

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

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Abstract

This research investigates the effect of SMEs' digital transformation (DX) efforts in O2O platforms on customer engagement. Among the three DX stages (i.e., digitization, digitalization, and DX), this study focuses on digitalization, a practically viable DX phase for SMEs using O2O platforms. This study categorizes the DX efforts of SMEs into three: information diversity, responsiveness to customers, and the degree of functional use. To analyze the impact of these efforts on customer engagement, we conduct the zero-inflated negative binomial regression using the dataset of Naver Smartplace, one of the representative O2O platforms in South Korea. The analysis result confirms that all three factors have positive impacts on customer engagement. Therefore, this study demonstrates that employing O2O platforms can be an effective strategy for SMEs lacking resources to achieve successful DX.

Keywords: digital transformation (DX), O2O platform, small and mid-size enterprise (SME), digitalization, Naver Smartplace

1. Introduction

ICT development and dynamic social and industrial environments have forced companies to execute digital transformation(DX) (Verhoef et al., 2021). Many companies in various countries invest a lot of money to achieve 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). In this situation, researchers also are getting highly interested in various perspectives of DX, such as DX strategy(Bharadwaj et al., 2013; Fitzgerald et al., 2014; McAfee et al., 2011), consumer relationship in DX(Piccinini et al., 2015).

However, most of the previous studies on DX mainly targeted large companies(Nadkarni & Prüggl, 2021), not small and mid-size enterprises(SMEs) (Li et al., 2018; Matarazzo et

al., 2021). To fill this research gap, we focus on the DX of SMEs and analyze the effect of DX on SMEs' performance. SME refers to a privately owned company operated by a small number of employees and has comparatively small sales(Jie & Sajda, 2012). The research on the DX of SMEs is called since SMEs play a critical role in the national economy(Altman & Gabriele, 2013), and DX offers more opportunities for SMEs than large companies.(Blili & Raymond, 1993).

However, it is not easy for SMEs to prepare for DX due to their resources restriction(OECD, 2021). Still, SMEs can effectively implement DX by leveraging O2O platforms.(Min & Kim, 2020). The O2O(Online to Offline) platform is a service that attracts online platform users to offline retail stores such as Dianpin in China and Yelp in America(Li & Bart, 2018; Pan & Wu, 2020). Furthermore, DX increases

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customer engagement(CE) by improving customer experience (Davidovski, 2018). Since CE has a positive effect on firm performance, CE has attracted many reesearchers' attention (Brodie et al., 2013; Thakur & Summey, 2010). In this vein, this study aims to investigate the effect of DX efforts on SMEs' performance(i.e., CE).

II. Theoretical Background

2.1. Digital transformation and SMEs

DX can be described in three phases: digitization, digitalization, and DX(Verhoef et al., 2021). Digitization, the first phase, concerns transforming analog data into digital information. In the next phase, digitalization conceptualizes the effort to enhance business processes by utilizing information technology or digital technology. The last stage, DX refers to the overall change of a company to develop its new business model(Verhoef et al., 2021). Most SMEs are at the first stage of DX(Guha et al., 2018; Harrigan & Miles, 2014; Jain, 2015; SEMAS, 2020). However, by participating in O2O platforms, SMEs can obtain digitalization without putting in many resources(Chen et al., 2014; Liang et al., 2018). O2O platforms offer various embedded tools that can help SMEs to develop new operational capabilities and routines for DX(Chen et al., 2014). Despite the promising opportunities for SMEs, scant attention has been paid to SMEs' digitalization efforts on the O2O platform. To fill this gap, we focus on investigating the effort of SMEs participating in the O2O platform specifically for digitalization.

2.2. Customer engaegment and SMEs

CE is defined as customers' behavioral manifestations with a brand or firm focus, resulting from motivational drivers, a behavior beyond a simple transactional action(Van et al., 2010). Some research have revealed that CE not only improves firm performance, but allows a firm to acquire a sustainable competitive advantage(Kumar & Pansari, 2016), increasing sales, profit, customer satisfaction, and customer loyalty(Brodie et al., 2013; Di & Wasko, 2009; Thakur & Summey, 2010). Despite the benefits of CE, SMEs are likely

to overlook the importance of CE because CE 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(Ahmad et al., 2012; Ates & Bititci, 2011). But considering the positive effect of CE on a firm's performance, CE should be a strategic business goal of SMEs.

III. Hypothesis Development

As the amount of information provided by a firm increases, current and potential customers have more evidence to make a purchase decision, leading to positive firm performance(Chung et al., 2020). Previous research shows that firms' high volume of postings on social media stimulates innovation(Gallaughar & Ransbotham, 2010) and prompts CE (Miller & Tucker, 2013). Thus, this research assumes that the more informative content SMEs provide, the higher the CE will be in the O2O platform as in the other platforms. We define information diversity as the amount of information supplied by SMEs on the O2O platform. Accordingly, we derive the first hypothesis as follows.

H1: The information diversity in O2O platforms has a positive effect on CE.

O2O platform presents an opportunity for customers to share their experiences on products or services through review publicly. The review significantly impacts other customers' purchase decisions(Mathwick & Mosteller, 2016). By responding to customer reviews, firms can reduce the likelihood of negative or wrong assumptions that potential customers may make based on reviews(Sparks & Bradley, 2017), and create a positive reputation(Lee & Song, 2010). Therefore, we expect responsiveness to customers in O2O platforms to positively affect CE. Responsiveness to customers means whether SMEs have responded to customers' reviews on the O2O platform. Thus, we derive the second hypothesis as follows.

H2: The responsiveness to customers in O2O platforms has a positive effect on CE.

SME restaurants can improve resource utilization(Wan & Feng, 2018), and enhance operational efficiency(Wan & Chen, 2019) by adopting digital functions in O2O platforms such as online booking, ordering, etc. In addition, the degree of using the platform-based functions in the online marketplace increases sales performance(Li et al., 2019). This will also have a positive impact on CE. We define the degree of functional use as how many functions SMEs use in the O2O platform. Thus, the following hypothesis is derived.

H3: The degree of functional use in the O2O platform has a positive effect on CE.

3.1. Research context and Data

To investigate the effect of DX on SMEs' performance, we collaborated with Naver, the largest ICT corporation in South Korea. Naver operates Naver Smartplace, the O2O platform service, and offers SMEs innovative and competitive business growth opportunities(Kim et al., 2022). As of 2021, there are 2.1 million businesses registered to Naver Smartplace. Hence, with its massive number of users and innovative digital functions embedded in the platform, Naver Smartplace presents a great context to research the effect of DX on SME performance. Specifically, we narrowed our investigation of SMEs to the restaurants on Naver Smartplace. Because the restaurant industry lagged behind technology innovation(Tan & Netessine, 2020), it has a high proportion of SMEs(Korean Statistical Information Service, 2020).

Naver provided the Naver Smartplace dataset, including name, location, other business-related information(e.g., menu, website address, opening hours, and services options, etc.), digital functions in-use(e.g., booking, ordering, automated booking confirmation features), the number of reviews, the number of responses to reviews and ratings as of June 30, 2021. We randomly sampled 14,905 restaurants located in Gangnam-gu, Seoul. We identified and removed a restaurant with more than 400 reviews as outliers from the dataset. As a result, the final dataset includes 13,472 restaurants.

3.2. Variables

We measure CE, a dependent variable, a positive outcome of digitalization, as the cumulative number of reviews as of June 30, 2021. This paper considers writing reviews as CE because writing reviews can significantly affect the purchase decision of potential customers(Mathwick & Mosteller, 2016) and be measured on the O2O platform.

Our first independent variable is information diversity measured by information provided by SME owners in four categories: menu, website address, opening hours, and services options. Next, responsiveness to customers is operationalized by a binary variable, which indicates whether a restaurant has responded to customer reviews at least once(Kumar & Kumar, 2018). Customers can leave reviews only when proven to be a real buyers with a purchase receipt or Naver booking history. If the SME owner has never responded to customer reviews, the variable would be 0; if not, it would be 1. Last, for the degree of functional use, we counted the number of platform-embedded functions that SMEs use in three categories - booking, ordering, and automated booking features-reducing SMEs' communication costs and customers' waiting time. Moreover, we identified three control variables that may influence the dependent variable, CE: the type of cuisine, tenure on the O2O platform, and ratings. (Anderson & Magruder, 2012; Bujisic et al., 2017; Tamimi & Sebastianelli, 2015).

IV. Research Methodology

4.1. Descriptive analysis

The mean of the dependent variable(i. e., the average number of reviews) is 73.61, and its range covers from 0 to 399. Meanwhile, in terms of our independent variables, the dataset presents that the digitalization of the restaurant is lagged behind(Guha et al., 2018; Harrigan & Miles, 2014; Jain, 2015; SEMAS, 2020). 26.1% of the restaurants did not have any information of the website address, menu, opening hours, and service options on the platform. In addition, only 7% of the restaurants responded to customer reviews. Over 90% of restaurants did not use any platform-embedded functions.

4.2. Zero-Inflated Negative Binomial Regression

In this study, a zero-inflated negative binomial(ZINB) regression model was used to analyze the effects of SME digitalization efforts on consumer engagement. The ZINB regression model is suitable when the count data depicts over-dispersion and the excess number of zero values does not follow normality(Ridout et al., 1998; Ridout et al., 2001, Heilbron, 1994). Before conducting the ZINB regression model, we calculated VIF(variance inflation factor) to detect multicollinearity and found that there was no multicollinearity problem(Allison, 2012; Midi et al., 2010).

Table 1 presents the results of our ZINB regression model. The factors that have a significant influence on non-occurrence of review are tenure on the platform($\beta = -0.06035$, $p=0.0357$) and the type of cuisines ($\beta = -272.70232$, $p < .001$). In terms of the estimation result of the count model, the factors statistically significantly related to CE are all independent variables: information diversity ($\beta = 0.21809$, $p < .001$), responsiveness to customers ($\beta = 0.09993$, $p < .001$), degree of functional use ($\beta = 0.19670$, $p < .001$). 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 information presented and 19.7% per one more function they use. The number of reviews also increases by 10% if they respond to customer reviews.

<Table 1> Results of ZINB regression model

	Logistic model	Count model
Information diversity	0.01045 (0.10588)	0.21809*** (0.01012)
Responsiveness to customers	0.09097 (0.24475)	0.09993*** (0.02160)
Degree of functional use	-10.53222 (46.61695)	0.19670*** (0.05024)
Tenure on platform	-0.06035* (0.02874)	0.01312*** (0.00108)
Type of cuisines	-272.70232*** (36.27796)	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: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Dependent variable=CE; Robust standard errors in parentheses.

V. Discussion and conclusion

Our analysis result confirms that SMEs' digitalization efforts on the O2O platform positively impact CE. Namely, the result shows that even SMEs that can not invest many resources in digital technologies can increase CE if they use the O2O platform to present their information, respond to customer reviews, or utilize various functions. Furthermore, like a large company, SMEs serving customers immediately and devoting a lot of resources can succeed in DX. Still, it can also be an excessive burden on SMEs. However, this study found that even if SMEs invest a minimum amount of resources utilizing the o2o platform, such as offering business information once, they can achieve a sufficiently positive effect.

This study provides the theoretical and practical implications for SMEs as follows. First, this study examines the digitalization effort of SMEs on CE, which lacked academic interest compared to large companies. Second, the study describes DX as three phases(i.e., digitization, digitalization, and DX), focusing on digitalization, a feasible phase that SMEs can achieve by participating in O2O platforms(Verhoef et al., 2021). Third, the study empirically proves that DX efforts(i.e., information diversity, responsiveness to customers, and the degree of functional use) by SMEs on O2O platforms have a positive effect on firms' performance(i.e., CE). Namely, it helps increase CE to (1)present basic business information, such as menu, website address, opening hours, and services options in O2O platforms, (2)respond to customer reviews personally, and (3)use the functions of O2O platforms such as booking, ordering, and automated booking confirmation for firm performance.

Although this study has several implications, there is room for improvement. First, If responsiveness can be measured by a volume of response, as in Chen et al.(2015) and Sheng(2019), the study could analyze the impact of the strength of responsiveness on CE. Second, The results of the study will be more prosperous if panel data is secured and further analysis of the CE of SME's digitalization effect over

time. Third, this study controlled the regional effect by limiting restaurants' data in Gangnam-gu, Seoul, South Korea. However, the results may be different if the study is conducted using data from other regions with different extent of digitalization.

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