanding of the underlying mechanisms influencing users' experiences in SCAs.



Businesses can draw upon these theoretical frameworks to inform their strategies, ensuring a more nuanced and culturally relevant approach to user interaction and retention.

Addressing social media fatigue has become crucial, and developers may focus on refining content curation algorithms to reduce information overload. Utilizing haptic features to guide users through the platform, providing a more relaxed and enjoyable social commerce experience, is one way to achieve this. Implementing haptic feedback to signal positive interactions or nudges within the app could contribute to a less exhausting and more engaging environment, aligning with preferences in the social commerce market. Moreover, the understanding of sequential mediation effects suggests an opportunity for developers to design features that capture users' attention through haptic imagery, guiding them seamlessly through an immersive journey and ultimately reducing social media fatigue within the social commerce business landscape.

Continuous user education about the practical usage of haptic imagery and gathering feedback on specific haptic elements that resonate positively or negatively can inform iterative design processes for SCAs, targeting more users. Through these practical examples, SCAs can unlock the full potential of haptic imagery, offering users a richer and more immersive shopping journey to encourage continued usage. The potential benefits extend from heightened engagement and emotional connection to a more personalized and interactive user journey, shaping a new paradigm for the future of social commerce in the Asian and global business context. In conclusion, this research provides actionable insights for businesses operating in the dynamic realm of SCAs, guiding them in harnessing the potential of haptic imagery, optimizing user experiences, and fostering continued user engagement. These implications pave the way for businesses to navigate the evolving landscape of social commerce in diverse markets.

## **7. LIMITATIONS AND FUTURE RESEARCH**

While this study contributes valuable insights, it is not without limitations. One notable limitation is the cross-sectional nature of the research design. Future research could adopt a longitudinal approach to better understand the temporal dynamics and causal connections between haptic imagery, immersion, social media fatigue, and continuance intention. Additionally, the study focused on users within a specific geographical context (Malaysia), and the findings may not be universally applicable. Extending the research to diverse cultural contexts could provide a more comprehensive understanding of the generalizability of the results. Next, the reliance on self-reported data introduces the possibility of response bias and social desirability effects. Employing objective measures or combining self-reports with behavioural data could enhance the robustness of the findings. Moreover, the study concentrated on a set of demographic control variables, namely age, education, and ethnicity. Future research could explore a broader range of demographic factors or incorporate individual differences, such as technology readiness or personality traits, to uncover nuanced insights. Lastly, the study generally focused on haptic imagery. Future investigations could delve into the distinct effects of various haptic modalities, such as touch feedback or force feedback, to discern their unique contributions to user experiences.

## **REFERENCES**

- Akram, U., Junaid, M., Zafar, A. U., Li, Z., & Fan, M. (2021). Online purchase intention in Chinese social commerce platforms: Being emotional or rational? *Journal of Retailing and Consumer Services*, 63, 102669.
- Al-maghrabi, T., Dennis, C., Halliday, S. V., & BinAli, A. (2011). Determinants of customer continuance intention of online shopping. *International Journal of Business Science & Applied Management*, 6(1), 41–66.
- Bao, Z., & Yang, J. (2022). Why online consumers have the urge to buy impulsively: Roles of serendipity, trust and flow experience. *Management Decision*, 60(12), 3350–3365.
- Brakus, J. J., Schmitt, B. H., & Zarantonello, L. (2009). Brand Experience: What Is It? How Is It Measured? Does It Affect Loyalty? *Journal of Marketing*, 73(3), 52–68.
- Busalim, A., Hollebeck, L. D., & Lynn, T. (2023). The effect of social commerce attributes on customer engagement: An empirical investigation. *Internet Research*. (ahead-of-print).
- Cheah (Jacky), J.-H., Magno, F., & Cassia, F. (2023). Reviewing the SmartPLS 4 software: The latest features and enhancements. *Journal of Marketing Analytics*, 12, 97-107 (2024).

- Chen, C., Hsiao, K., & Wu, S. (2018). Purchase intention in social commerce An empirical examination of perceived value and social awareness. *Library Hi Tech*, 36(4), 583–604.
- Cheng, X., Gu, Y., & Shen, J. (2019). An integrated view of particularized trust in social commerce: An empirical investigation. *International Journal of Information Management*, 45, 1–12.
- Chiu, W., Oh, G.-E. (Grace), & Cho, H. (2022). An integrated model of consumers' decision-making process in social commerce: A cross-cultural study of the United States and China. *Asia Pacific Journal of Marketing and Logistics*, 35(7), 1682–1698.
- Chong, S. E., Ng, S.-I., & Norazlyn, K. B. (2023). A Systematic Review of Studies on Flow Experience from 2010-2022. Insights and Directions for Future Research. *NUST Business Review*, 4(2), 1–21.
- Chong, S. E., Ng, S. I., Kamal Basha, N., & Lim, X. J. (2024). Social Commerce in the Social Media Age: Understanding How Interactive Commerce Enhancements Navigate App Continuance Intention. *Journal of Research in Interactive Marketing*. (ahead-of-print).
- Cohen, J. (2003). A power primer (p. 436). American Psychological Association.
- Csikszentmihalyi, M. (1975). *Beyond boredom and anxiety: Experiencing Flow in Work and Play*. Jossey-Bass.
- Csikszentmihalyi, M. (1990). *Flow: The Psychology of Optimal Experience*. Harper and Row.
- Data Reportal. (2023, February 13). Digital 2023: Malaysia. DataReportal – Global Digital Insights. <https://datareportal.com/reports/digital-2023-malaysia>
- Doha, A., Elnahla, N., & McShane, L. (2019). Social commerce as social networking. *Journal of Retailing and Consumer Services*, 47, 307–321.
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G\*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41(4), 1149–1160.
- Fu, S., Li, H., Liu, Y., Pirkkalainen, H., & Salo, M. (2020). Social media overload, exhaustion, and use discontinuance: Examining the effects of information overload, system feature overload, and social overload. *Information Processing & Management*, 57(6), 102307.
- Goncalves, G., Melo, M., Vasconcelos-Raposo, J., & Bessa, M. (2020). Impact of Different Sensory Stimuli on Presence in Credible Virtual Environments. *Ieee Transactions on Visualization and Computer Graphics*, 26(11), 3231–3240.
- Hadi, R., & Valenzuela, A. (2020). Good Vibrations: Consumer Responses to Technology-Mediated Haptic Feedback. *Journal of Consumer Research*, 47(2), 256–271.
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2–24.
- Hair, J., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2021). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM) (Third Edition)*. SAGE Publications, Inc.
- Hajli, N., Shanmugam, M., Powell, P., & Love, P. E. D. (2015). A study on the continuance participation in on-line communities with social commerce perspective. *Technological Forecasting and Social Change*, 96, 232–241.
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115–135.
- Herrando, C., Jimenez-Martinez, J., & De Hoyos, M. (2018). From sPassion to sWOM: the role of flow. *Online Information Review*, 42(2), 191–204.
- Herrando, C., Jimenez-Martinez, J., & Martin-De Hoyos, M. (2019). Social Commerce Users' Optimal Experience: Stimuli, Response and Culture. *Journal of Electronic Commerce Research*, 20(4), 199–218.
- Hew, J.-J., Lee, V.-H., Ooi, K.-B., & Lin, B. (2016). Mobile social commerce: The booster for brand loyalty? *Computers in Human Behavior*, 59, 142–154.
- Hoffman, D. L., & Novak, T. P. (1996). Marketing in hypermedia computer-mediated environments: Conceptual foundations. *Journal of Marketing*, 60(3), 50–68.
- Hu, X., Chen, Z., Davison, R. M., & Liu, Y. (2022). Charting consumers' continued social commerce intention. *Internet Research*, 32(1), 120–149.
- Huang, T.-L., & Liao, S.-L. (2017). Creating e-shopping multisensory flow experience through augmented-reality interactive technology. *Internet Research*, 27(2), 449–475.

- Ivanov, A., Head, M., & Biela, C. (2023). Mobile shopping decision comfort using augmented reality: The effects of perceived augmentation and haptic imagery. *Asia Pacific Journal of Marketing and Logistics*, 35(8), 1917–1934.
- Javornik, A. (2016). ‘It’s an illusion, but it looks real!’ Consumer affective, cognitive and behavioural responses to augmented reality applications. *Journal of Marketing Management*, 32(9–10), 987–1011.
- Ji, F., Wang, F., & Wu, B. (2023). How does virtual tourism involvement impact the social education effect of cultural heritage? *Journal of Destination Marketing & Management*, 28, 100779.
- Jordan, P. J., & Troth, A. C. (2020). Common method bias in applied settings: The dilemma of researching in organizations. *Australian Journal of Management*, 45(1), 3–14.
- Kline, R. B. (2023). *Principles and Practice of Structural Equation Modeling (Fifth)*. Guilford Publications.
- Lee, H., Xu, Y., & Porterfield, A. (2020). Consumers’ adoption of AR-based virtual fitting rooms: From the perspective of theory of interactive media effects. *Journal of Fashion Marketing and Management: An International Journal*, 25(1), 45–62.
- Leong, L.-Y., Hew, T. S., Ooi, K.-B., Hajli, N., & Tan, G. W.-H. (2023). Revisiting the social commerce paradigm: The social commerce (SC) framework and a research agenda. *Internet Research*. (ahead-of-print).
- Liao, J., Chen, K., Qi, J., Li, J., & Yu, I. (2023). Creating immersive and parasocial live shopping experience for viewers: The role of streamers’ interactional communication style. *Journal of Research In Interactive Marketing*, 17(1), 140–155.
- Liang, T.-P., Ho, Y.-T., Li, Y.-W., & Turban, E. (2011). What Drives Social Commerce: The Role of Social Support and Relationship Quality. *International Journal of Electronic Commerce*, 16(2), 69–90.
- Lim, W. M., Kumar, S., Pandey, N., Rasul, T., & Gaur, V. (2022). From direct marketing to interactive marketing: A retrospective review of the Journal of Research in Interactive Marketing. *Journal of Research in Interactive Marketing*, 17(2), 232–256.
- Lim, X.-J., Cheah, J.-H., Waller, D. S., Ting, H., & Ng, S. I. (2019). What s-commerce implies? Repurchase intention and its antecedents. *Marketing Intelligence & Planning*, 38(6), 760–776.
- Lin, J., Lin, S., Turel, O., & Xu, F. (2020). The buffering effect of flow experience on the relationship between overload and social media users’ discontinuance intentions. *Telematics and Informatics*, 49, 101374.
- Lin, X., & Wang, X. (2022). Towards a model of social commerce: Improving the effectiveness of e-commerce through leveraging social media tools based on consumers’ dual roles. *European Journal of Information Systems*, 32(5), 782–799.
- Liu, C., Bao, Z., & Zheng, C. (2019). Exploring consumers’ purchase intention in social commerce An empirical study based on trust, argument quality, and social presence. *Asia Pacific Journal of Marketing and Logistics*, 31(2), 378–397.
- Liu, H., Chu, H., Huang, Q., & Chen, X. (2016). Enhancing the flow experience of consumers in China through interpersonal interaction in social commerce. *Computers in Human Behavior*, 58, 306–314.
- Mikalef, P., Giannakos, M. N., & Pappas, I. O. (2017). Designing social commerce platforms based on consumers’ intentions. *Behaviour & Information Technology*, 36(12), 1308–1327.
- Ming, J., Zeng, J., Bilal, M., Akram, U., & Fan, M. (2021). How social presence influences impulse buying behavior in live streaming commerce? The role of S-O-R theory. *International Journal of Web Information Systems*, 17(4), 300–320.
- Molinillo, S., Aguilar-Illescas, R., Anaya-Sanchez, R., & Liebana-Cabanillas, F. (2021). Social commerce website design, perceived value and loyalty behavior intentions: The moderating roles of gender, age and frequency of use. *Journal of Retailing and Consumer Services*, 63, 102404.
- Molinillo, S., Anaya-Sanchez, R., & Liebana-Cabanillas, F. (2020). Analyzing the effect of social support and community factors on customer engagement and its impact on loyalty behaviors toward social commerce websites. *Computers in Human Behavior*, 108, 105980.
- Molinillo, S., Liebana-Cabanillas, F., & Anaya-Sanchez, R. (2018). A Social Commerce Intention Model for Traditional E-Commerce Sites. *Journal of Theoretical and Applied Electronic Commerce Research*, 13(2), 80–93.

- Mulcahy, R., & Riedel, A. (2018). 'Touch it, swipe it, shake it': Does the emergence of haptic touch in mobile retailing advertising improve its effectiveness? *Journal of Retailing and Consumer Services*, 54.
- Nandi, S., Nandi, M., & Khandker, V. (2021). Impact of perceived interactivity and perceived value on mobile app stickiness: An emerging economy perspective. *Journal of Consumer Marketing*, 38(6), 721–737.
- Ornati, M., & Kalbaska, N. (2022). Looking for haptics. Touch digitalization business strategies in luxury and fashion during COVID-19 and beyond. *Digital Business*, 2(2), 100035.
- Osatuyi, B., & Qin, H. (2018). How vital is the role of affect on post-adoption behaviors? An examination of social commerce users. *International Journal of Information Management*, 40, 175–185.
- Osatuyi, B., Qin, H., Osatuyi, T., & Turel, O. (2020). When it comes to Satisfaction ... It depends: An empirical examination of social commerce users. *Computers in Human Behavior*, 111, 106413.
- Osatuyi, B., & Turel, O. (2018). Social motivation for the use of social technologies: An empirical examination of social commerce site users. *Internet Research*, 29(1), 24–45.
- Papagiannidis, S., Bourlakis, M., & See-To, E. (2019). Social media in supply chains and logistics: Contemporary trends and themes. *International Journal of Business Science and Applied Management*, 14, 17–34.
- Park, J., & Ha, S. (2021). Developing Brand Loyalty through Consumer Engagement with Brand Communities in Social Media. *Asian Journal of Business Research*, 11(1), 83–102.
- Petit, O., Velasco, C., & Spence, C. (2019). Digital Sensory Marketing: Integrating New Technologies Into Multisensory Online Experience. *Journal of Interactive Marketing*, 45, 42–61.
- Podsakoff, P. M., Podsakoff, N. P., Williams, L. J., Huang, C., & Yang, J. (2024). Common Method Bias: It's Bad, It's Complex, It's Widespread, and It's Not Easy to Fix. *Annual Review of Organizational Psychology and Organizational Behavior*, 11(1).
- Qu, Y., Cieřlik, A., Fang, S., & Qing, Y. (2023). The role of online interaction in user stickiness of social commerce: The shopping value perspective. *Digital Business*, 3(2), 100061.
- Racat, M., & Plotkina, D. (2023). Sensory-enabling Technology in M-commerce: The Effect of Haptic Stimulation on Consumer Purchasing Behavior. *International Journal of Electronic Commerce*, 27(3), 354–384.
- Rashid, N. A. A., Mokhlis, S., & Yaakop, A. Y. (2017). The Antecedents of Consumer Behavioral Intention in Social Commerce. *Advanced Science Letters*, 23(4), 3111–3114.
- Rodríguez-Ardura, I., & Meseguer-Artola, A. (2018). Imagine, feel "there", and flow! Immersive experiences on m-Facebook, and their affective and behavioural effects. *Information Technology & People*, 32(4), 921–947.
- Shi, S. W., & Kalyanam, K. (2018). Touchable Apps: Exploring the Usage of Touch Features and Their Impact on Engagement. *Journal of Interactive Marketing*, 44(C), 43–59.
- Shiau, W.-L., Chau, P. Y. K., Thatcher, J. B., Teng, C.-I., & Dwivedi, Y. K. (2024). Have we controlled properly? Problems with and recommendations for the use of control variables in information systems research. *International Journal of Information Management*, 74, 102702.
- Shmueli, G., Sarstedt, M., Hair, J. F., Cheah, J.-H., Ting, H., Vaithilingam, S., & Ringle, C. M. (2019). Predictive model assessment in PLS-SEM: Guidelines for using PLSpredict. *European Journal of Marketing*, 53(11), 2322–2347.
- Silva, S. C., Rocha, T. V., De Cicco, R., Galhanone, R. F., & Manzini Ferreira Mattos, L. T. (2021). Need for touch and haptic imagery: An investigation in online fashion shopping. *Journal of Retailing and Consumer Services*, 59, 102378.
- Sundar, S. S., Jia, H., Waddell, T. F., & Huang, Y. (2015). Toward a Theory of Interactive Media Effects (TIME). In *The Handbook of the Psychology of Communication Technology* (pp. 47–86). John Wiley & Sons, Ltd.
- Sunil, S., Sharma, M. K., Amudhan, S., Anand, N., & John, N. (2022). Social media fatigue: Causes and concerns. *International Journal of Social Psychiatry*, 68(3), 686–692.
- Tan, K.-L., Hii, I. S. H., Lim, X.-J., & Wong, C. Y. L. (2023). Enhancing purchase intentions among young consumers in a live-streaming shopping environment using relational bonds: Are there differences between "buyers" and "non-buyers"? *Asia Pacific Journal of Marketing and Logistics*, 36(1), 48–65.

- Tech Wire Asia. (2023, June 1). Watch out Lazada and Shopee; TikTok Shop is no longer just a sleeping giant. Tech Wire Asia. <https://techwireasia.com/06/2023/watch-out-lazada-and-shopee-tiktok-shop-is-no-longer-just-a-sleeping-giant/>
- Tian, H., & Lee, Y. (2022). Factors affecting continuous purchase intention of fashion products on social E-commerce: SOR model and the mediating effect. *Entertainment Computing*, 41, 100474.
- Tuncer, I. (2021). The relationship between IT affordance, flow experience, trust, and social commerce intention: An exploration using the S-O-R paradigm. *Technology in Society*, 65, 101567.
- Ujitoko, Y., Ban, Y., & Yokosaka, T. (2022). Getting Insights From Twitter: What People Want to Touch in Daily Life. *IEEE Transactions on Haptics*, 15(1), 142–153.
- Vazquez, E. E., Patel, C., Alvidrez, S., & Siliceo, L. (2023). Images, reviews, and purchase intention on social commerce: The role of mental imagery vividness, cognitive and affective social presence. *Journal of Retailing and Consumer Services*, 74, 103415.
- Wang, N., Zhao, Y., & Zhou, R. (2023). A meta-analysis of social commerce adoption and the moderating effect of culture. *Data Technologies and Applications*. (ahead-of-print).
- Wang, P., & Huang, Q. (2023). Digital influencers, social power and consumer engagement in social commerce. *Internet Research*, 33(1), 178–207.
- WARC. (2023). The social shelf: How APAC is leading social commerce. <http://www.warc.com/newsandopinion/opinion/the-social-shelf-how-apac-is-leading-social-commerce/en-gb/6270>
- Yu, W.-J., Hung, S.-Y., Yu, A. P.-I., & Hung, Y.-L. (2024). Understanding consumers' continuance intention of social shopping and social media participation: The perspective of friends on social media. *Information & Management*, 61(4), 103808.
- Zhang, H., Lu, Y., Gupta, S., & Zhao, L. (2014). What motivates customers to participate in social commerce? The impact of technological environments and virtual customer experiences. *Information & Management*, 51(8), 1017–1030.
- Zhang, S., Zhao, L., Lu, Y., & Yang, J. (2016). Do you get tired of socializing? An empirical explanation of discontinuous usage behaviour in social network services. *Information & Management*, 53(7), 904–914.
- Zhao, W., Hu, F., Wang, J., Shu, T., & Xu, Y. (2023). A systematic literature review on social commerce: Assessing the past and guiding the future. *Electronic Commerce Research and Applications*, 57, 101219.
- Zhou, T. (2020). The effect of flow experience on users' social commerce intention. *Kybernetes*, 49(10), 2349–2363.