The Effect of Digital Transformation on SMEs using O2O Platforms: Focusing on Customer Engagement

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A B S T R A C T

The purpose of this study is to investigates the effect of SMEs' digital transformation efforts in O2O platforms on customer engagement. This study focuses on digitalization, which is a practically viable phase for SMEs using O2O platforms among the three digital transformation stages (digitization, digitalization, and digital transformation). This study specifically categorizes digital transformation efforts into three categories: information diversity, responsiveness to customers, and the degree of functional use. To analyze the impact of these efforts on customer engagement, we conducted a zero-inflated negative binomial regression using the dataset provided by Naver SmartPlace, a representative O2O platform in South Korea. The results present that the positive relationship between these aforementioned factors and customer engagement. Thus, this study demonstrates that utilizing O2O platforms can be an effective strategy for SMEs that lack the resources to achieve a successful digital transformation.

Keywords: Digital Transformation, O2O Platform, Small and Mid-sized Enterprise (SME), Digitalization, Naver SmartPlace

Ⅰ. Introduction

The development of ICT and dynamic social and industrial environments have forced companies to execute digital transformation (Verhoef et al., 2021). Digital transformation (DX) is the use of new digital technologies, such as social media, mobile devices, analytics, or embedded devices, to enable major busi-ness improvements, such as enhancing customer experience, streamlining operations, and creating new business models (Fitzgerald et al., 2014). Many companies in various countries have invested significant amounts of money to achieve DX. The investment in DX is expected to increase further, reflecting the growing interest in DX. DX investment in 2018 has already reached about $1.3 trillion (Forbes, 2018),

and \$6.3 trillion is expected to be invested between 2022 and 2024 (IDC, 2021). Despite such huge investments, most companies find it difficult to perform successful DX and achieve practical results (Forbes, 2018). Researchers are also becoming highly interested in various perspectives of DX, such as the DX strategy (Fitzgerald et al., 2014), consumer relationships in DX (Piccinini et al., 2015), and literature reviews on DX research (Nadkarni and Prügl, 2021).

However, most previous studies on DX have analyzed its effectiveness, mainly targeting large companies (Nadkarni and Prügl, 2021), and few studies have focused on the DX of small and medium-sized enterprises (SME) (Li et al., 2018b; Matarazzo et al., 2021). An SME refers to a company that is privately owned, operated by a small number of employees, and has comparatively low sales (Xiong and Qureshi, 2012). To fill this research gap, we focus on the DX of SMEs, analyze their effects on SMEs' customer engagement (CE), and address these research questions: (1) Does the information diversity in O2O platforms affect SMEs' CE? (2) Does the degree of functional use in O2O platforms affect SMEs' CE? (3) Does the responsiveness to customers in O2O platforms affect SMEs' CE? Research on the DX of SMEs has been conducted for several reasons. First, the nature of SMEs is entirely different from that of large ones. Therefore, SMEs require different managerial and theoretical approaches (Blili and Raymond, 1993). For example, SMEs should participate in a third-party platform for successful DX, considering their limited resources and capabilities (Li et al., 2018b). Second, SMEs play a critical role in the national economies of most countries. Hence, SMEs' DX is an important issue for the national economy (Altman and Gabriele, 2013). SMEs globally constitute the majority of global enterprises and contribute to employment, regional economic growth,

and GDP growth (Turner et al., 2010). In most OECD countries, SMEs account for more than 50% of GDP (ILO, 2014), and in South Korea, they account for approximately 87.9% of employment and 99.9% of the number of enterprises. (National Statistics Office, 2014). Third, DX offers more opportunities for SMEs than large companies (Blili and Raymond, 1993). Specifically, DX provides SMEs with significant opportunities to develop entirely new high-value products and services, add value to existing products and services as well as to existing activities, and reduce costs (Li et al., 2016).

Nevertheless, it is not easy for SMEs to prepare for the DX (OECD, 2021). To successfully implement DX, companies must reinvent themselves from existing business processes, human resources, and culture to new business models and revenue streams, which require huge investments from a long-term perspective (CIO, 2021; Forbes, 2018). As customers tend to choose companies with high digital capabilities, the DX is a critical agenda without those (Verhoef et al., 2021). Despite resource restrictions, SMEs can effectively implement DX by leveraging O2O platforms (Min and Kim, 2020). The O2O (Online to Offline) platform is a service that integrates online and offline commerce to attract online platform users to offline retail stores (Li et al., 2018a; Pan and Wu, 2020), and the representative O2O platforms are Dianpin in China, Yelp in North America, and Naver SmartPlace in South Korea. By adopting the O2O platform, SMEs improved the efficiency of their daily operational activities and successfully implemented omnichannel retailing beyond online and offline boundaries. However, few researchers have studied the performance of SMEs implementing DX on O2O platforms. For instance, Pertiwi et al. (2016) describe Indonesian SMEs that leverage O2O platforms to attract more customers regionally and

nationally.

Meanwhile, DX with new and innovative technologies increases CE by improving the customer experience (Davidovski, 2018). Since CE has a positive effect on firm performance, it has attracted much attention from researchers (Brodie et al., 2013; Di Gangi and Wasko, 2009; Thakur and Summey, 2010). In this vein, this study investigates the effect of DX efforts on SMEs' CE. For this purpose, we analyzed 13,472 observations from the Naver SmartPlace, a representative O2O platform in South Korea, as of June 30, 2021. The zero-inflated negative binomial regression was used as the research methodology because of the zero-inflated characteristics of our dataset.

The remainder of this paper is organized as follows. Section 2 reviews previous research on DX, focusing on SMEs and CE as potential outputs. Section 3 presents the research hypotheses based on a literature review. Section 4 explains the research dataset and the variables. Section 4 explains the research methodology and results. The final section presents a discussion and conclusions.

Ⅱ. Theoretical Background

Based on the previous literature and the characteristics of the O2O platform, this study identified three digitalization efforts. We adopted firms' social media efforts model (Chung et al., 2014), which identifies firms' social media efforts as intensity (i.e., how many messages the firm posted on social media sites), richness (i.e., how much information the firm posts on social media sites), and responsiveness (i.e., how responsive the firm is to customer messages on social media sites). In addition, to attract online platform users to offline retail stores, the O2O platform provides information about firms, channels to communicate with firms, and functions to use company services easily. Thus, this study identified digitalization efforts as information diversity, responsiveness to customers, and degree of functional use in the context of the O2O platform and SMEs.

2.1. Digital Transformation and SMEs

Digital transformation (DX) refers to disruptive change to reinvent an existing business model in all respects of firms (Liere-Netheler et al., 2018). Thus, to achieve successful DX, companies should conduct DX over a long period from a long-term perspective. DX can be described in three phases: digitization, digitalization, and digital transformation (Verhoef et al., 2021). Digitization, the first phase, involves transforming analog data into digital information to reduce costs. However, it is difficult to consider this phase to be the most pervasive and fundamental phase of DX because companies only focus on the cost-saving aspect of DX. In the next phase, digitalization conceptualizes the effort to enhance business processes by utilizing information or digital technology to increase revenue and reduce costs. For example, online communication channels, such as digital mobile applications and social media, transform interaction with the customers by connecting firms and customers efficiently (Ramaswamy and Ozcan, 2016). This stage is a prerequisite for successful DX (Verhoef et al., 2021), and many companies in the DX process have attempted to achieve this stage. (Hess et al., 2016). In the last stage, DX refers to the overall change of a firm to develop its new business model and seek a different cost-revenue model from its own existing one (Verhoef et al., 2021). Prior studies on DX have mostly dealt with the last stage of DX (Agarwal et al., 2010; Li et al.,

2018), which is the same for SMEs (Bouwman et al., 2019; Guha et al., 2018; Harrigan and Miles, 2014; Jain, 2015). Previous studies focused on the last stage of DX asserted that SMEs could achieve DX by spending more time and resources to overcome technical challenges and experiment with business models (Bouwman et al., 2019).

However, in reality, most SMEs are in the first stage of DX, not in the last stage, and they are mainly making an effort to enter the second phase, digitalization (Guha et al., 2018; Harrigan and Miles, 2014; Jain, 2015; Korea SMEs & Startups Institute, 2020). For example, in South Korea, SMEs that use digital technology accounts for only 15.4%, and digital technology used by SMEs is mostly limited to online commerce (Korea SMEs & Startups Institute, 2020). This is because SMEs suffer from resource constraints such as a lack of capital, skills, and technical knowledge, which are comparatively abundant in large firms for successful DX (Pei and Cha, 2015). Accordingly, SMEs rarely invest in the technology and assets required for DX (Harris et al., 2008). Tremendous effort is required for SMEs to pursue DX on their own (Cosenz and Bivona, 2021). However, by participating in O2O platforms, SMEs can achieve the digitalization stage without much effort (Chen et al., 2014; Li et al., 2018b). O2O platforms offer diverse embedded business function tools that can help SMEs develop new operational capabilities and routines for DX (Chen et al., 2014) and ultimately support the successful DX of SMEs (Li et al., 2018b). Despite the promising opportunities presented by such platforms for SMEs, little attention has been paid to the effect of the O2O platform on SMEs' digitalization. Thus, this study aims to fill this gap by investigating the effect of participating in an O2O platform on digitalization.

2.2. Customer Engagement and SMEs

Digital technology has reduced information asymmetry, allowing customers to access information about products and services more easily than ever (Reinartz, 2019). With easy access to information, customers tend to switch to new products or services more easily (Châlons and Dufft, 2017). As switching costs to alternate products or services become smaller for customers, firms are trying to build a firm-customer relationship and create customer engagement (CE) to improve profitability (Rasool et al., 2020). CE is defined as a customer's behavioral manifestations with a brand or firm focus resulting from motivational drivers, beyond a simple transactional action (Van Doorn et al., 2010). The effect of CE has been studied in an abundant amount of research. Several studies have revealed that CE not only improves firm performance, such as increasing sales, profits, customer satisfaction, and customer loyalty (Brodie et al., 2013; Di Gangi and Wasko, 2009; Thakur and Summey, 2010) but also allows a firm to acquire a sustainable competitive advantage (Kumar and Pansari, 2016).

However, few studies have investigated whether SMEs achieve CE through DX. Previous studies attempted to investigate how SMEs can increase CE. For example, SMEs can drive CE by using digital marketing tools, such as websites, e-mail, and mobile applications (Jain, 2015) or harnessing the analytics and reporting tools provided by social media (Guha et al., 2018; Harrigan and Miles, 2014). Although it is plausible to expect that SMEs work on CE to achieve the previously mentioned benefits of CE, in reality, SMEs are likely to overlook the importance of CE because it is about building and sustaining relationships with customers in the long term (Thakur, 2018). SMEs tend to plan their business in a short-term manner, so it is difficult for them

to understand and realize the actual value of CE (Ahmad et al., 2012). However, considering the positive effect of CE on a firm's performance, CE should be a strategic business goal of SMEs. Therefore, this study explores how SMEs can achieve CE through DX using an empirical approach.

Ⅲ. Hypothesis Development

3.1. Information Diversity

SMEs are required to input business information to join O2O platforms. The type and depth of information provided by SMEs depend solely on their choices (McIntyre and Srinivasan, 2017). The more information SMEs choose to provide to potential customers on the platform, the more effort is required to manage the information afterward. Hence, SMEs providing more diverse information on the platform can be assumed to make more efforts to achieve digitalization than those providing less. Furthermore, as the amount of information provided by a firm increases, current and potential customers have more evidence to make purchase decisions, leading to positive firm performance (Chung et al., 2014). Previous research has confirmed that firm-generated informative content has a positive effect on firm performance. Bai and Yan (2020) show that firm-generated information on social media positively affects firm sales and CE. Some research shows that a high volume of posts on social media sites stimulates innovation (Gallaugher and Ransbotham, 2010) and prompts CE (Miller and Tucker, 2013). Thus, this study assumes that the more informative content the SME provides, the higher the cumulative number of reviews will be in O2O platforms as in the case of other platforms. We define information diversity

as the amount of information provided by SMEs on the O2O platform. Accordingly, we derive the first hypothesis as follows:

> H1: The information diversity in O2O platforms has a positive relationship with the cumulative number of reviews.

3.2. Responsiveness to Customers

The O2O platform presents an opportunity for customers to share their experiences publicly on products or services through reviews. These reviews are known to have a great influence on other customers' purchase decisions (Mathwick and Mosteller, 2017). Therefore, firms use strategies to gain more customer reviews, and one way to increase the number of customer reviews is the firm's responses. For example, Ye et al. (2010) demonstrate that firm's responses significantly and positively affect the volume of subsequent customer reviews, and the average review volume increases by 48% after managerial responses. Furthermore, by responding to customer reviews, firms can reduce the likelihood of negative or incorrect assumptions that potential customers may make based on reviews (Sparks and Bradley, 2017) and create a positive reputation (Lee and Song, 2010). Many studies have confirmed that a firm's responsiveness has a positive effect on firm performance. (Chen et al., 2015; Sheng, 2019; Strauss and Hill, 2001). The timing and content of personal messages responding to customers can increase revenue (Chen et al., 2015). The volume and speed aspects of online responsiveness have a positive impact on review volume in the community, but the relationship between the length and the volume of reviews is not statistically significant (Sheng, 2019). In the case of complaint e-mails, customer sat-

isfaction, the likelihood of repurchase, and perceived company credibility are higher when a customer receives a reply from a firm than who did not (Strauss and Hill, 2001). Therefore, we expect responsiveness to customers on O2O platforms to have a positive effect on the cumulative number of reviews. Responsiveness to customers refers to whether SMEs responded to customers' reviews on O2O platforms. Thus, we derive the second hypothesis as follows:

> *H2: The responsiveness to customers in O2O platforms has a positive relationship with the cumulative number of reviews.*

3.3. Degree of Functional Use

Firms can benefit from IT technology that O2O platforms provided by enhancing operational efficiency (Bhargava and Choudhary, 2004). For instance, by adopting digital functions on O2O platforms, such as online booking, ordering, and automated booking confirmation features, small restaurants can improve resource utilization (Wan and Feng, 2018) and can further enhance operational efficiency (Wan and Chen, 2019). Specifically, online booking and ordering systems are known to be effective in reducing customer waiting times (Bagaskara et al., 2021). Yelp and OpenTable, representative O2O platforms in North America, provide a simple booking function on online websites that allows customers to book a restaurant without any contact with the restaurant's staff (Dai and Luca, 2016). Naver SmartPlace, a representative O2O platform in South Korea, also offers automated booking confirmation features, in addition to booking and ordering systems (Naver service center, 2022). The reduction of customers' waiting time from such digital functions has a positive impact on the likelihood of revisits, revenue

increases, service evaluations, and customer satisfaction (Davis and Maggard, 1990; Houston et al., 1998). Because customer reservations are automatically checked by the system, not by the manager's manual inquiry, it is effective in reducing customer waiting time. In addition to these positive benefits, the higher the use of these digital functions on online platforms, the better the firm performance. For example, the use of platform-based functions in the online marketplace increases sales performance (Li et al., 2019). However, platform-based functions require additional resources and effort to improve the existing processes (Chircu et al., 2001). Accordingly, more use of functions on O2O platforms can be assumed as more effort by SMEs toward successful digitalization. In other words, SMEs that actively use the business functions embedded in the O2O platform are putting more effort into digitalization to achieve business process optimization and performance improvement. This also has a positive impact on the cumulative number of reviews. The degree of functional use refers to the number of functions that SMEs use on O2O platforms. Thus, the following hypothesis was derived:

> *H3: The degree of functional use in the O2O platform has a positive relationship with the cumulative number of reviews.*

Ⅳ. Research Context and Variables

4.1. Research Context

We collaborated with Naver, the largest ICT corporation in South Korea, to investigate the effects of digital transformation on SME performance. Naver owns the most prominent online search engine with

42 million enrolled users, which handles nearly 75% of web searches in South Korea (Prnewswire, 2020). Based on the massive traffic volume from its own search engine, Naver operates various ICT services, such as O2O platforms, advertising, and e-commerce. In particular, Naver SmartPlace, an O2O platform service, offers innovative and competitive business growth opportunities for SMEs (Kim et al., 2022). As of 2021, there are 2.1 million offline businesses registered to Naver SmartPlace.

Naver SmartPlace offers three main functions. First, business owners can register their business information on Naver SmartPlaces without any fee. The business information includes business name, location, phone number, website address, services options, opening hours, and notice. Once registered, the information will be automatically exposed to users of Naver services or any 3rd party services connected via Naver API, who search for related products or nearby location information. Second, Naver SmartPlace offers booking, ordering, and automated booking confirmation features, thereby reducing the communication cost of SMEs and the waiting time of customers. Customers do not need to engage in in-person communication to confirm reservations. The reservation request is confirmed via an automated process once the request is submitted and does not require manual approval by the manager. Third, customers can leave reviews on Naver SmartPlace. They can write reviews only when they have been proven as actual buyers with a purchase receipt or Naver booking history. Figure 1 shows a screenshot of a restaurant registered on the Naver SmartPlace. Hence, with the huge number of users and innovative digital functions embedded in the platform, Naver SmartPlace presents a great context for research on the effects of digital transformation on SME performance.

We narrowed down our investigation of SMEs to restaurants on the Naver SmartPlace. The restaurant industry has desirable characteristics for measuring the effects of DX efforts by SMEs on their performance. First, the restaurant industry is one of the industries that lagged behind technology innovation due to its labor-intensive and low-margin industry structure (Tan and Netessine, 2020). The relatively low adoption rate of digital technology by restaurants allowed us to examine the pure effect of DX. Second, most of the restaurants in South Korea are SMEs. Non-SME restaurants account for less than 0.005% of all restaurants (Korean Statistical Information Service, 2020b). In South Korea, according to the Small and Medium Business Act (Article 2) and the Framework Act on Small Businesses (Article 2), an SME restaurant is defined as a small enterprise with less than sales of 1 billion KRW and five full-time workers and a medium enterprise with less than sales of 40 billion KRW and total assets of 500 billion KRW. Third, the restaurant industry is a critical sector in the retail industry, accounting for the largest proportion of retail sales among single-product groups in South Korea in 2019 (Korean Statistical Information Service, 2020a). Ultimately, restaurants are appropriate subjects for this research, considering the low speed of DX, a high proportion of SMEs, and their importance in the retail industry.

4.2. Data Collection

This study was conducted at restaurants that registered Naver SmartPlace, the largest O2O platform in South Korea. Naver provided the Naver SmartPlace dataset, including business name, location, type of business, other business-related information (e.g., phone number, menu, website address, service options, and opening hours), digital functions in use
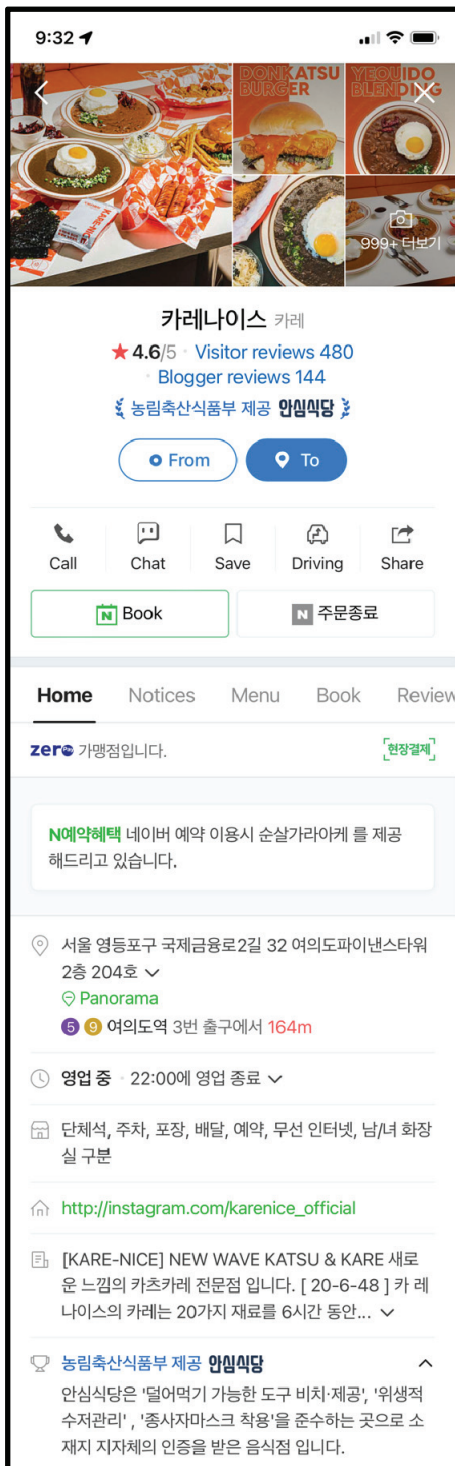
<Figure 1> Screenshot of Naver SmartPlace

(e.g., booking, ordering, automated booking confirmation features), the number of reviews, and the number of responses to reviews and ratings as of June 30, 2021. We randomly sampled 14,905 restaurants in Gangnam-gu. Gangnam-gu is reported to have the largest number of restaurants with authorized business licenses (Data Seoul, 2021). Sampling from Gangnam-gu allowed us to secure a rich sample size and eliminate the effects of digital competency differences among the people engaged in economic activities in each district. We identified and removed restaurants with more than 400 reviews as outliers. The final dataset includes 13,472 restaurants with fewer than 400 reviews.

4.3. Variables

We measure CE, a positive outcome of digitalization, as a dependent variable. CE is known to positively affect customer satisfaction, firm performance, revenue growth, and profitability (Brodie et al., 2013; Chircu et al., 2001; Di Gangi and Wasko, 2009; Kumar and Pansari, 2016; Thakur and Summey, 2010; Van Doorn et al., 2010). CE can be measured on digital platforms by writing blogs or comments, creating word of mouth, helping other customers, and recommending companies and brands to others (Van Doorn et al., 2010). This study considers writing reviews as a CE because writing reviews can significantly affect the purchase decisions of potential customers (Mathwick and Mosteller, 2017), and we can measure it directly on O2O platforms. We operationalize CE as the cumulative number of reviews as of June 30, 2021.

Our first independent variable is information diversity, measured by the amount of information SMEs provide. Restaurants can enter and manage diverse business information on O2O platforms, such as loca-

tion, phone number, menus, website addresses, service options, and opening hours. Since, in the context of Naver SmartPlace, the phone number and location information are mandatory to use Naver SmartPlace, we count the amount of information provided by SME owners into four categories — menus, website addresses, service options, and opening hours — as the intensity of the digitalization effort. Information diversity ranges from 0 to 4. Next, responsiveness to customers is operationalized by a binary variable that indicates whether a restaurant has responded to customer reviews at least once (Kumar et al., 2018). If the SME owner has never responded to customer reviews, the variable would be 0; otherwise, it would be 1. Finally, for the degree of functional use, we count the number of platform-embedded functions that SMEs used in three categories: booking, ordering, and automated booking. The variables ranged from 0 to 3.

We identify three control variables that may influence the dependent variable (i.e., CE), which are the type of cuisine, tenure on the O2O platform, and ratings. First, since restaurant sales can be affected by food seasonality, we controlled for cuisine type.

Bujisic et al. (2017) posited that weather factors, including temperature, rain, and wind, could affect cuisine sales. Since there is a possibility that the number of reviews may differ depending on weather or seasonal factors for each type of cuisine, we included 20 types of cuisine set by the platform as a control variable. Second, the number of reviews is likely to be higher for restaurants that joined the platform earlier than those that did not. The longer the tenure of SMEs on the platform, the more chance to respond to the customer. Thus, it could affect customers to write more reviews. To control this aspect, we include restaurant tenure on an O2O platform as a control variable. Third, we controlled for review ratings, which can indirectly affect the number of reviews. The review ratings may reflect customers' perceived quality of the restaurant (Ye et al., 2014). Additionally, the higher the rating, the higher the likelihood of purchase (Anderson and Magruder, 2012; Tamimi and Sebastianelli, 2015). Hence, we controlled for review ratings by including the cumulative average review ratings as of June 30, 2021. <Table 1> summarizes the definitions and descriptions of these variables.

<Table 1> Variable Description

Construct	Measurement	Description
Customer Engagement	The cumulative number of reviews	Customer's behavioral manifestations that have a brand or firm focus, resulting from motivational drivers beyond a simple transactional action
Information Diversity	The number of information provided by SMEs	The content quantity that SMEs provide on the O2O platform
Responsiveness to Customers	Binary value of whether SMEs have responded to customer reviews	Whether SMEs have responded to customers on the O2O platform
Degree of Functional Use	The number of functions SMEs use	The degree that SMEs use platform-embedded functions on the O2O platform

Ⅴ. Research Methodology

5.1. Descriptive Analysis

<Table 2> presents the descriptive statistics of the variables in our study. Since the ratio of missing values in our dataset was less than 5%, we excluded any observations containing missing values according to the Listwise deletion (Graham, 2009; Schafer, 1997). Our dataset had two characteristics. First, the distribution of the dependent variable, CE (i.e., the number of reviews), is positively skewed to the right (skewness = 8.04) and depicts a large number of outliers (kurtosis = 108.17). In general, normality can be assumed when skewness is within ±3 and kurtosis is within ±10 (Kline, 2009). Thus, we classified restaurants with more than 400 reviews as outliers, which was 9.6% of the total data. After excluding outliers, our final dataset contains information on 13,472 restaurants, and skewness and kurtosis were dramatically reduced (skewness = 1.45, kurtosis = 1.32). However, the result from tests for normality, QQ plot and Shapiro-Wilk's W test, showed our final dataset exhibits non-normality. The mean of the dependent variable (i.e., the average number of reviews) is 73.61, and its range covers from 0 to 399. Second, the dataset has a high proportion of zero values for each variable (i.e., zero-inflated data). Observations with zero values for the dependent variable accounted for 20.4% of the 13,472 observations.

In terms of our independent variables, the dataset shows digitalization of restaurants lags, which is consistent with the results of previous studies (Guha et al., 2018; Harrigan and Miles, 2014; Jain, 2015; Korea SMEs & Startups Institute, 2020). 26.1% of the restaurants did not have any information on menus, website addresses, service options, or opening hours on the platform. In addition, only 7% of the restaurants responded to customer reviews, and the average number of responses to reviews amounted to 0.07. In other words, 93% of restaurants on the platform never responded to customer reviews. Over 90% of the restaurants did not use any platform-embedded functions, and only 81 out of 13,472 restaurants used all functions – booking, ordering, and automated booking confirmation.

Regarding our control variables, Korean cuisine showed the largest proportion (33.7%) among the 20 types of cuisines. The average tenure of the restaurants on the platform was 1,532 days, indicating that restaurants joined the platform in May 2017 on average. The mean of the review ratings was 3.8 out of 5 stars, and the median value was 4.4, implying a left-skewed distribution. Based on the data distribution, many restaurants had high ratings.

<Table 2> Descriptive Statistics

Variable		Mean	std.	Min	Max	Median
Independent	Information Diversity	1.96	1.48	0	4	2
	Responsiveness to Customers	0.07	0.25	0	1	0
	Degree of Functional Use	0.19	0.59	0	3	0
Dependent	Customer Engagement	73.61	94.64	0	399	30
Control	Type of Cuisines	-	-	-	-	-
	Tenure on Platform	1,531.92	1,295.39	172	8,276	1,270.00
	Ratings	3.83	1.49	0	5	4.35

<Table 3> Pearson's Correlation Matrix

	Customer Engagement	Information Diversity	Responsiveness to Customers	Degree of Functional Use	Type of Cuisines	Tenure on Platform	Ratings
Customer Engagement	1.000	0.328	0.195	0.205	0.103	0.217	0.284
Information Diversity	0.328	1.000	0.233	0.276	-0.074	0.185	0.317
Responsiveness to Customers	0.195	0.233	1.000	0.293	0.013	-0.021	0.116
Degree of Functional Use	0.205	0.276	0.293	1.000	-0.006	0.015	0.136
Type of Cuisines	0.103	-0.074	0.013	-0.006	1.000	0.014	0.064
Tenure on Platform	0.217	0.185	-0.021	0.015	0.014	1.000	0.071
Ratings	0.284	0.317	0.116	0.136	0.064	0.071	1.000

Note: all coefficients were statistically significant (P < 0.001).

As a preliminary step to test our hypotheses, we conducted Pearson's correlation analysis in <Table 3>. We find a modest positive relationship between information diversity and CE (r = 0.328, p < 0.01), information diversity and ratings (r = 0.317, p < 0.01). Namely, it is likely to have high ratings and more reviews if SMEs upload more various information to the O2O platform. On the other hand, contrary to our expectation that the more reviews or the larger the tenure, the more responses, the weak or negligible correlations between the remaining variables are confirmed. We also calculated the VIF (Variance Inflation Factor) to detect multicollinearity. As every VIF coefficient was under 2.5, it was confirmed that there was no multicollinearity problem (Allison, 2012; Midi et al., 2010).

5.2. Zero-Inflated Negative Binomial Regression

Since our dataset is zero-inflated, we considered two types of statistical models: a zero-inflated negative binomial (ZINB) and a zero-inflated Poisson (ZIP) regression model. The Vuong test (Vuong, 1989) is conducted for statistical model selection (Xu et al., 2015), and the result confirms that ZINB fits our dataset (z = 76.31288, p < 0.001) since the Vuong statistic is upper than 1.96 (Shankar and Mannering, 1997). Thus, the ZINB regression model was used to analyze the effects of SMEs' digitalization efforts on CE. The ZINB regression model is suitable when the count data depict over-dispersion, an excess number of zero values also exists, and residuals do not follow normality (Ridout et al., 1998). The ZINB regression model includes both a logit model for predicting the probability of non-occurrence of events and a count model for predicting the frequency of events that have occurred (Ridout et al., 1998). To explain this in more detail in relation to this study, the logit model serves to predict the factors affecting the non-occurrence of reviews, and the count model serves to predict the factors affecting the number of reviews.

<Table 4> presents the results of the ZINB regression model. The analysis results show that the

factors that have a significant influence on the non-occurrence of reviews are tenure on the platform (β = -272.70232, p < 0.001) and type of cuisine (β = -0.06035, p = 0.0357). This result indicates that the longer the tenure of SMEs on the O2O platform, the higher the probability of receiving a review. In addition, the existence of a review varies depending on the type of cuisine provided by the restaurant. In terms of the estimation result of the count model, the factors statistically significantly related to CE are all independent variables: information diversity (β = 0.21809, p < 0.001), responsiveness to customers (β = 0.19670, p < 0.001), and degree of functional use (β = 0.09993, p < 0.001). This result can be interpreted that when data is limited to restaurants that have received one or more reviews

and considering the effect of the control variable: the number of reviews increases by 21.8% per one more piece of information they present on the O2O platform; the number of reviews also increases by 19.7% if they respond to customer reviews; 10% per one more function they use on the O2O platform. Besides, all control variables were founded that they have a significant effect on CE: tenure on the platform (β =0.01312, p < 0.001), type of cuisine (β = 0.02434, p < 0.001), review rating (β = 1.04491, p < 0.001). The longer they use the O2O platform and the higher the rating they receive, the more reviews SMEs get. These results show that even SMEs that cannot invest a lot of resources in DX can achieve the DX effect, such as increasing CE if they use the O2O platform to present their own information, respond to custom-

<Table 4> Results of ZINB regression model

	Zero-inflation Model (logit link)	Count Model (log link)
Information Diversity	0.01045 (0.10588)	0.21809*** (0.01012)
Responsiveness to Customers	-10.53222 (46.61695)	0.19670*** (0.05024)
Degree of Functional Use	0.09097 (0.24475)	0.09993*** (0.02160)
Tenure on Platform	-272.70232*** (36.27796)	0.01312*** (0.00108)
Type of Cuisines	-0.06035* (0.02874)	0.02434*** (0.00205)
Ratings	-0.21336 (0.11919)	1.04491*** (0.01297)
(Intercept)	489.66857*** (78.71737)	-1.41347*** (0.07804)
Log(theta)		-0.60195*** (0.01243)
N	Zero obs. = 2,746	Non-zero obs. = 10,726
	13,472	

Note: Dependent variable = Customer engagement (The cumulative number of reviews); *p < 0.05, **p < 0.01, ***p < 0.001; Robust standard errors in parentheses.

er reviews, or utilize various functions of the O2O platform.

VI. Discussion and Conclusion

This study investigates the effect of SMEs' DX efforts on CE on an O2O platform. Based on previous literature on DX, we focus on digitalization, the second phase of DX, which is a practically viable DX phase for SMEs using the O2O platform. We categorize SMEs' DX efforts into three categories: information diversity, responsiveness to customers, and the degree of functional use. To analyze the impact of these DX efforts on CE, we conducted a ZINB regression using the Naver SmartPlace dataset, a representative O2O platform in South Korea. Our results confirm that these factors positively impact CE. Thus, the results demonstrate that utilizing an O2O platform can be an effective strategy for SMEs that lack resources.

This study provides the following theoretical implications of digital strategies for SMEs. First, it examines the digitalization efforts of SMEs on CE, which lack academic interest compared to large companies. Previous research on digitalization efforts has focused mainly on large companies, but SMEs call for different digitalization approaches because of their limited resources compared to large companies. Second, the study focuses on the digitalization phase, a feasible phase that SMEs can achieve by participating in O2O platforms among three DX phases: digitization, digitalization, and DX (Verhoef et al., 2021). Prior studies on the effect of DX did not specify its phase (Guha et al., 2018; Harrigan and Miles, 2014; Jain, 2015), so it was not straightforward to conduct an empirical analysis of the detailed efforts to achieve DX and the consequences of such efforts. Furthermore, the literature mainly focuses on digital strategies for the last phase of DX, which SMEs can rarely achieve using restricted resources (Guha et al., 2018; Harrigan and Miles, 2014; Jain, 2015). Therefore, previous research has had limited implications for SMEs. Third, this study identifies the digitalization efforts of SMEs on the O2O platform in three categories: information diversity, responsiveness to customers, and degree of functional use. This study also empirically proves the positive relationship between SMEs' digitalization efforts on O2O platforms and CE.

This study also has practical implications for practitioners in developing digital strategies. Any SME with limited resources to implement its own DX strategy can immediately apply the strategy proposed in this study. First, it helps increase CE by presenting basic business information, including menus, website addresses, service options, and opening hours, on O2O platforms. In other words, SME owners can increase their CE by providing accurate and rich information about their business on the O2O platform. Second, this study confirms that SMEs can enhance CE by responding to customer reviews. This result is consistent with previous studies that have emphasized the effect of personalized responses to customers on social media (Chen et al., 2015) and via e-mail (Strauss and Hill, 2001). Therefore, SME owners should leverage free-offered digital functions on O2O platforms to communicate with customers. Third, it is important for firm performance to use the functions of O2O platforms, such as booking, ordering, and automated booking confirmation. SMEs can improve their resource utilization (Wan and Feng, 2018) and operational efficiency (Wan and Chen, 2019) using platform-embedded business functions. Additionally, SMEs can reduce the negative impact of customer waiting times on the likelihood of customer revisits, revenue growth, service evalua-

tions, and customer satisfaction (Bagaskara et al., 2021). SMEs can benefit from digital functions on O2O platforms, which have a positive impact on their business performance.

Although this study has several implications, there is scope for further research. First, we measure CE using the cumulative number of reviews since customer engagement intensity can be measured with the number of reviews (Messner, 2020). However, CE can be measured in other various ways. For example, Gruss et al. (2020) measured CE as the number of likes, comments, and shares on Facebook. Kang et al. (2021) measured CE as the number of thumbing up, gift-giving, and customer reviews in live streaming commerce platform. If CE can be measured in other ways, the study will become more robust. Second, even though we controlled the tenure of SMEs on the platform, it could still be an endogeneity issue of our model, which is not addressable in this paper. This study is meaningful to analyze the digital transformation effect of SME using data from the actual O2O platform, but it is necessary to deal with this issue in more depth in future studies. Third, the effect of digital transformation can be measured by other variables, such as the average star ratings. For robustness check, we conducted a regression with the average star ratings <Table 1A in Appendix>. The analysis presents a consistent result except the significance of responsiveness to customers. We assume that this is because the star ratings are more affected by the actual service quality from the SMEs (i.e. restaurant) than the effort of digital transformation on SMEs on the O2O platform. Therefore, it is necessary to analyze data targeting SMEs other than restaurants. In addition, if panel data are secured and further analysis of the effect of SMEs' digitalization on CE over time is conducted, the research results can be prosperous and more logical. For example, the number of reviews per month or the growth of the number of reviews could be used as the effect of digital transformation to scrutinize the causal relationship.

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<References>

[1] Agarwal, R., Gao, G., DesRoches, C., and Jha, A. K. (2010). Research commentary－The digital transformation of healthcare: Current status and the road ahead. *Information Systems Research, 21*(4), 796-809. https://doi.org/10.1287/ isre.1100.0327

[2] Ahmad, F. S., Omar, R., Rasid, S. Z. A., and Amin, M. (2012). Leadership branding for sustainable customer engagement. *International. Journal of Social and Human Sciences, 6,* 217-224. http://doi.org/

10.5281/zenodo.1085623

[3] Allison, P. D. (2012). *Logistic Regression Using SAS: Theory and Application*. SAS Institute.

[4] Altman, E. I., and Sabato, G. (2013). Modeling credit risk for SMEs: Evidence from the US market. In O. Roggi and E. I. Altman (Eds.), *Managing and Measuring Risk: Emerging Global Standards and Regulations After the Financial Crisis* (pp. 251-279). World Scientific Publishing Co. Pte. Ltd..

[5] Anderson, M., and Magruder, J. (2012). Learning from the crowd: Regression discontinuity estimates of the effects of an online review database. *The Economic Journal, 122*(563), 957-989. https://doi.org/10.1111/j.1468-0297.2012.02512.x

[6] Bagaskara, A., Naufal, A. R., Dhojopatmo, I. E., Abdurrab, A., and Budiharto, W. (2021). Development of Smart Restaurant Application for Dine-In. *2021 1st International Conference on Computer Science and Artificial Intelligence (ICCSAI),* 230-235. http://doi.org/10.1109/ ICCSAI53272.2021.9609723.

[7] Bai, L., and Yan, X. (2020). Impact of firm-generated content on firm performance and consumer Engagement: Evidence from social media in China. *Journal of Electronic Commerce Research, 21*(1), 56-74. http://doi. org/10.1057/s41291-021-00156-0

[8] Bhargava, H. K., and Choudhary, V. (2004). Economics of an information intermediary with aggregation benefits. *Information Systems Research, 15*(1), 22-36. https://doi.org/10. 1287/isre.1040.0014

[9] Blili, S., and Raymond, L. (1993). Information technology: Threats and opportunities for small and medium-sized enterprises. *International Journal of Information Management, 13*(6), 439-448. https://doi.org/10.1016/0268- 4012(93)90060-H

[10] Bouwman, H., Nikou, S., and de Reuver, M. (2019). Digitalization, business models, and SMEs: How do business model innovation practices improve performance of digitalizing SMEs?. *Telecommunications Policy, 43*(9), 101828. https://doi.org/10.1016/j.telpol. 2019.101828

[11] Brodie, R. J., Ilic, A., Juric, B., and Hollebeek, L. (2013). Consumer engagement in a virtual brand community: An exploratory analysis. *Journal of Business Research, 66*(1), 105-114. https://doi.org/10.1016/j.jbusres.2011.07.029

[12] Bujisic, M., Bogicevic, V., and Parsa, H. G. (2017). The effect of weather factors on restaurant sales. *Journal of Foodservice Business Research, 20*(3), 350-370. https://doi.org/10.1080/15378020.2016.1209723

[13] Châlons, C., and Dufft, N. (2017). The role of IT as an enabler of digital transformation. In F. Abolhassan (Ed.), *The Drivers of Digital Transformation* (pp. 13-22). Springer.

[14] Chen, H., De, P., and Yu, J. H. (2015). IT-enabled broadcasting in social media: An empirical study of artists' activities and music sales. *Information Systems Research, 26*(3), 513-531. https://doi.org/10.1287/isre.2015. 0582

[15] Chen, J. E., Pan, S. L., and Ouyang, T. H. (2014). Routine reconfiguration in traditional companies'e-commerce strategy implementation: A trajectory perspective. *Information And Management, 51*(2), 270-282. https://doi.org/10.1016/j. im.2013.11.008

[16] Chircu, A. M., Kauffman, R. J., and Keskey, D. (2001). Maximizing the value of Internet-based corporate travel reservation systems. *Communications of The ACM, 44*(11), 57-63. https://doi.org/10.1145/384150. 384162

[17] Chung, S., Animesh, A., Han, K., and Pinsonneault, A. (2014). Firm's social media efforts, consumer behavior, and firm performance. *ICIS 2014 Proceedings, 14.* Retrieved from https://aisel. aisnet.org/icis2014/proceedings/SocialMedia/14

[18] CIO. (2021). What is digital transformation? A necessary disruption, Retrieved from https://www. cio.com/article/230425/what-is-digital-transformation-a-necessary-disruption.html

[19] Cosenz, F., and Bivona, E. (2021). Fostering growth patterns of SMEs through business model innovation. A tailored dynamic business modelling approach. *Journal of Business Research, 130*, 658-669. https://doi.org/10. 1016/j.jbusres.2020.03.003

[20] Dai, D., and Luca, M. (2016). Effectiveness of paid search advertising: Experimental evidence. *Harvard*

Business School NOM Unit Working Paper No. 17-025. http://dx.doi.org/10.2139/ ssrn.2847084

[21] Data Seoul. (2021). Seoul Food Sanitation Industry Status Statistics, Retreived from https://data.seoul. go.kr/dataList/33/S/2/datasetView.do

[22] Davidovski, V. (2018). Exponential innovation through digital transformation. *In Proceedings of the 3rd International Conference on Applications in Information Technology*, 3-5. https://doi.org/ 10.1145/3274856.3274858

[23] Davis, M. M., and Maggard, M. J. (1990). An analysis of customer satisfaction with waiting times in a two-stage service process. *Journal of Operations Management, 9*(3), 324-334. https://doi.org/10.1016/ 0272-6963(90)90158-A

[24] Di Gangi, P. M., and Wasko, M. (2009). The co-creation of value: Exploring user engagement in user-generated content websites. *Proceedings of JAIS Theory Development Workshop, 9*(50), 9-50.

[25] Fitzgerald, M., Kruschwitz, N., Bonnet, D., and Welch, M. (2014). Embracing digital technology: A new strategic imperative. *MIT Sloan Management Review, 55*(2), 1.

[26] Forbes. (2018). Why digital transformations fail: Closing the $900 billion hole in enterprise strategy, Retrieved from https://www.forbes.com/sites/ forbestechcouncil/2018/03/13/why-digital-transfor mations-fail-closing-the-900-billion-hole-in-enterp rise-strategy/?sh=3d0e2a877b8b

[27] Gallaugher, J., and Ransbotham, S. (2010). Social media and customer dialog management at Starbucks. *MIS Quarterly Executive, 9*(4).

[28] Graham, J. W. (2009). Missing data analysis: Making it work in the real world. *Annual Review of Psychology, 60*, 549-576. http://doi.org/10. 1146/annurev.psych.58.110405.085530

[29] Gruss, R., Kim, E., and Abrahams, A. (2020). Engaging restaurant customers on Facebook: The power of belongingness appeals on social media. *Journal of Hospitality & Tourism Research, 44*(2), 201-228. https://doi.org/10. 1177/1096348019892071

[30] Guha, S., Harrigan, P., and Soutar, G. (2018). Linking social media to customer relationship management (CRM): A qualitative study on SMEs. *Journal of Small Business And Entrepreneurship, 30*(3), 193-214. https://doi.org/10.1080/ 08276331.2017.1399628

[31] Harrigan, P., and Miles, M. (2014). From e-CRM to s-CRM. Critical factors underpinning the social CRM activities of SMEs. *Small Enterprise Research, 21*(1), 99-116. https://doi.org/10.1080/13215906. 2014.11082079

[32] Harris, L., Rae, A., Dhaliwal, J., and Grewal, S. (2008). Punching above their weight with Web 2.0: The rise of the gifted amateur, Retrieved from http://www. jasdhaliwal.com/downloads/York_Paper_PAYW.pdf

[33] Hess, T., Matt, C., Benlian, A., and Wiesböck, F. (2016). Options for formulating a digital transformation strategy. *MIS Quarterly Executive, 15*(2), 123-139.

[34] Houston, M. B., Bettencourt, L. A., and Wenger, S. (1998). The relationship between waiting in a service queue and evaluations of service quality: A field theory perspective. *Psychology and Marketing, 15*(8), 735-753. https://doi.org/10.1002/(SICI)1520- 6793(199812)15:8<735::AID-MAR2>3.0.CO;2-9

[35] IDC. (2021). IDC FutureScape: Worldwide digital transformation 2022 predictions, Retrieved from https://www.idc.com/getdoc.jsp?containerId=US47 115521

[36] ILO. (2014). The power of small: unlocking the potential of SMEs, Retreived from https://www. ilo.org/infostories/en-GB/Stories/Employment/SM Es

[37] Jain, R. (2015). Impact of social media marketing on SME business. SAMVAD, 8.

[38] Kang, K., Lu, J., Guo, L., and Li, W. (2021). The dynamic effect of interactivity on customer engagement behavior through tie strength: Evidence from live streaming commerce platforms. *International Journal of Information Management, 56*, 102251. https://doi.org/10.1016/j.ijinfomgt. 2020.102251

[39] Kim, H., Ryu, M. H., Lee, D., and Kim, J. H. (2022). Should a small-sized store have both online and offline channels? An efficiency analysis of the O2O platform

strategy. *Journal of Retailing and Consumer Services, 64*, 102823. https://doi.org/10.1016/j.jretconser. 2021.102823

[40] Kline, R. B. (2009). *Becoming a Behavioral Science Researcher: A Guide to Producing Research That Matters.* New York, GuildfordPress.

[41] Korea SMEs & Startups Institute, SMEs Digital Status Survey. (2020). Retreived from https://www.kosi.re.kr/ kosbiWar/front/functionDisplay?menuFrontNo=3 &menuFrontURL=front/focusDetail?dataSequence =J210614K01

[42] Korean Statistical Information Service. (2020a). Monthly report of retail sales in December 2019, Retrieved from http://kosis.kr/upsHtml/online/ downSrvcFile.do?PUBCODE=OQ&FILE_NAME=/ OQ/201912.pdf&SEQ=493

[43] Korean Statistical Information Service. (2020b). Economically Active Population. Retrieved from https://www.index.go.kr/potal/main/EachDtlPageD etail.do?idx_cd=2779

[44] Kumar, N., Qiu, L., and Kumar, S. (2018). Exit, voice, and response on digital platforms: An empirical investigation of online management response strategies. *Information Systems Research, 29*(4), 849-870. https://doi.org/10.1287/isre.2017.0749

[45] Kumar, V., and Pansari, A. (2016). Competitive advantage through engagement. *Journal of Marketing Research, 53*(4), 497-514. https://doi.org/10.1509/ jmr.15.0044

[46] Lee, Y. L., and Song, S. (2010). An empirical investigation of electronic word-of-mouth: Informational motive and corporate response strategy. *Computers In Human Behavior, 26*(5), 1073-1080. https://doi.org/10.1016/j.chb.2010.03.009

[47] Li, H., Fang, Y., Lim, K. H., and Wang, Y. (2019). Platform-based function repertoire, reputation, and sales performance of e-marketplace sellers. *MIS quarterly, 43*(1), 207-236. http://doi.org/10.25300/MISQ/ 2019/14201

[48] Li, H., Shen, Q., and Bart, Y. (2018a). Local market characteristics and online-to-offline commerce: An empirical analysis of Groupon. *Management Science,*

64(4), 1860-1878. https://doi.org/10.1287/mnsc.2016.2666

[49] Li, L., Su, F., Zhang, W., and Mao, J. Y. (2018b). Digital transformation by SME entrepreneurs: A capability perspective. *Information Systems Journal, 28*(6), 1129-1157. https://doi.org/ 10.1111/isj.12153

[50] Li, W., Liu, K., Belitski, M., Ghobadian, A., and O'Regan, N. (2016). E-Leadership through strategic alignment: An empirical study of small-and medium-sized enterprises in the digital age. *Journal of Information Technology, 31*(2), 185-206. https://doi.org/10.1057/jit.2016. 10

[51] Liere-Netheler, K., Packmohr, S., and Vogelsang, K. (2018). Drivers of digital transformation in manufacturing. *Proceedings of the 51st Hawaii International Conference on System Sciences, 51*, 3926-3935. Retrieved from https://aisel.aisnet.org/hicss-51/ in/digital_supply_chain/2/

[52] Matarazzo, M., Penco, L., Profumo, G., and Quaglia, R. (2021). Digital transformation and customer value creation in Made in Italy SMEs: A dynamic capabilities perspective. *Journal of Business Research, 123*, 642-656. https://doi.org/10.1016/j.jbusres.2020.10.033

[53] Mathwick, C., and Mosteller, J. (2017). Online reviewer engagement: A typology based on reviewer motivations. *Journal of Service Research, 20*(2), 204-218. https://doi.org/10.1177/ 1094670516682088

[54] McIntyre, D. P., and Srinivasan, A. (2017), Networks, platforms, and strategy: Emerging views and next steps, *Strategic Management Journal, 38*(1), 141-160. https://doi.org/10. 1002/smj.2596

[55] Messner, W. (2020). Understanding the influence of culture on customer engagement and recommendation intentions. *Journal of Strategic Marketing*, 1-25. https://doi.org/10.1080/ 0965254X.2020.1849363

[56] Midi, H., Sarkar, S. K., and Rana, S. (2010). Collinearity diagnostics of binary logistic regression model. *Journal of Interdisciplinary Mathematics, 13*(3), 253-267. https://doi.org/10.1080/09720502. 2010.10700699

[57] Miller, A. R., & Tucker, C. (2013). Active social media management: The case of health care. *Information Systems Research, 24*(1), 52-70.

https://doi.org/10.1287/isre.1120. 0466

[58] Min, S. A., and Kim, B. Y. (2020). Platform leadership and strategy of small and medium enterprises on digital transformation. *International Journal of Management (IJM), 11*(12), 2176-2188. http://doi.org/10.34218/IJM.11.12.2020.205

[59] Nadkarni, S., and Prügl, R. (2021). Digital transformation: A review, synthesis and opportunities for future research. *Management Review Quarterly, 71*(2), 233-341. https://doi.org/10.1007/s11301-020-00185-7

[60] National Statistics Office. (2014). Status of Korean SMEs, Retrieved from https://www.kosmes.or.kr/sbc/SH/EHP/SHEHP025M0.do

[61] Naver Service Center. (2022). How to set up automated booking confirmation, Retrieved from https://m.help.naver.com/support/contents/contentsView.help?contentsNo=14916&lang=ko

[62] OECD. (2021). The digital transformation of SMEs, Retrieved from https://doi.org/10.1787/bdb9256a-en

[63] Pan, Y., and Wu, D. (2020). A novel recommendation model for online-to-offline service based on the customer network and service location. *Journal of Management Information Systems, 37*(2), 563-593. https://doi.org/10.1080/07421222. 2020.1759927

[64] Pei, X., and Cha, H. (2015). BPR application in China of a SME Information Management. *In 2015 International Conference on Education Technology, Management and Humanities Science (ETMHS 2015),* 83-89. https://doi.org/10.2991/etmhs-15.2015.20

[65] Pertiwi, E., Guihua, N., and Pingfeng, L. (2016). The influence of omni-channel retailing on Indonesian SMEs online and offline business operations. *Innovation and Management,* 746-752.

[66] Piccinini, E., Gregory, R. W., and Kolbe, L. M. (2015). Changes in the Producer-Consumer Relationship -Towards Digital Transformation. Wirtschaftsinformatik Proceedings 2015, 109. Retrieved from https://aisel.aisnet.org/ wi2015/109

[67] Prnewswire. (2020). Naver, leading online search platform in South Korea and creator of the LINE messenger app, deploys Bright Pattern, Retrieved from https://www.prnewswire.com/in/news-releases/naver-leading-online-search-platform-in-south-korea-and-creator-of-the-line-messenger-app-deploys-bright-pattern-contact-center-software-821817064.html

[68] Ramaswamy, V., and Ozcan, K. (2016). Brand value co-creation in a digitalized world: An integrative framework and research implications. *International Journal of Research in Marketing, 33*(1), 93-106. https://doi. org/10.1016/j.ijresmar.2015.07.001

[69] Rasool, A., Shah, F. A., and Islam, J. U. (2020). Customer engagement in the digital age: A review and research agenda. *Current Opinion in Psychology, 36*, 96-100. https://doi.org/10.1016/j.copsyc.2020. 05.003

[70] Reinartz, W. (2019). Reinventing the retailer: Retaining relevance and customer access. *NIM Marketing Intelligence Review, 11*(1), 10-17. https://doi.org/10.2478/nimmir-2019-0002

[71] Ridout, M. S., Demetrio, C. G. B. and Hinde, J. P. (1998). Models for count data with many zeros, Proceedings of the XIXth International Biometrics Conference, Cape Town, 179-192. Retrieved from https://www.kent.ac.uk/smsas/personal/msr/webfiles/zip/ibc_fin.pdf

[72] Schafer, J. L. (1997). *Analysis of Incomplete Multivariate Data.* CRC press.

[73] Shankar, V., Milton, J., and Mannering, F. (1997). Modeling accident frequencies as zero-altered probability processes: An empirical inquiry. *Accident Analysis & Prevention, 29*(6), 829-837. https://doi.org/ 10.1016/S0001-4575(97)00052-3

[74] Sheng, J. (2019). Being active in online communications: Firm responsiveness and customer engagement behaviour. *Journal of Interactive Marketing, 46*, 40-51. https://doi.org/10.1016/j.intmar. 2018.11.004

[75] Sparks, B. A., and Bradley, G. L. (2017). A "Triple A" typology of responding to negative consumer-generated online reviews. *Journal of Hospitality and Tourism Research, 41*(6), 719-745. https://doi.org/ 10.1177/1096348 014538052

[76] Strauss, J., and Hill, D. J. (2001). Consumer

complaints by e-mail: An exploratory investigation of corporate responses and customer reactions. *Journal of Interactive Marketing, 15*(1), 63-73. https://doi.org/10.1002/1520-6653(200124)15:1<63::AID-DIR1004>3.0.CO;2-C

[77] Tamimi, N., and Sebastianelli, R. (2015). The relative importance of e-tailer website attributes on the likelihood of online purchase. *Internet Research, 25*(2), 169-183. https://doi.org/10.1108/IntR-07-2013-0131

[78] Tan, T. F., and Netessine, S. (2020). At your service on the table: Impact of tabletop technology on restaurant performance. *Management Science, 66*(10), 4496-4515. http://dx.doi.org/10.2139/ssrn.3037012

[79] Thakur, R. (2018). Customer engagement and online reviews. *Journal of Retailing and Consumer Services, 41*, 48-59. https://doi.org/10.1016/j.jretconser.2017.11.002

[80] Thakur, R. A. M. E. N. D. R. A., and Summey, J. H. (2010). Optimizing CRM: a framework for enhancing profitability and increasing lifetime value of customers. *Marketing Management Journal, 20*(2), 140-151.

[81] Turner, R., Ledwith, A., and Kelly, J. (2010). Project management in small to medium-sized enterprises: Matching processes to the nature of the firm. *International Journal of Project Management, 28*(8), 744-755. https://doi.org/10.1016/j.ijproman.2010.06.005

[82] Van Doorn, J., Lemon, K. N., Mittal, V., Nass, S., Pick, D., Pirner, P., and Verhoef, P. C. (2010). Customer engagement behavior: Theoretical foundations and research directions. *Journal of service research, 13*(3), 253-266. http://doi.org/10.1177/1094670510375599

[83] Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., and Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda.

Journal of Business Research, 122, 889-901. https://doi.org/10.1016/j.jbusres.2019.09.022

[84] Vuong, Q. H. (1989). Likelihood ratio tests for model selection and non-nested hypotheses. *Econometrica: Journal of the Econometric Society*, 307-333. https://doi.org/10.2307/1912557

[85] Wan, X., and Chen, J. (2019). The relationship between platform choice and supplier's efficiency-evidence from China's online to offline (O2O) e-commerce platforms. *Electronic Markets, 29*(2), 153-166. https://doi.org/10.1007/s12525-017-0280-3

[86] Wan, X., and Feng, X. (2018). Online-to-offline (O2O) Platforms, Proprietary Platforms and Firm Performance. *WHICEB 2018 Proceedings, 27*. Retrieved from https://aisel.aisnet.org/whiceb2018/27

[87] Xiong, J., & Qureshi, S. (2012). Analysis of information and communications technology adoption between small businesses in China and the United States, *Information Systems and Quantitative Analysis Faculty Proceedings & Presentations, 51*. Retrieved from https://digitalcommons.unomaha.edu/isqafacproc/51/

[88] Xu, L., Paterson, A. D., Turpin, W., & Xu, W. (2015). Assessment and selection of competing models for zero-inflated microbiome data. *PloS one, 10*(7), e0129606. https://doi.org/10.1371/journal.pone.0129606

[89] Ye, Q., Gu, B., & Chen, W. (2010). Measuring the Influence of Managerial Responses on Subsequent Online Customer Reviews – A Natural Experiment of Two Online Travel Agencies (SSRN Scholarly Paper No. 163968). *Social Science Research Network*, https://doi.org/10.2139/ssrn.1639683

[90] Ye, Q., Li, H., Wang, Z., and Law, R. (2014). The influence of hotel price on perceived service quality and value in e-tourism: An empirical investigation based on online traveler reviews. *Journal of Hospitality and Tourism Research, 38*(1), 23-39. https://doi.org/10.1177/1096348012442540

<Appendix>

<Table 1A> Results of ZINB Regression Model

	Zero-inflation Model (Logit Link)	Count Model (Log Link)
Information Diversity	-0.53921*** (0.02949)	0.01009** (0.00344)
Responsiveness to Customers	-10.95822 (411.24913)	0.02669 (0.01774)
Degree of Functional Use	-1.85280*** (0.49082)	0.01733* (0.00758)
Tenure on Platform	0.00873** (0.00301)	-0.00111** (0.00036)
Type of Cuisines	-0.03495*** (0.00614)	-0.00096 (0.00077)
The Cumulative Number of Reviews	-1.12059*** (0.05810)	-0.00015** (0.00005)
(Intercept)	12.09720	1.43500
Log(theta)		17.35000
N	Zero obs. = 1,721	Non-zero obs. = 11,751
	13,472	

Note: Dependent variable = Ratings; *p < 0.05, **p < 0.01, ***p < 0.001; Robust standard errors in parentheses.

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