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Drivers and performance impacts of live streaming commerce adoption: Revolutionizing the e-commerce supply chain

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A B S T R A C T

This study explores the factors that drive the adoption of live streaming commerce and its effects on business performance. The research finds that relative advantage, streamer expertise, interactivity, consumer pressure, and competitive pressure are key drivers of live streaming commerce adoption, while compatibility and cost-effectiveness are less significant. The study also reveals that live streaming commerce positively impacts both non-financial aspects, such as customer engagement and loyalty, and financial metrics, including sales volume and profitability. The findings offer valuable insights for businesses considering the implementation of live streaming commerce to enhance customer relationships and drive financial success.

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1. Introduction

"Welcome! Please feel free to browse our products inside the store"., "We have plenty of new arrivals today. Come in and take a look!", "Come in, browse, and make a purchase!". An invitation from merchants that many people are familiar with, calling for customers to enter the store to choose their products. Historically, entrepreneurs used traditional methods to sell products and services before live streaming for sales became popular. Entrepreneurs are opening brick-and-mortar stores to sell products directly to customers. Reinartz et al., (2019) describe the convenience of visiting the store, selecting products, touching them, and trying them out. Various trade shows and flea markets are places for entrepreneurs to sell their products. It is a form of direct selling where sellers meet customers face-to-face (Belk et al., 1988). Entrepreneurs present their products through television programs, typically as product demonstrations, in the next era of TV shopping. The hosts explain the details of the product, and viewers can place orders by calling in (Chua et al., 2005). As we moved into an era in which the internet was a common resource. The exchange of information and communication was conducted via e-mail, sales of products were also conducted catalog sales. Product catalogs that included detailed descriptions and images, which were mailed to customers. Orders can be placed by phone or by mail (Rhee & McIntyre, 2008). As technology advanced, entrepreneurs began selling products through their own websites to stay competitive. Direct purchases can be made by customers through the website. It is convenient, timesaving, and allows customers to reach a wider audience (Doolin et al., 2005). In live streaming, live streaming allows customers to see products clearly, see demonstrations, and ask questions immediately, which can lead to more hesitation during the purchasing decision process. This phenomenon is caused by the speed of the internet and the access to people's work as people become more connected to the internet. As the digital economy booms, businesses operate differently, consumers interact differently, and value is created differently. The rise in internet users has been a key driver of the digital economy's growth, transforming business operations, consumer

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engagement, and value creation (Qalati et al., 2021a). Social media has become crucial for entrepreneurs, especially in emerging markets, due to its accessibility, affordability, and ability to reach a large consumer base (Wongkitrungrueng & Assarut, 2020; Ali Abbasi et al., 2022). Consequently, social commerce is on the rise, with entrepreneurs being able to reach target audiences and reduce marketing and advertising costs (Alsoud et al., 2023). Facebook is the most preferred platform among entrepreneurs, with 65.5% usage, due to its user-friendly interface, reputation, audience reach, low expenses, and diverse payment options. Social commerce aligns with consumer behavior, as they enjoy engaging in conversations, inquiries, and price negotiations before purchasing. With global sales through social commerce expected to reach $2.9 trillion by 2026 many sectors are prioritizing social commerce strategies to prepare for future growth (Frisoni, 2023).

The emergence of live streaming commerce, a phenomenon where products and services are sold through live broadcasts on social media platforms, has significantly reshaped consumer behavior and created a new culture of consumption (Törhönen et al., 2021; Guo et al., 2021). This transformation has been accelerated by the COVID-19 pandemic, which has led to the widespread adoption of innovative technologies and digital services, resulting in a "new normal" characterized by the increasing embrace of online platforms and the rise of digital lifestyle trends (Bawack et al., 2023; Ma, 2021; Park & Lin, 2020; Wongkitrungrueng & Assarut, 2020; Hu et al., 2017).

Live streaming commerce differs from traditional e-commerce in various aspects, such as media, product presentation, social interaction, and interactivity (Xue et al., 2020). Despite its growing popularity, research on live streaming commerce from the entrepreneurial perspective is limited, particularly in understanding the factors influencing small business entrepreneurs' adoption and continued use of this technology (Sun et al., 2020). To comprehensively examine these factors, researchers have combined the *TOE* framework (Tornatzky & Fleischer, 1990) and the diffusion of innovation theory (Rogers, 1962), which consider both internal and external business aspects, as well as innovation characteristics (Chau et al., 2020a; Oyewobi et al., 2023; Rawash, 2021). However, the *TOE* framework has limitations in addressing entrepreneurs' characteristics, such as their technical knowledge, funding, and training, which can impact technology adoption and performance (Amornkitvikai et al., 2021; Hung et al., 2018; Qalati et al., 2021b). Additionally, entrepreneurs' fear of negative effects from social commerce may hinder adoption (de Vries et al., 2018). In the context of live streaming commerce, entrepreneurs act as streamers, and their expertise and interactivity during live sessions may influence its success (Guo et al., 2021). Despite the potential for stimulating business growth and sales, not all entrepreneurs can effectively utilize live streaming commerce to improve performance, and they still face challenges in its implementation (Bawack et al., 2023).

Research on live streaming commerce, which examines how it impacts the performance of small business entrepreneurs who sell fashion and apparel products through social media platforms, highlights the importance of the internet in driving the growth of the digital economy, in particular e-commerce (Kemp., 2023; Nisar & Prabhakar, 2017). Increasingly, social commerce, a new form of e-commerce that enables consumers and entrepreneurs to transact through social media, is becoming a valuable business tool due to its affordability, user-friendliness, and extensive reach (Qalati et al., 2021c; Wongkitrungrueng & Assarut, 2020). The emergence of live streaming commerce, a novel form of social commerce that allows entrepreneurs to showcase their products through real-time video streaming, has gained substantial popularity in countries like China, India, and Thailand, especially after the COVID-19 pandemic. In addition to boosting e-commerce sales, this innovative approach has also revolutionized business processes and models, serving as a catalyst for business growth (Ma, 2021; Guo et al., 2022). Arora et al. (2021) found that fashion, apparel, and beauty products were the most popular items in live streaming commerce. Even though social commerce and live streaming commerce are growing in popularity, existing research has focused on trust, purchase intention, and consumer interaction during live streaming sessions. There is a paucity of research examining the entrepreneurs' perspective, particularly what motivates small business entrepreneurs with limited resources to adopt and sustain live streaming commerce (Hu et al., 2017; Park & Lin, 2020; Wongkitrungrueng & Assarut, 2020; Xue et al., 2020; Ma, 2021; Törhönen et al., 2021; Guo et al., 2021; Bawack et al., 2023; Chandrruangphen et al., 2022;). To address this gap, the study uses the Technology-Organization-Environment *(TOE)* framework together with characteristics of innovation obtained from the diffusion of innovation theory. It examines technological, organizational, environmental, and entrepreneur characteristics that contribute to the sustainable use of live streaming commerce within the realms of technology, organization, and environment. Live streaming commerce will also be examined in relation to business performance. It is expected that the findings will enrich academic knowledge and provide practical guidance for businesses on how to leverage live streaming commerce, ultimately enhancing organizational performance and fostering the digital economy (Arpaci et al., 2012; Rogers & Cartano, 1962; Oyewobi et al., 2022; Rawash, 2021; Amornkitvikai et al., 2021; Qalati et al., 2021a; de Vries et al., 2018).

This research explores the impact of live streaming commerce on the business performance of micro entrepreneurs selling fashion and apparel products. The study concentrates on widely used social media platforms such as *Facebook, Instagram*, and *TikTok*, as they are the most popular channels for live streaming commerce. Fashion and apparel products are chosen as the focus due to their high sales volume in live streaming commerce, making them a pertinent subject for this investigation. The observations for this empirical study give rise to two key research questions:1) Assessing the impact factors of technology, including relative, compatibility advantages and cost effectiveness. Streamer's expertise and interaction are the factors of organizational effectiveness. A consumer-driven ecosystem is characterized by competitive pressure and consumer

demand. What factors contribute to entrepreneurs' sustained adoption and ongoing use of live streaming commerce? 2) How does entrepreneurs' continuous engagement with live streaming commerce influence and shape their overall business performance?

2. Literature review

2.1 TOE Framework

The Technology-Organization-Environment *(TOE)* framework is an organization-level theory developed by Tornatzky and Fleischer (1990) to understand the critical factors influencing the decision to adopt technological innovations within an organization. It encompasses both the constraints and opportunities of applying technological innovations in an organization. *TOE* describes how three different contextual factors—technological, organizational, and environmental—influence innovation adoption and implementation. Rawashdeh and Rawashdeh (2023) studied the adoption of cloud accounting systems for small and medium-sized enterprises (SMEs) using the *TOE* framework. Cloud accounting is an accounting service that operates through the internet, allowing numerous clients to access it from anywhere. According to Rawashdeh and Rawashdeh (2023), cloud accounting is a service that operates over the internet, enabling a wide range of clients to access it from anywhere in the world. The study used the *TOE* framework to examine the adoption of cloud accounting systems by small and medium-sized enterprises (SMEs). The research findings revealed that the three contextual factors based on the *TOE* framework are: 1) Technological context, including relative advantage and compatibility; 2) Organizational context, including organizational readiness and top management support; and 3) Environmental context, including competitive pressure and vendor support. Cloud accounting systems are adopted based on all factors except vendor support, according to the study. Organizations define their digital vision through these systems. As measured by the balanced scorecard, the digital vision of the organization also impacts performance. This finding is more prevalent than in many other *TOE* framework studies related to the adoption of innovation and technology in organizations, it is found that has been used to explain the adoption of innovation and technology in organizations. The adoption of innovation and technology in organizations has been studied in the pre-adoption, adoption decision, actual use, and continuous use stages. Additionally, the *TOE* framework has been applied to study the adoption of various types of innovation and technology, such as data mining, cloud systems, artificial intelligence, Industry 4.0 technology, educational information systems, big data analytics, social media, and e-commerce. Furthermore, most studies are based on the integration of different theories to better understand the adoption of innovation and technology in organizations. The theories that have been used in conjunction with the *TOE* framework include the Diffusion of Innovation (*DOI*) theory, the Technology Acceptance Model (*TAM*), the Resource-Based View (*RBV*) theory, and the Institutional Theory (Ali Abbasi et al., 2022; Al-Sharafi et al., 2023; Hmoud et al., 2023; Pejić Bach et al., 2023; Salimon et al., 2023; Stamenkov & Zhaku-Hani., 2023; Yakubu et al., 2023)

2.2 Diffusion of Innovation Theory (DOI)

The Diffusion of Innovation (*DOI*) theory is a sociological theory related to the adoption of new innovations. It explains the process by which innovations are diffused through communication channels to a social system. In other words, it describes the process of how new innovations are spread through various media to society, in order to achieve desired objectives, and those innovations may impact social change in the subsequent period (Rogers et al., 2014). Many studies have explored the factors influencing the adoption of new technologies using the *DOI* theory, such as mobile banking (Al-Jabri & Sohail, 2012), e-learning (Zhang et al., 2015), and social media (Archibald & Clark, 2014). Additionally, *DOI* theory has been applied to study the diffusion of new products and services in the market, including the adoption of new consumer products (Claudy et al., 2015) and the spread of online shopping (Colby & Parasuraman, 2003).

2.3 Social Commerce

Social commerce, a concept lacking a specific definition, has been interpreted in various ways by different scholars. It is generally viewed as a new form of e-commerce that leverages social media, Web 2.0 technology, and online social networks to facilitate interactions between businesses and consumers, support user-generated content, and enable the buying and selling of goods and services. Social commerce is seen as an evolution of traditional e-commerce, focusing on social interactions and relationships among users. It benefits both sellers and consumers by providing convenience, expanding market reach, and creating business value through online user interactions. The rise of social commerce is attributed to the popularity of social media and online social networks, marking a transformation in online business (Afrasiabi Rad et al., 2011; Hajli, 2013; Huang & Benyoucef, 2013; Hajli et al., 2014; Busalim, 2016; Wang & Xie, 2020; Han, 2023).

Afrasiabi Rad and Benyoucef (2011) studied a model for understanding social commerce found that a six-stage model for understanding social commerce, which leverages social networks and Web 2.0 technologies to enhance the traditional e-commerce process. The model demonstrates how social factors influence each stage of consumer buying behavior, from need recognition to post-purchase evaluation. By utilizing the right social commerce strategies, businesses can boost sales and reduce marketing expenses, while customers can make better-informed decisions based on input from their social connections. The key driver of social commerce is the increased user interaction and engagement facilitated by social

networks. Wang et al. (2023) explores how content creators can strategically use language to design marketing content that effectively stimulates consumer purchase behaviors in emerging social commerce platforms. By analyzing a large dataset from *JD WeChat* shopping circle using text mining methods and regression analyses, the researchers identified specific linguistic features at micro, macro, and meta levels that influence consumer purchases. The findings provide valuable insights for content creators and marketers to optimize their content strategies in content-driven social commerce environments, contributing to both theoretical understanding and practical applications in this domain.

2.4 Live Streaming

Chen & Lin (2018) and Zhao et al. (2018) explain that live streaming is a new form of social media channel where streamers can publish video and audio content to viewers in real-time, allowing users to perceive their identities. Live streaming is a medium that records and broadcasts immediately, using communication technology that enables instant transmission of video and audio from one place to another via the internet, making viewers feel like they are part of the event. Due to the interactive nature of live streaming between streamers and viewers, it has characteristics similar to a small community. The popularity of live streaming has resulted in the emergence of numerous live streaming platforms, including *Twitch, Periscope, MeerKat, YY LIVE, IOC, LIVEhouse.in, 17. live*, as well as social media platforms such *as YouTube Live, Instagram Live*, and *Facebook Live* (Haimson & Tang, 2017). In recent years, live streaming has experienced rapid growth, spreading to many countries worldwide due to its popularity. Several countries have launched commercial live streaming platforms to demonstrate this. Amazon Live Creator, for example, facilitates live streaming for businesses. Japanese e-commerce giant Rakuten officially entered the e-commerce market with the launch of its Rakuten Live app. Facebook and Instagram have also been updated to add commercial live streaming features to enhance interactive experiences (Gong et al., 2022). The increasing popularity of live streaming has led to its full-fledged application in e-commerce, known as Live Streaming Commerce. It encompasses both the social aspects of live streaming and the characteristics of e-commerce (Chen et al., 2017; Chen & Lin, 2018). The study relates to live streaming most of the research on live streaming commerce has focused on consumer behavior, such as purchase intention, viewing intention, engagement in live streaming commerce, and stickiness of consumers in live streaming commerce (Bawack et al., 2023; Liao et al., 2023; Guo et al., 2022; Park & Lin, 2020; Sun et al.,2019; Zhang et al., 2021; Guo et al., 2021; Jiang et al., 2022; Kang et al., 2021; Wongkitrungrueng & Assarut , 2020; Ma, 2021; Hilvert-Bruce et al., 2018; Chau et al., 2020b). Several studies have taken the perspective of businesses, investigating factors such as sales strategies through live streaming commerce, the implications of product quality and standards on profits, and the impact of product type on sales performance (Wongkitrungrueng & Assarut, 2020; Gong et al., 2022). However, there has been limited research from the business perspective on issues like the adoption and continued use of live streaming commerce within organizations, and the business performance outcomes of using live streaming commerce with company personnel acting as streamers (Xu et al., 2020). Although research has begun to shed light on various aspects of live streaming commerce from the consumer and streamer perspectives, more studies are needed from an organizational viewpoint, especially regarding adoption, use, and business value. To maximize the effectiveness of this increasingly popular sales and marketing channel, companies should take a closer look at these issues. The Technology-Organization-Environment (*TOE*) framework and Diffusion of Innovation (*DOI*) theory provide a foundation for understanding the adoption and implementation of technological innovations, such as social commerce and live streaming, within organizations. Social commerce, an evolution of traditional e-commerce, has transformed online business by leveraging social media and online social networks to facilitate interactions between businesses and consumers. Live streaming, a new form of social media channel, allows for real-time broadcasting and interaction between streamers and viewers, fostering a sense of community. The combination of social commerce and live streaming has led to the emergence of Live Streaming Commerce. While most research on live streaming commerce has focused on consumer behavior, some studies have investigated business perspectives. However, there is limited research on the adoption, continued use, and business performance outcomes of live streaming commerce within organizations, highlighting the need for further investigation in this area. The researcher is interested in studying the characteristic of relative advantage, which is a technological factor that may affect live streaming by entrepreneurs in Thailand.

3. Hypothesis generation and research framework

3.1 Relative and compatibility advantage

Relative advantage and compatibility are two essential characteristics of innovation derived from Rogers' (1983) theory of innovation diffusion. These characteristics have been extensively investigated in studies focusing on the adoption of technology within organizations. Relative advantage pertains to the extent to which a technological innovation is viewed as being more advantageous and superior compared to existing options. It is considered a technological factor that offers advantages to enterprises. Studies have explored how relative advantage impacts the adoption of different technologies, including cloud computing, business intelligence, e-commerce, and social media platforms. However, the results have been mixed, likely due to variations in the unique features of each technology and the diverse settings of organizations and countries (Rawashdeh & Rawashdeh, 2023; Hmoud et al., 2023). Compatibility refers to the degree to which an innovation is seen as aligning with the existing values, prior experiences, and requirements of potential adopters. It is a vital component of the *TOE* framework and significantly influences the adoption of innovations and technologies. The majority of research

has demonstrated that compatibility is a crucial technological factor that positively affects the adoption and utilization of various innovations, especially in the context of small and medium-sized enterprises (SMEs). However, a limited number of studies have not found a significant impact of compatibility in certain situations, indicating that its influence may differ based on the technology and industry (Tajudeen et al., 2018; Qalati et al., 2021; Oyewobi et al., 2022; Hmoud et al., 2023; Rawashdeh & Rawashdeh, 2023). This is how the hypothesis can be expressed.

H1: *Relative advantages have impacts on livestream commerce.*
H2: *Compatibility advantages have impact on livestream commerce.*

3.2 Cost effectiveness

A crucial factor that contributes to the successful adoption and implementation of innovations and technologies within organizations, especially SMEs, is cost effectiveness. As part of the *TOE* framework, it is defined as the extent to which users believe that adopting a new technology or innovation will result in increased profits or improved outcomes. Based on Rogers' (1983) diffusion of innovation theory, cost effectiveness is an essential consideration along with relative advantage and compatibility. Technology adoption is influenced heavily by this variable (Ainin et al., 2015; Tajudeen et al., 2018) and is a crucial component of the *TOE* framework. In Qalati et al.'s (2021) definition of cost effectiveness, the degree to which users perceive that adopting an innovation or technology leads to increased profits or better outcomes. In addition, small and medium-sized enterprises (SMEs), non-profit organizations, and government agencies are all interested in cost-effective innovations and technologies (Tajudeen et al., 2018). By introducing chatbots in e-commerce customer support, staff can focus on higher-value questions, which leads to cost savings (Cui et al., 2017). Cost effectiveness influences organizational social media usage (Qalati et al., 2021). The hypothesis can formulate as this below:

H3: *Cost effectiveness has an impact on livestream commerce.*

3.3 Streamer's Expertise and Interactivity

Expertise is a key factor influencing the adoption of innovations and technologies in organizations (Castelo-Branco et al., 2019). Entrepreneurs who are streamers and an internal organizational factor influencing the adoption of innovations and technologies in organizations. Streamer's expertise is also one of the important attributes of livestream commerce (Wu et al., 2023). This research relates to livestream commerce where entrepreneurs act as streamers, leading and conducting the livestream themselves. This differs from livestream commerce that uses well-known and popular streamers. Streamers have varying levels of expertise, and not every streamer or entrepreneur can attract consumers and successfully sell products (Guo et al., 2022). On the other side, livestream commerce, streamer's interactivity is the streamer's ability to communicate and interact instantly with viewers through two-way communication during livestream commerce. Streamer's interactivity is an important characteristic of livestream commerce (Kang et al., 2021) and one of the characteristics of entrepreneurs who are streamers (Jiang et al., 2022). Past research shows that entrepreneurs' interactivity influences the adoption of innovations and technologies, especially interactive innovations, and technologies that users are more likely to adopt (Rogers, 1995). Therefore, the researcher is interested in studying whether streamer's expertise and interactivity may affect entrepreneurs' livestream commerce, leading to the following hypothesis:

H4: *Streamer's Expertise has an impact on livestream commerce*.
H5: *Streamer's Interactivity has an impact on livestream commerce.*

3.4 Consumer and competitive Pressure

Consumer pressure and competitive pressure are two key external environmental factors that influence the adoption of innovations and technologies in organizations (Maduku et al., 2016; Gangwar et al., 2015). Consumer pressure arises from organizations' perception that consumers expect and want them to use new innovations and technologies, which stimulates organizations to adopt these technologies to meet consumer expectations (Abed, 2020). On the other hand, competitive pressure is the level of pressure organizations feel from competitors in their industry, driving them to adopt innovations and technologies to gain a competitive advantage in rapidly changing and highly competitive environments (Hmoud et al., 2023; Salimon et al., 2023). Competitive pressure also acts as a threat to losing competitive advantage, further pushing organizations to adopt new technologies (Islam et al., 2023). The level of consumer pressure and competitive pressure experienced by organizations varies depending on their specific environment, context, and the technologies in question (Oliveira et al., 2014). Following are the study's hypotheses.

H6: Consumer pressure has an impact on live stream commerce.
H7: Competitive pressure has an impact on live stream commerce.

3.5 Live streaming performance

Entrepreneurs are increasingly adopting technology in their businesses as it saves time and operational costs, creates competitive advantages, and increases profits (Aithal et al., 2023). Livestream commerce, in particular, has become a popular channel for entrepreneurs to sell products and services on social media, as it provides competitive advantages and allows entrepreneurs to increase sales channels for higher profits and improved performance, both financially and non-

financially (Ainin et al., 2015). Financial performance includes revenue, profit, cost savings, and order volume, while non-financial performance encompasses market share, improved services, enhanced interactions with consumers, and increased consumer engagement (Asante et al., 2023). Prior research has primarily focused on the performance outcomes of e-commerce and social media usage, with livestream commerce being a form of e-commerce conducted on social media platforms (Mao et al., 2022; Sun et al., 2019). Studies have found positive relationships between e-commerce investments, social media usage, and organizational performance, considering both tangible (e.g., sales, profits) and intangible (e.g., increased brand awareness) aspects (Cai et al., 2018; Yang et al., 2015; Parveen et al., 2016; Odoom et al., 2017). Moreover, the adoption of social media has been shown to improve the performance of small and medium-sized enterprises (SMEs), with technological, organizational, and environmental contexts also influencing performance (Qalati et al., 2021; Pandey et al., 2023). Ainin et al. (2015) found that social media usage by SME entrepreneurs has a greater impact on non-financial performance (e.g., cost reduction, improved customer relationships, and access to information) than on financial performance. As a result, the following hypothesis has been developed for the study of performance based on the information provided above.

H8: *Livestream commerce affects non-financial performance.*
H9: *Livestream commerce affects financial performance.*

This document represents the framework for the investigation of the above study hypotheses based on Fig. 1.

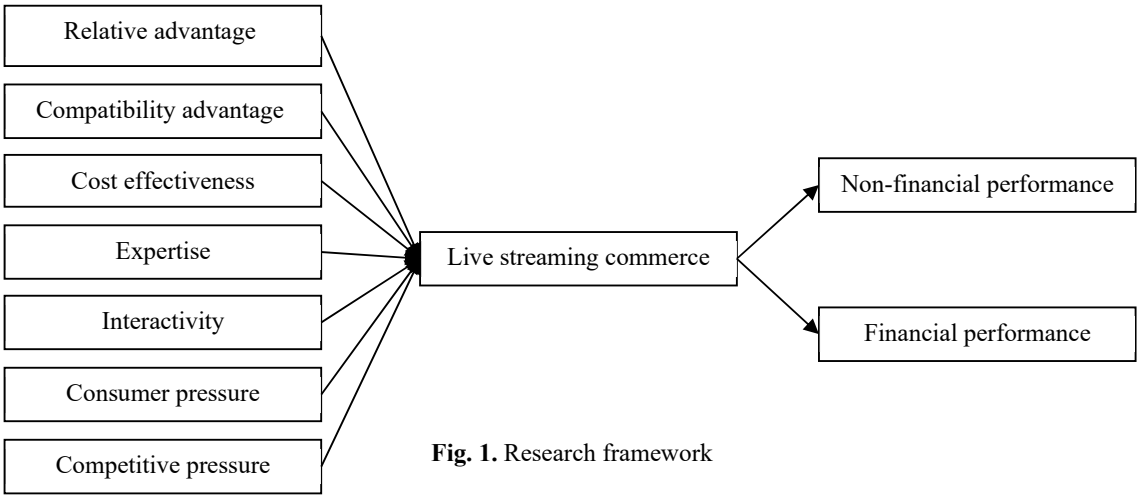

Fig. 1. Research framework

4. Methodology

4.1 Sample and data collection

In this study, data was gathered from Thai micro entrepreneurs who have been engaged in live streaming commerce for over a year, focusing on the most popular product categories in this domain, namely fashion, clothing, and miscellaneous items (Arora et al., 2021). The entrepreneurs included in the study conducted their live streaming commerce activities on widely used social media platforms, such as Facebook, Instagram, or TikTok (Statista Research, 2023). To determine the appropriate sample size, Cochran's (1977) formula was employed, assuming a 95% confidence level. As the precise population size was not known, the formula yielded a sample size of 385 respondents. However, considering the recommendations of Hair et al. (2010) and Kline (2016) for structural equation modeling analysis, which suggest a sample size greater than 20 times the number of observed variables, the final sample size for this study was set at 400 respondents. The allocation of the sample was based on the proportions of popular social media platforms used for live streaming commerce (Statista Research, 2023). Consequently, the sample consisted of 194 respondents (48.41%) from Facebook, 153 respondents (38.36%) from Instagram, and 53 respondents (13.23%) from TikTok. To collect data, an online questionnaire was utilized as the primary research instrument. The questionnaire was subjected to rigorous validity and reliability testing to ensure the accuracy and consistency of the data collected.

4.2 Data analysis

Confirmatory Factor Analysis (*CFA*) was employed to examine the consistency of the measurement model with the empirical data by considering the factor loadings of all variables. This analysis determines whether the observed variables used in the measurement adequately represent the latent variables. Structural model analysis was performed to test the research hypotheses. The researcher assessed the goodness of fit measures to determine how well the model fits the empirical data. Subsequently, the hypotheses were analyzed using structural equation modeling by examining the regression weights, focusing on the p-values. For the hypotheses to be supported, the p-values must be lower than 0.05, indicating statistical significance at the 0.05*, 0.01**, and 0.001*** levels. This rigorous data analysis approach ensures that the research

findings are reliable and valid, providing valuable insights into the relationships between the studied variables in the context of live streaming commerce among micro entrepreneurs in Thailand.

5. Result

5.1 Assessing the normality.

The normality of the observed variables was assessed by examining the skewness and kurtosis values. The analysis results showed that the skewness values ranged from -0.926 to +0.311, which fall within the acceptable range of -1.5 to +1.5 (Tabachnick & Fidell, 2013). The kurtosis values ranged from -1.102 to +1.985, which are within the acceptable range of -2 to +2 (George & Mallery, 2010). These findings indicate that the data collected in this research follows a normal distribution. By satisfying the acceptable ranges for both skewness and kurtosis, the data collected in this research demonstrates a normal distribution, which is an important assumption for many statistical analyses, including structural equation modeling.

5.2 Analyzing the Multicollinearity.

The results of the analysis of the relationships between observed variables revealed that the correlation coefficients ranged from 0.005 to 0.499, with statistical significance. These values are lower than the acceptable threshold of 0.70 suggested by Davis (1971). Therefore, it can be concluded that the observed variables in this research do not exhibit the problem of multicollinearity.

5.3 Analyzing the VIF and Tolerance

In this research, the VIF values ranging from 1.104 to 1.654 and the Tolerance values ranging from 0.605 to 0.906 are well within the acceptable limits, indicating that multicollinearity is not a concern. This means that the independent variables in the model are not highly correlated with each other, and the estimates of the regression coefficients are stable and reliable. Consequently, the interpretation of the relationships between the independent variables and the dependent variable in the structural equation model can be considered accurate.

5.4 Testing model sustainability

The assessment of the model's fit to the empirical data yielded highly favorable results, indicating that the proposed model is well-suited to represent the relationships among the studied variables. This conclusion is strongly supported by the following fit indices and their corresponding values: The Chi-square to degrees of freedom ratio ($\chi 2/df$) of 1.094 falls below the recommended threshold of 2.000 (Hair et al., 2010), suggesting an excellent model fit. These findings strongly support the model's validity and its capacity to accurately capture the relationships among the variables under investigation., as shown in Table 1.

Table 1
Factor loading, variance and reliability result

Indication factor	λ	CR	AVE	Cronbach
Relative advantage in Live streaming commerce: (RA)		**0.815**	**0.524**	**0.793**
Increases opportunities	0.693			
Improve their efficiency.	0.734			
Improve customer service	0.707			
Improve advertising and marketing efforts	0.760			
Compatibility advantage in Live streaming commerce: (CB)		**0.793**	**0.562**	**0.793**
Compatible with your culture and values	0.809			
Align with your existing strategies	0.679			
Complement your business operations	0.755			
Cost effectiveness in Live streaming commerce: (CE)		**0.821**	**0.543**	**0.811**
Can be more cost-effective than other technologies	0.681			
Save time in operations	0.965			
Reduce operational costs	0.628			
Eliminate unnecessary expenses and time in business operations	0.619			
Streamer's Expertise: (SE)		**0.767**	**0.525**	**0.760**
Understanding of the products they are presenting	0.756			
Knowledge and experience with the products	0.757			
Skills in organizing sales promotion activities	0.655			
Streamer's Interactivity: (SI)		**0.798**	**0.506**	**0.788**
Being approachable, natural during interactions with viewers	0.925			
Engaging in conversations and responding to viewers	0.611			
Being able to answer viewers' questions	0.660			
Capturing the attention of viewers	0.599			
Consumer pressure: (CSP)		**0.756**	**0.508**	**0.754**
Your relationship with customers may suffer without live streaming commerce	0.772			
Customers want you to build relationships with them through live streaming commerce	0.678			
Customers may perceive you as outdated without live streaming commerce	0.685			

Table 1
Factor loading, variance and reliability result (Continued)

Indication factor	λ	CR	AVE	Cronbach
Competitive pressure: (CPP)		**0.812**	**0.591**	**0.803**
Face pressure from competitors to use live streaming commerce	0.760			
Live streaming commerce helps you gain a competitive edge	0.833			
Live streaming commerce enhances your business capabilities beyond your competitors	0.707			
The adoption of live streaming commerce: (LS)		**0.859**	**0.552**	**0.862**
Attract new customers	0.805			
Maintain customer relationships	0.689			
Build brand awareness	0.793			
Meet customer needs	0.781			
Gather feedback for future products and services	0.629			
Non-financial performance: (NFP)		**0.800**	**0.500**	**0.773**
Increased customer numbers	0.720			
Better relationships with customers	0.646			
Enhanced customer engagement	0.759			
Faster and more convenient customer communication	0.700			
Financial performance: (FP)		**0.802**	**0.511**	**0.809**
Increased sales	0.639			
Higher profits	0.566			
Reduced advertising and promotional expenses	0.715			
Lower costs for customer communication and service	0.897			

5.5 Results of hypothesis testing

The structural equation model demonstrated a good fit with the empirical data, as evidenced by the satisfactory goodness-of-fit indices, supporting the adequacy of the proposed model in representing the relationships among the variables under investigation. The SEM results showed that all fit indices met the established criteria, with $\chi 2 = 601.878$, df = 550, $\chi 2/df = 1.094$, p-value = 0.062, GFI = 0.928, CFI = 0.991, RMR = 0.022, RMSEA = 0.015, and SRMR = 0.046. These findings indicate that the structural equation model has a good fit with the empirical data. The structural equation model is presented in Fig. 2.

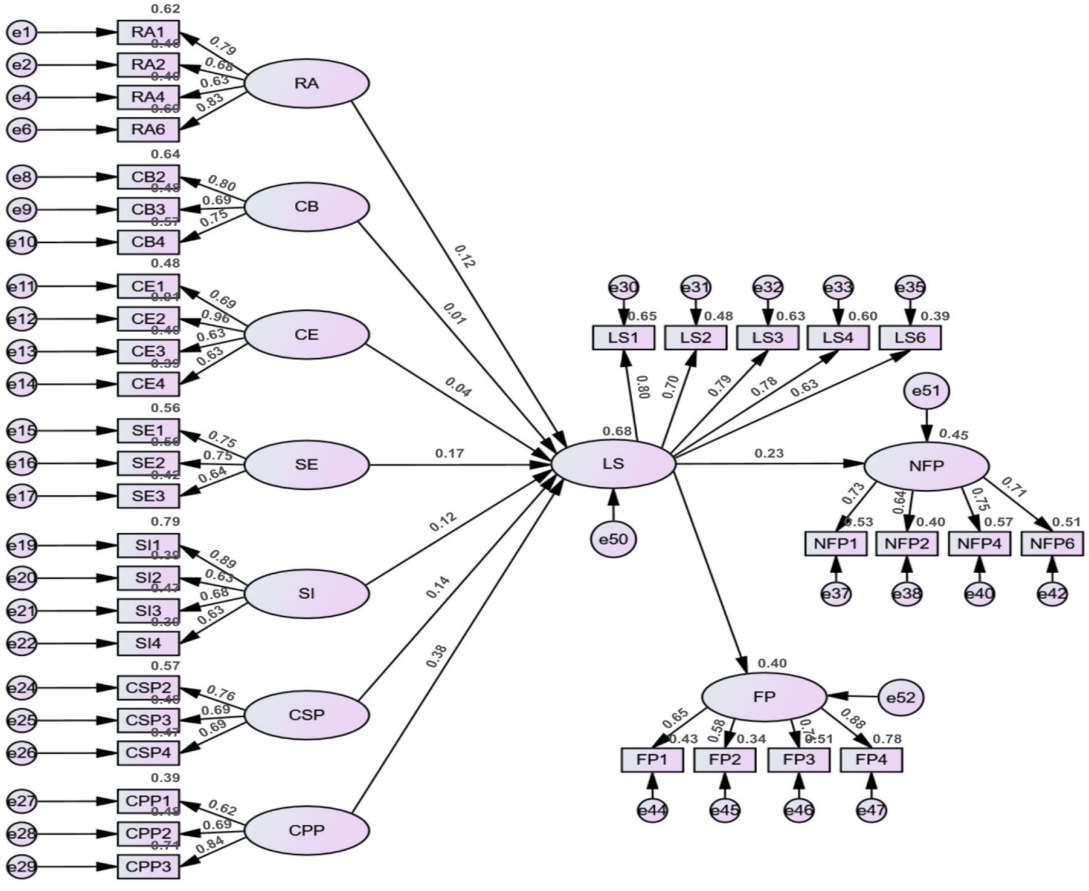

Fig. 2: The structural equation models.

The Goodness of Fit Index (*GFI*) of 0.928 lies within the acceptable range of 0.900 to 0.950 (Diamantopoulos & Siguaw, 2000), further confirming a good model fit. The Comparative Fit Index (*CFI*) of 0.991 surpasses the recommended value of 0.950 (Hair et al., 2010), providing additional evidence of an excellent model fit. Moreover, the Root Mean Square Residual (*RMR*) of 0.022 and the Standardized Root Mean Square Residual (*SRMR*) of 0.046 are both below the suggested cut-off of 0.050 (Diamantopoulos & Siguaw, 2000), indicating that the model's residuals are within an excellent range. Lastly, the Root Mean Square Error of Approximation (*RMSEA*) of 0.015 is well below the recommended threshold of 0.050 (Diamantopoulos & Siguaw, 2000), offering further support for an excellent model fit. The structural equation model that fit well with the empirical data was then used to analyze the hypotheses by determining the size, direction, and statistical significance of its estimated structural parameters. Seven structural paths were statistically significant in the expected direction, according to the structural equation model analysis. A significant level of p = 0.056 was found on three of these paths, while a significant level of p = 0.010 was found on the remaining three paths. The result is shown in Table 2.

Table 2
Result of hypothesis testing.

H	Influence Paths	β	t-value	Result
H_1	RA → LS	0.119	1.958*	Accept
H_2	CB → LS	0.013	0.236	Reject
H_3	CE → LS	0.040	0.880	Reject
H_4	SE → LS	0.165	2.340*	Accept
H_5	SI → LS	0.119	2.231*	Accept
H_6	CSP → LS	0.143	2.807**	Accept
H_7	CPP → LS	0.383	5.395***	Accept
H_8	LS → NFP	0.226	3.912***	Accept
H_9	LS → FP	0.511	6.132***	Accept

Note: *p<0.050, **p<0.010, ***p<0.001; indicate p value to accept or reject hypothesis.

The hypothesis testing revealed that the factors influencing the use of live streaming commerce (LS) include relative advantage (RA) (β = 0.119, p < 0.050), streamer expertise (SE) (β = 0.165, p < 0.050), streamer interactivity (SI) (β = 0.119, p < 0.050), consumer pressure (CSP) (β = 0.143, p < 0.010), and competitive pressure (CPP) (β = 0.383, p < 0.001). Therefore, hypotheses 1, 4, 5, and 6 were supported. Furthermore, the hypothesis testing found that the use of live streaming commerce (LS) had a significant impact on non-financial performance (NFP) (β = 0.226, p < 0.001) and financial performance (FP) (β = 0.511, p < 0.001). Thus, hypotheses 8 and 9 were supported. However, the hypothesis testing revealed that compatibility (CB) and cost-effectiveness (CE) did not have a significant effect on the use of live streaming commerce (LS). Consequently, hypotheses 2 and 3 were rejected.

6. Discussion

Relative advantage, streamer expertise, streamer interactivity, consumer pressure, and competitive pressure positively influence the use of live streaming commerce. Live streaming commerce has been investigated in various studies, supporting the findings of the current study. This evidence in the study of relative advantage, streamer expertise, streamer interaction, consumer pressure, and competitive pressure have been identified as key determinants of live streaming commerce adoption. According to Wongkitrungrueng and Assarut (2020), perceived usefulness, a concept similar to relative advantage, influences consumer intentions to use live streaming commerce platforms positively. Its adoption is driven by perceived benefits, like convenience and interactivity. The perceived usefulness of live streaming shopping was also identified by Sun et al. (2019).

The study of Streamer Expertise factors confirms that Zhao et al. (2018) found that streamer expertise can influence viewers' trust and purchase intentions during live streaming commerce. Streamers who demonstrate expertise in the products they promote are more trustworthy and more likely to make purchases, according to Park & Lin (2020). In live streaming commerce, streamer expertise is also emphasized as a driving force behind viewer engagement and purchase behavior. Further, the streamer interactivity factor agrees with the study by Hu et al. (2017), which examined the impact of streamer interactivity on viewer engagement in live streaming platforms. Streamer interactivity increases viewer engagement and loyalty, according to their study. According to Wongkitrungrueng and Assarut (2020), interactivity is also an important factor influencing consumers' use of live streaming commerce, as it enhances the shopping experience and builds trust between streamers and viewers.

The results of the Consumer Pressure and Competitive Pressure study are consistent with the findings of Cai et al. (2018), who explored the impact of social influence, including consumer pressure, on live streaming shopping adoption. Consumers' intentions to use live streaming commerce were positively influenced by normative and informational social influences. Additionally, Chen & Lin (2018) stressed the importance of social influence in driving live streaming shopping adoption, including recommendations from friends and family. Chinese retailers' adoption of live streaming commerce was examined by Zhu et al. (2020). As a result of competitive pressure, retailers are more likely to adopt live streaming commerce when their competitors do so. Similarly, Hao et al. (2020) found that competitive intensity in the market positively affects businesses' adoption of live streaming commerce.

Performance is one of the major issues addressed in this study. It has been shown that live streaming commerce has a positive impact on a variety of aspects of organizational performance, including both non-financial and financial metrics. Based on these studies, it is apparent that live streaming commerce has a positive impact on business outcomes, which is consistent with the findings of current research. Non-financial Performance: According to Wongkitrungrueng and Assarut (2020), live streaming commerce increases customer engagement and builds trust, leading to improved customer satisfaction and loyalty. Streaming commerce is interactive and strengthens the relationship between sellers and customers, resulting in better non-financial performance. As live streaming commerce allows for real-time interaction and personalized shopping experiences, Chen & Lin (2018) concluded that live streaming commerce positively affects customer engagement. Increasing customer engagement can result in increased customer satisfaction and advocacy. Financial Performance: Xu et al. (2020) examined how live streaming commerce impacts business performance in e-commerce. They found that live streaming commerce significantly increases sales volume and revenue since it attracts more customers and encourages impulse purchases. Li et al. (2021) examined how live streaming commerce affects firm performance in the fashion industry. Companies that adopted live streaming commerce experienced higher sales growth and profitability than those that did not, indicating a positive financial impact. A study by Cai et al. (2018) also found that live streaming commerce creates a sense of urgency and scarcity, encouraging viewers to make immediate purchases. In live streaming commerce, conversion rates and average order values may be higher due to the interactive and engaging nature of the experience. These research studies provide empirical evidence supporting the positive impact of live streaming commerce on both non-financial and financial performance. The findings suggest that businesses can benefit from adopting live streaming commerce, as it enhances customer engagement, satisfaction, and loyalty, while also driving sales and revenue growth.

Furthermore, the results of this study indicate that two factors (Compatibility and Cost-Effectiveness) do not significantly influence live streaming commerce use, which is consistent with the findings of Wongkitrungrueng and Assarut (2020) who examined the factors influencing the adoption of live streaming commerce in Thailand. Compatibility did not have a significant effect on adoption intention, but perceived usefulness and perceived ease of use did. Compatibility might not be as important as other factors because of the unique features of live streaming commerce. Additionally, Sun et al. (2019) examined the factors that influence consumers' adoption of live streaming shopping. Their study did not include compatibility as a potential determinant, suggesting that it may not be a critical factor in the context of live streaming commerce. In a study conducted by Cai et al. (2018), Chinese consumers explored their motivations for live streaming shopping. Live streaming shopping adoption was mainly driven by utilitarian and hedonic motivations, not cost-effectiveness. Live streaming commerce may be more important for entertainment and social interaction than cost considerations. In Chen & Lin (2018), the authors investigated the factors that influence the intention to use live streams. It was found that perception of value, which encompasses aspects of cost-effectiveness, did not affect usage intention directly. A greater influence was exerted by factors such as flow, entertainment, and social interaction instead.

7. Conclusion

These findings provide valuable insights into the factors that drive the adoption of live streaming commerce and its impact on entrepreneurs' performance. The results suggest that businesses should focus on enhancing the relative advantages of live streaming commerce, ensuring streamer expertise and interactivity, and responding to consumer and competitive pressures to effectively leverage this technology. Additionally, the positive influence of live streaming commerce on both non-financial and financial performance highlights the potential benefits of adopting this technology for businesses.

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