

Hwang, Jaunghyun; Kim, Donggeun; Kim, Alex Jiyoung; Kim, Junghwan

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Economic Impact of Live Streaming Commerce on Small and Medium-sized Enterprises

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Economic Impact of Live Streaming Commerce on Small and Medium-sized Enterprises

Jaunghyun Hwang¹⁾

Business School, SungKyunKwan University, Seoul, South Korea

Donggeun Kim²⁾

Media School, Pukyong National University, Busan, South Korea

Alex Jiyoung Kim³⁾

Business School, SungKyunKwan University, Seoul, South Korea

Junghwan Kim⁴⁾

Media School, Pukyong National University, Busan, South Korea

Abstract

This study investigates the adoption of live streaming commerce among the small and medium-sized enterprises (SMEs) in South Korea. While most previous research has focused on consumer perceptions such as intention to watch live streaming and buy products, this research examines sellers' issues that are mostly SMEs by focusing on SMEs' adoption of live streaming commerce and changes on their sales. Specifically, we analyze actual sales data of 32 SMEs that were recruited and had no prior live streaming commerce experience. By comparing SMEs' performance before and after adoption of live streaming commerce, we find that most of performance metrics such as a number of buyers, a number of payments, revenue per sale, and a number of items sold per sale all improve after the adoption of live streaming commerce, highlighting the potential of live streaming commerce to enhance SME performance. These findings suggest that live streaming commerce can help SMEs as an effective tool to strengthen SMEs' digital marketing capabilities. We also provide policy implications for SMEs and regulatory organizations about how they can effectively utilize live streaming commerce.

Keywords: Live Streaming Commerce, Digital Transformation, Small and Medium-sized Enterprises (SMEs), Business Performance, E-commerce

¹⁾ bonar53@skku.edu

²⁾ kmky0503@pukyong.ac.kr

³⁾ alex.kim@skku.edu

⁴⁾ media.jhk@gmail.com, Corresponding Author

1. Introduction

Adoption of digital transformation has recently accelerated after the COVID-19 pandemic (Gu et al., 2021). Businesses have started utilizing various digital marketing strategies, to facilitate digital transformation, such as search engine marketing, social media, and live streaming commerce, and so on (Choi et al., 2023; Jang et al., 2022). Live streaming commerce has recently emerged as one of the fastest growing online marketing channels that support businesses to effectively adopt digital transformation (Astound Commerce, 2021; Chen et al., 2023). Evidences suggest that live streaming commerce has been gaining substantial popularity among consumers and sellers across the world (Xiong et al., 2023). For example, it contributed to about 76 percent of the increase in online payments during the COVID-19 pandemic, driving the growth of the global online commerce market (Astound Commerce, 2021; Chen et al., 2023). Likewise, the revenue of global live streaming commerce platforms is expected to increase with a CAGR of 21.2 percent from 2024 to 2030 (Research and Markets, 2024). This study investigates such an important yet less explored topic of live streaming commerce focusing on economic impacts of live streaming commerce on businesses.

The fast adoption of live streaming commerce stems from the fact that live streaming commerce has successfully combined the benefits of e-commerce with those of traditional brick and mortar marketing. For example, sellers showcase their products to customers in real time during the live streaming, while interacting with customers and promoting product sales simultaneously (Ge et al., 2023). In other words, sellers can provide relevant and timely information sought by customers in real-time, resulting in a more dynamic and satisfying interaction compared to a traditional online sales environment, which is usually more unidirectional (Wongkitrungrueng et al., 2020). This dynamic nature of live

streaming commerce contributes to higher customer satisfaction, leading to significantly higher conversion rates. A recent study reports that live streaming commerce has a significantly higher conversion rate of 5-8%, compared to the 0.3-1% seen in traditional e-commerce channels (Oh, 2020).

Small and medium-sized enterprises (SMEs), who consist of majority of online sellers, are fast adopting live streaming commerce recently (Song et al., 2021). For example, the number of online sellers that have adopted live streaming commerce in China has increased from around 1.49 million in 2018 to approximately 12.34 million in 2020 (Statista, 2024). Main rationale behind why SMEs have favored live streaming commerce are two-fold. First, live streaming commerce is easy to implement as it does not take much time and effort to conduct live streaming commerce. For example, sellers can broadcast live streaming with a minimal number of equipment such as a smartphone, and it is not difficult to learn at all how to conduct the live streaming (McKinsey & Company, 2021; 2023). Second, live streaming commerce is known to be cost effective as it does not require heavy equipment nor major investment (Merritt & Zhao, 2022; Ray & Zou, 2022). For example, many SMEs have been successfully using platforms like Instagram Live and TikTok Live to showcase their products to a wide audience without significant financial outlay (Al-Muani et al., 2023; Delivered Social, 2024).

While SMEs are vast majority of the businesses that have adopted live streaming commerce, previous studies have mainly focused on issues related to consumers and platforms that host live streaming commerce. Previous studies have mostly focused on customer related issues such as how customer perceptions and intentions change with respect to live streaming commerce based on behavioral evidence using surveys and experiments. On the other hand, little studies have examined live streaming commerce directly from

sellers' perspective, although anecdotal evidences suggest strong economic impacts of live streaming commerce. Thus, this study aims to fill this gap in the literature and examines the impacts of live streaming commerce on sellers' economic performances. Specifically, we compare SMEs' marketing performance before and after the adoption of live streaming commerce and provide empirical evidence on the economic impacts of live streaming commerce.

The main findings of this paper are as follows. First, the adoption of live streaming commerce affects the economic performance of SMEs in a positive way. Not only a number of buyers, a number of payments and items sold per sale increased, but the revenue per sale was also higher after the adoption. Second, the effects of adopting live streaming commerce varied according to the characteristics of the SMEs. Particularly, the effects were more pronounced for businesses that operated only online channels, were in non-metropolitan areas, operated in the sports/leisure/accessories business category, and had owners in their 50s. Lastly, the findings of this study contribute to both practical and academic domains by providing insights into the effectiveness of live streaming commerce for SMEs, thus offering valuable implications for digital marketing strategies and policy making aimed at supporting SMEs' growth and competitiveness.

The rest of the paper is organized as follows. In the following section, we review the existing literature related to SMEs, digital transformation, and live streaming commerce, that help to derive the research questions. Subsequently, we discuss the research design including data collection and analysis. We then present results of the analysis discussions of the results, followed by conclusions at the end providing summary of key insights and directions for future research.

2. Theoretical Background and Research Question

2.1 SMEs and Digital Transformation

Digital transformation, which was accelerated by the COVID-19 pandemic, has made global businesses to embrace digitalization (Cordes & Musies, 2021; Fernandez et al., 2022; Pradeep & Udai, 2020). This shift aims at sustainable growth through efficient resource management and new business opportunities using technologies like artificial intelligence (Ghobakhloo, 2020; Nylen & Holmström, 2015). While SMEs have also recognized the need for digital transformation, they have struggled with operationalizing it into their business process due to various challenges (Gaffar et al., 2022). For instance, SMEs face various issues that make successful digital transformation difficult, such as information gaps, lack of skilled personnel, and funding limitations (Pei & Cha, 2015; Scuotto et al., 2021). Nevertheless, it is imperative for SMEs to adopt digital transformation to enhance their capabilities and economic stability (Kim & Balachander, 2023; Nam, 2021; Fitriasari, 2020). In this regard, leveraging digital transformation tools that are offered by digital platform and easily accessible is becoming more important to help SMEs' successful digital transformation (Kim, 2018).

Digital platforms offer an array of tools to support SMEs' digital transformation activities and enhance the outcome of such activities. NAVER, which is the largest digital platform in South Korea stands as a pioneering example of such platforms (Heo, 2023). As a market leader in South Korea's digital platform sector, NAVER provides a diverse range of tools to facilitate SMEs' digital transformation (Naver, 2020). NAVER provides services such as 'Smart Store', aiding SMEs in establishing online stores, and 'Shopping Live', enabling easy live streaming commerce with minimal efforts (Naver, 2020). NAVER also operates 'NAVER Business School' site, where sellers can take training classes on

various topics like advertising and online store management, to enhance SMEs' online marketing and digital transformation capabilities. Moreover, Naver engages in a number of different initiatives like the SME Digital Marketing Supporters program, collaborating with universities and local SMEs (Naver, 2020). Likewise, Coupang which is famous in e-commerce platform in Korea, fosters SMEs' digital transformation through its distribution network under the Coupang Growth initiative (Coupang, 2023; Heo, 2023).

Despite the efforts provided by e-commerce platforms, the online penetration rate of SMEs in South Korea remains low, ranked in the bottom 19% among OECD countries (OECD, 2021). A primary factor contributing to the low adoption rate is SMEs' limited understanding of the benefits of digital transformation (Cho et al., 2021). While it is relatively well known that digital transformation helps firms to improve performance, whether and how it benefits SMEs is relatively not well known yet (Bang et al., 2022; Guo & Xu, 2021; Nam, 2021). This study aims to offer empirical evidence on the impact of digital transformation adoption on the performance of SMEs.

2.2 Live streaming commerce

Live streaming commerce has emerged as a prominent online marketing tool in recent years (Canavan et al., 2007). It involves sellers showcasing products and engaging with customers in real-time through comments during live streaming, offering a unique shopping experience compared to traditional online shopping (Ge et al., 2023). The interactive and dynamic nature of live streaming commerce sets it apart from more traditional online marketing tools (Hamilton et al., 2014; Wang et al., 2022). Particularly during the COVID-19 pandemic lockdowns, live streaming commerce effectively boosted consumer spending, driving e-commerce market growth (Astound Commerce, 2021; Teng, 2020). This trend has led to sustained interest in

online platforms integrating live streaming commerce, such as Facebook, Taobao, and Twitter (Wongkitrungrueng & Assarut, 2020).

Live streaming commerce provides significant advantages for sellers, particularly addressing challenges faced in traditional online shopping where the size and visibility of businesses heavily influence purchase decisions that have usually disadvantaged SMEs (Jarvenpaa et al., 2000). Acting as intermediaries between sellers and consumers, live streaming commerce efficiently drives online purchases and aids in shopping processes (Wang et al., 2022). Real-time product information exchanged directly between sellers and consumers enhances information quality and consumer trust on sellers and products (Luo et al., 2023), that positively impacts sales and builds consumer brand loyalty through increased engagement (Wongkitrung & Assarut, 2020). Additionally, unlike sales promotion conducted in physical stores, live streaming commerce allows sellers to access diverse customer bases without geographic limitations, facilitating the expansion of target market customers (Kocca, 2020). This suggests that live streaming commerce offers SMEs opportunities beyond conventional online store openings and social media marketing efforts, potentially expanding their business models (Choi et al., 2023).

Despite the increasing amount of interests regarding live streaming commerce, a vast majority of previous studies have focused on research questions from consumer perspective. In addition, recent studies have started examining live streamers and their characteristics. For example, past studies have shown that the live stream characteristics enhance consumer immersion experiences, consequently fostering sustained intentions to engage with live streaming commerce (Cheng & Choi, 2023; Song & Choi, 2024). Academic studies have also suggested that the enjoyment derived from live streaming commerce has high correlation with impulsive

buying behavior of consumers (Lee & Chen, 2021). Furthermore, empirical evidence supports the notion that building consumer trust through live streaming commerce plays a pivotal role in prompting impulsive purchase tendencies (Ming et al., 2021).

Despite its potential as a digital transformation tool to generate profits, empirical studies examining the impact of live streaming commerce on SME performance have been lacking. Given its capacity to enhance consumer pleasure and trust in products, as well as its ability to drive purchases, live streaming commerce presents significant benefits for SMEs, while there is a shortage of empirical research validating its impact on SME performance. Thus, this study aims to empirically assess the economic ramifications of adopting live streaming commerce on SMEs.

2.3 SMEs Characteristics

Several key variables are known to influence the performance of SMEs, including presence in online and offline channels, geographic location of businesses, business categories, and the age of the business owner. Previous research indicates that these characteristics have significant contribution on SMEs' performance (Li et al., 2018). Thus, understanding the interplays among these variables is crucial in examining the impact of live streaming commerce on SMEs' business performance.

Previous research suggests that online and offline channel presence of sellers, whether they operate only online or both online and offline, can play a pivotal role in their performance (Kolbe et al., 2022). Since it takes a significant amount of resources to manage both online and offline channels, SMEs with an online channel may reap greater benefits from live streaming commerce, especially taking much more scarce resources of SMEs into account (Li & Ng, 2023). This may indicate that SMEs operating in online channel

only may be able to concentrate its efforts in an online channel, thus becoming more competitive than those operating both online and offline channels. This study aims to examine whether businesses exclusively operating online can achieve higher performance or not.

Geographic location of businesses, whether in metropolitan or non-metropolitan areas, may significantly influence the business performance (Glaeser, 2008; Braesemann et al., 2022). Businesses located in metropolitan areas may thrive in online environments due to high population density and intense competition, while those located in non-metropolitan areas may benefit more from online live streaming commerce due to fewer geographic constraints (Margarian, 2021). This study examines whether or not SMEs in non-metropolitan areas can achieve better performance.

A business category may be another important factor that affect SMEs' performance (Suh et al., 2011). Certain business categories may respond more favorably to online activities, emphasizing the need for tailored digital transformation strategies (Lark, 2024). For example, performances in categories with higher unit prices and lower competition intensity, such as sports/leisure/accessories, may be higher. This study aims to validate if the adoption of live streaming commerce has a more pronounced effect in such categories with lower competition and higher profitability.

Characteristics of the business owner, such as age, may be an important factor in examining the performance of SMEs, because SMEs are usually managed with limited human resource frequently including the business owner (Blackburn et al., 2013). Age and the level of digital literacy are known to have inverse correlation, meaning younger owners may have higher level of digital literacy and innovative skills (Kaunda, 2013). On the other hand, older generation business owners who may have lower digital capabilities may benefit more by adoption

of digital transformation tools (Czaja et al., 2001; Kim et al., 2024). This study examines whether or not older generation business owners benefits more from adopting live streaming commerce.

2.4 Research Questions

The primary objective of this study is to empirically investigate the impact of live streaming commerce implementation on business performance, using performance data of SMEs online stores. Main research questions of this study are as follows. First of all, we examine if the adoption of live streaming commerce positively affects economic performance of SMEs. Specifically, we examine the impact of live streaming commerce adoption on a number of buyers, a number of payments, revenue per sale, and a number of items sold per sale. Second, we examine how the effects of the adoption of live streaming commerce vary according to various characteristics of SMEs such as presence in online and offline channels (if operating in online only or both online and offline channels), location of business (whether or not located metropolitan area), business categories, and age of the business owner.

3. Study Method

3.1 SME Digital Marketing Supporters Initiative

To investigate the main research questions, we used data from SMEs using Naver's Smart Store, a prominent search engine in South Korea, that we recruited to experiment the impact of live streaming participation from March 2022 to December 2023 as part of Naver's "SME Digital Marketing Supporters" Initiative. The initiative was operated based on collaborations among SMEs who participated in live streaming commerce, universities that provided student consultants to help SMEs in adopting and using the live streaming commerce, and Naver, which is a leading search engine in Korea and provided technical supports such as the platform. The initiative aimed to introduce digital marketing

tools such as live streaming commerce to SMES, who were known to have little digital marketing knowledge in general and eventually enhance digital marketing capabilities of the SMEs. It also aimed to foster positive relationships and create a beneficial social ecosystem for SMEs, platforms, and consumers alike. The SMEs that participated in the initiative had no to little experience in live streaming commerce and digital marketing in general prior to participating in the initiative.

3.2 Data and Methodology

The SMEs we recruited are mainly based in Seoul and Busan metropolitan areas who had similar annual sales and no prior experience with digital transformation tools like live streaming commerce before the recruitment. Once they were recruited, they were given about a month to understand live streaming commerce and learn how to use it. Subsequently SMEs began utilizing live streaming commerce service on Naver platform, "Shopping Live" around the same time period. A team of undergraduate students paired with each SME and provided supports throughout the participation period.

The data we use include purchase data from individual consumers that were aggregated into daily business-level data for our analysis. The key variables in the dataset include the number of buyers, number of payments, revenue per sale, and number of items sold per sale, which serve as the primary dependent variables. To assess the impact of live streaming, a binary variable indicating whether the observation is from the period after the first live streaming event for each business (coded as 1) or before (coded as 0) is employed as an explanatory variable. Furthermore, we collected data on various business characteristics such as online and offline channel presence (online only or both), business location (metropolitan area or otherwise), business categories, and age of the business owner, and so on. Detailed demographic and descriptive statistics of the businesses are presented below in

Table 1 and Table 2. (<Table 1>, <Table 2>).

----- Insert <Table 1> here -----

----- Insert <Table 2> here -----

We excluded data from SMEs that had used live streaming commerce before to control for any experience effect to influence the impact of adopting live streaming commerce. We also removed SMEs with only one live streaming because first live streaming was used as a test for many SMEs. To analyze the impact of live streaming commerce adoption, we used both One-Way ANOVA and Two-Way ANOVA tests to compare SMEs' performance before and after the adoption of live streaming commerce.

4. Results

The results of the One-Way ANOVA show that the performance metrics of SMEs improved significantly after adopting live streaming commerce, compared to their performance before adoption. Specifically, the average values of a number of buyers, a number of payments, revenue per sale, and a number of items sold per sale were 2.55 (SD=5.63, $p<0.05$), 2.99 (SD=6.09, $p<0.01$), 309,859 KRW (SD=719,570, $p<0.01$), and 5.66 (SD=9.84, $p<0.1$) respectively, before the adoption of live streaming commerce. After the adoption, these averages increased to 3.17 (SD=5.18, $p<0.05$), 4.02 (SD=6.65, $p<0.01$), 621,001 KRW (SD=2,417,298, $p<0.01$), and 6.71 (SD=11.22, $p<0.1$) respectively, showing statistically significant improvements in all metrics (<Table 3>, <Figure 1>). Therefore, we can conclude that the adoption of live streaming commerce would have a positive impact on SMEs' business performance.

----- Insert <Table 3> here -----

----- Insert <Figure 1> here -----

The results of the two-way ANOVA show the interaction effects between adoption of live streaming commerce and business characteristics of SMES, such as the presence in online and

offline channels, location of businesses, business categories, and the age of business owners. First, the interaction effect between the adoption of live streaming commerce and the presence in online and offline channels was significantly larger for those only operating online store. Specifically, as shown in <Table 4> and <Figure 2>, all performance metrics after the adoption of live streaming commerce were higher for businesses operating only in online channel, compared to those using both online and offline channels. This suggests that the benefits of adopting live streaming commerce are more pronounced for local SMEs without offline stores, indicating that live streaming commerce can effectively mitigate the limitations of not having a physical offline store and thus amplify the positive impact on business performance.

----- Insert <Table 4> here -----

----- Insert <Figure 2> here -----

Secondly, the interaction effect between the adoption of live streaming commerce and the location of business, whether the business is based in metropolitan or non-metropolitan areas, revealed that businesses in non-metropolitan area experienced a larger increase in revenue per sale, while businesses in the metropolitan area showed larger increases in a number of buyers, a number of payments (<Table 5>, <Figure 3>). There was no significant difference in a number of items sold per sale. The larger increase in a number of buyers and a number of payments for SMEs located in metropolitan area may be based on the higher population density in metropolitan areas. However, it appeared that the SMEs located in non-metropolitan areas had larger increase in the revenue per sale, suggesting that live streaming commerce can mitigate the locational constraints for SMEs in non-metropolitan areas.

----- Insert <Table 5> here -----

----- Insert <Figure 3> here -----

Thirdly, the interaction effects between the

adoption of live streaming commerce and business category showed that businesses in the sports/leisure/accessories category experienced larger improvements in most sales performance metrics compared to those in the fashion/clothing/beauty and food/lifestyle/health categories. Specifically, as shown in <Table 6> and <Figure4>, which businesses in sports/leisure/accessories category experienced a larger increase in revenue per sale and a number of items sold per sale, while businesses in the fashion/clothing/beauty category showed larger increases in a number of buyers and a number of payments. Although the purchase frequency in the sports/leisure/accessories category is lower compared to other categories, the higher average purchase price in this category may account for these significant effects, and the purchase frequency in the fashion/clothing/beauty category is higher compared to other categories, so larger increase in a number of buyers and a number of payments is shown for SMEs in these categories.

----- Insert <Table 6> here -----
----- Insert <Figure 4> here -----

Lastly, the interaction effect between the adoption of live streaming commerce and the age of the business owner showed that businesses with owners in their 50s experienced statistically more significant improvements in all performance metrics (<Table 7>, <Figure 5>). Despite the lower digital literacy skills often associated with older business owners compared to younger owners, the performance improvement after the adoption of live streaming commerce was greater for older owners, highlighting the importance of digital literacy training for older business owners.

----- Insert <Table 7> here -----
----- Insert <Figure 5> here -----

Summarizing the results above, we found that the adoption of live streaming commerce was an effective tool for digital transformation.

Specifically, after the adoption of live streaming commerce, the performance metrics of SMEs, such as a number of buyers, a number of payments, revenue per sale, and a number of items sold per sale, showed statistically significant increases. This emphasizes the importance and urgency for SMEs to adopt digital transformation. We also found that the effects of adopting live streaming commerce varied according to the characteristics of the SMEs. Particularly, the effects were more pronounced for businesses operating an online channel only, those located in non-metropolitan areas, businesses in the sports/leisure/accessories category, and those with business owners in their 50s. These results suggest that live streaming strategy needs to be adapted for business characteristics and that digital transformation such as live streaming commerce can help SMEs to overcome their inherent weaknesses.

5. Conclusion and Implication

This study found that live streaming commerce significantly enhances business performance, with metrics such as a number of buyers, a number of payments, revenue per sale, and a number of items sold per sale showing statistically significant improvements post-adoption of live streaming commerce. Regarding the presence in online and offline channels of the businesses, businesses operating only online channels experienced a greater increase in performance compared to those operating both online and offline channels. These findings suggest that focusing on online channels is more competitive in terms of business efficiency. In cases where there are offline stores, management issues such as store maintenance and staff management arise, making it difficult to achieve efficient performance management. Additionally, businesses that operate solely through online channels tend to exhibit stronger growth effects due to their accumulated expertise in online marketing and performance management.

Geographic disparities were also observed, with non-metropolitan location businesses seeing greater improvements in revenue per sale, while metropolitan location businesses experienced higher increases in a number of buyers and payments. Business category variations were evident, as the sports/leisure/accessories business category benefited more significantly from live streaming commerce than the fashion/clothing/beauty and food/lifestyle/health categories. Additionally, older business owners (50s) saw more significant improvements, indicating a high potential return on investment for digital literacy initiatives targeting this demographic.

In contrast to most prior studies that primarily focused on surveying consumer perceptions using user-centered approaches to verify purchase intentions and immersion effects of live streaming commerce, this study expands upon the findings of such previous research by empirically assessing the performance of SMEs who have adopted live stream commerce as part of their digital transformation using sales data. This point represents the most significant contribution of this study. Through the utilization of field research data, the practical impacts of live streaming commerce were empirically validated, and group comparisons were conducted according to various criteria such as location of business and age of business owner. Consequently, this study is expected to enhance scholarly understanding of live streaming commerce from the perspective of SMEs. Moreover, practically demonstrating the effects when SMEs in the early stages of digital transformation, lacking experience in live streaming commerce, utilize this platform provides evidence of the potential enhancement of SMEs digital marketing capabilities and their actual business performance.

Our research findings also present significant policy implications. For example, platform providers should develop more systematic support policies for SMEs. Given that digital

marketing utilization capabilities can vary based on business environments and characteristics, platform providers need to design more detailed policies.

Furthermore, accentuating the significance of comprehensive platform-mediated support mechanisms (encompassing educational initiatives and technical assistance) and cultivating mutually beneficial interdependencies (predicated on the platform's societal value proposition) with local SMEs to stimulate their volitional engagement can substantively contribute to the development and sustenance of a robust platform ecosystem.

Furthermore, this study underscores the necessity for the government and private sectors to develop and implement comprehensive digital literacy and marketing training programs tailored specifically for SMEs. Such programs can bridge the digital divide and equip SMEs, especially those in older age groups, with the skills needed to effectively utilize live streaming commerce and other digital tools. Additionally, policymakers could consider providing financial incentives, such as grants or tax breaks, to encourage SMEs to adopt digital technologies. This would lower the entry barriers and stimulate more widespread adoption of digital tools like live streaming commerce, leading to improved business performances. Moreover, encouraging partnerships between tech platforms, educational institutions, and government bodies can facilitate the development of tailored programs that address the unique challenges faced by SMEs in different regions and business categories.

In conclusion, tech platforms like Naver should continue expanding their educational and support programs to demonstrate the tangible benefits of live streaming commerce, thereby encouraging more active participation by SMEs. Developing category-specific live streaming commerce strategies and tools can maximize benefits for different categories of businesses,

addressing their unique challenges and opportunities. Enhanced community engagement should also be emphasized, with platforms creating a collaborative ecosystem where SMEs can share best practices and success stories, fostering a community of learning and mutual support. By focusing on these areas, stakeholders can ensure that the benefits of digital transformation are accessible to all SMEs, ultimately leading to a more robust and inclusive economy. Furthermore, it is necessary to examine the roles and functions of digital marketing facilitators, such as the program utilized as the data source for this study. This is because young university students, digital natives clearly play a role in supporting SMEs overcome the initial physical and psychological barriers to entry in e-business.

Despite these insights, this study has several limitations. First, the study utilized performance data from only 32 SMEs, which limits the representativeness of the sample. Future research should aim to increase the sample size by including SMEs from more regions to enhance the external validity of the findings. Second, this study compared the performance of SMEs before and after the adoption of live streaming commerce within a narrow time window based on each business's first live streaming broadcast date. Therefore, future research should consider extending the time window to measure and compare the long-term effects of adopting live streaming commerce. Lastly, regarding the interaction effect between the adoption of live streaming commerce and the location characteristic of businesses, the two-way ANOVA results were not consistent across all dependent variables and were not statistically significant in some cases. Future research should ensure a balanced sample concerning the geographic location of businesses to provide more rigorous estimates.

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<Table 1> Demographic Characteristics of the Businesses (n=32, obs=1,244)

	Detailed Item	Frequency (n)	Percentage (%)
Location of Business	Metropolitan	374	30.06
	Non-metropolitan	870	69.94
Presence in Online and Offline Channels	Online and Offline	714	57.4
	Only Online	530	42.6
Age of the Business Owner	20s	374	36.99
	30s	330	32.64
	40s	54	5.34
	50s	253	25.02
Business Category	Fashion/Clothing/Beauty	478	38.42
	Food/Lifestyle/Health	613	49.28
	Sports/Leisure/Accessories	153	12.3

Note: Age of business owner obs = 1,011 (excluding missing values)

<Table 2> Descriptive Statistics (n=32, obs=1,244)

	Mean	Median	SD	Min	Max
Live Commerce Dummy (1: After, 0: Before)	0.546	1	0.498	0	1
Number of Buyers	2.888	2	5.394	1	125
Number of Payments	3.555	2	6.415	1	127
Revenue per Sale	479,688	65,950	1,856,402	4,200	43,500,000
Number of Items Sold per Sale	6.232	3	10.623	1	158

Note: Live Commerce Dummy = 1 (obs=679) vs. Live Commerce Dummy = 0 (obs=565)

<Table 3> One-way ANOVA Result

DV	Live Commerce Dummy	Mean(SD)	F(p-Value)
Number of Buyers	before	2.55(5.63)	3.99**
	after	3.17(5.18)	
Number of Payments	before	2.99(6.09)	7.83***
	after	4.02(6.65)	
Revenue per Sale	before	309,859(719,570)	8.72***
	after	621,001(2,417,298)	
Number of Items Sold per Sale	before	5.66(9.84)	2.97*
	after	6.71(11.22)	

Note. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

<Table 4> Two-way ANOVA Result (Presence in Online and Offline Channels)

DV	Presence in Online and Offline Channels	Live Commerce Dummy	Mean(SD)	F(p-Value)
Number of Buyers	Online and Offline	before	2.19(7.17)	5.86***
		after	2.61(4.25)	
	Only Online	before	3.02(2.45)	
		after	3.95(6.17)	
Number of Payments	Online and Offline	before	2.79(7.79)	4.12***
		after	3.62(5.79)	
	Only Online	before	3.27(2.55)	
		after	4.58(7.66)	
Revenue per Sale	Online and Offline	before	68,026(83,990)	33.91***
		after	105,613(172,681)	
	Only Online	before	621,208(1,002,540)	
		after	1,342,181(3,621,069)	
Number of Items Sold per Sale	Online and Offline	before	6.64(12.65)	3.05**
		after	6.62(11.33)	
	Only Online	before	4.41(3.60)	
		after	6.82(11.09)	

Note. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

<Table 5> Two-way ANOVA Result (Location of Business)

DV	Location of Business	Live Commerce Dummy	Mean(SD)	F(p-Value)
Number of Buyers	Metropolitan	before	3.05(2.32)	4.72***
		after	4.10(7.46)	
	Non-Metropolitan	before	2.31(6.68)	
		after	2.81(3.94)	
Number of Payments	Metropolitan	before	3.37(2.56)	4.04***
		after	4.74(8.88)	
	Non-Metropolitan	before	2.81(7.22)	
		after	3.74(5.55)	
Revenue per Sale	Metropolitan	before	140,150(185,328)	9.04***
		after	164,320(255,651)	
	Non-Metropolitan	before	393,816(858,087)	
		after	794,577(2,816,809)	
Number of Items Sold per Sale	Metropolitan	before	4.85(4.05)	1.66
		after	6.30(10.26)	
	Non-Metropolitan	before	6.07(11.67)	
		after	6.86(11.57)	

Note. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

<Table 6> Two-way ANOVA Result (Business Category)

DV	Business Category	Live Commerce Dummy	Mean(SD)	F(p-Value)
Number of Buyers	Fashion/Clothing/Beauty	before	1.58(0.90)	5.77***
		after	2.42(3.34)	
	Food/Lifestyle/Health	before	2.91(7.52)	
		after	3.43(6.14)	
	Sports/Leisure/Accessories	before	3.64(2.61)	
		after	4.81(5.99)	
Number of Payments	Fashion/Clothing/Beauty	before	1.92(1.35)	5.65***
		after	3.08(5.08)	
	Food/Lifestyle/Health	before	3.46(8.11)	
		after	4.56(7.74)	
	Sports/Leisure/Accessories	before	3.95(2.66)	
		after	5.25(6.57)	
Revenue per Sale	Fashion/Clothing/Beauty	before	68,928(58,710)	43.22***
		after	121,151(202,301)	
	Food/Lifestyle/Health	before	244,675(641,561)	
		after	467,410(1,614,504)	
	Sports/Leisure/Accessories	before	1,211,419(1,157,986)	
		after	3,008,893(5,738,880)	
Number of Items Sold per Sale	Fashion/Clothing/Beauty	before	2.35(2.40)	13.71***
		after	4.13(6.87)	
	Food/Lifestyle/Health	before	7.94(12.79)	
		after	8.38(12.99)	
	Sports/Leisure/Accessories	before	5.03(3.50)	
		after	9.35(14.22)	

Note. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

<Table 7> Two-way ANOVA Result (Age of the Business Owner)

DV	Age of the Business Owner	Live Commerce Dummy	Mean(SD)	F(p-Value)		
Number of Buyers	20s	before	1.81(2.48)	4.42***		
		after	2.48(3.62)			
	30s	before	2.78(2.23)			
		after	3.34(4.54)			
	40s	before	1.83(1.23)			
		after	3.39(6.70)			
	50s	before	2.02(1.32)			
		after	4.05(7.80)			
	Number of Payments	20s	before		2.60(4.62)	3.25***
			after		3.49(6.28)	
30s		before	3.22(2.49)			
		after	4.52(5.84)			
40s		before	2.47(1.93)			
		after	4.33(7.40)			
50s		before	2.21(1.48)			
		after	4.53(8.84)			
Revenue per Sale		20s	before	75,176(80,293)	9.83***	
			after	116,774(178,723)		
	30s	before	588,033(923,546)			
		after	805,003(2,062,706)			
	40s	before	59,922(43,950)			
		after	103,650(207,498)			
	50s	before	550,601(1,083,883)			
		after	1,654,550(4,575,598)			
	Number of	20s	before	8.29(14.41)		3.12***

Items Sold per Sale		after	7.03(13.47)
		before	5.14(3.80)
30s		after	6.76(7.61)
		before	5.22(3.88)
40s		after	6.22(10.22)
		before	2.83(2.47)
50s		after	7.19(13.56)

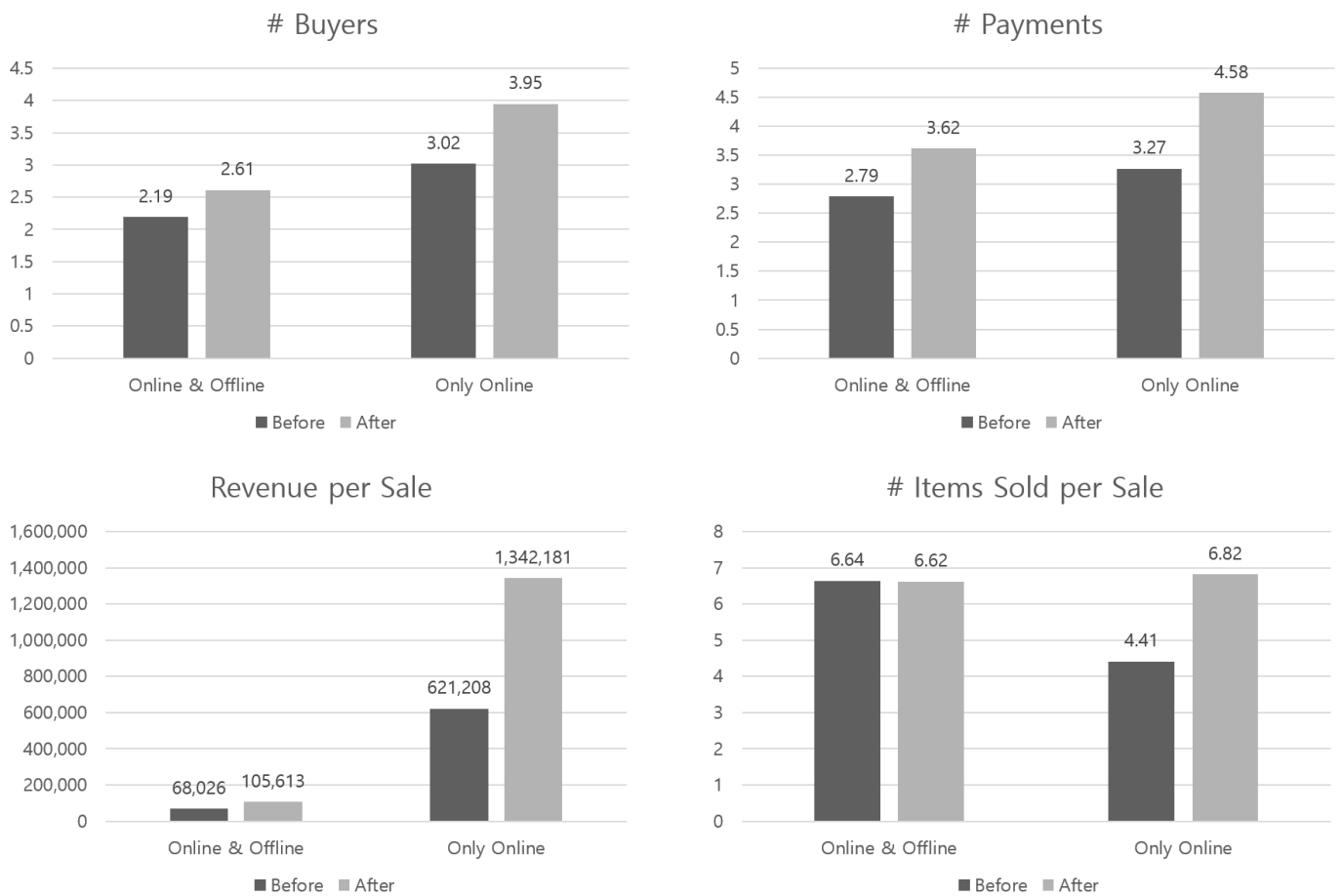
*Note. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$*

<Figure 1> One-way ANOVA Result

Comparing SMEs Performance Before and After Live Streaming Commerce Adoption



<Figure 2> Two-way ANOVA Result (Presence in Online and Offline Channels)



<Figure 3> Two-way ANOVA Result (Location of Business)



<Figure 4> Two-way ANOVA Result (Business Category)



<Figure 5> Two-way ANOVA Result (Age of the Business Owner)

