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Exploring the Influences of Network Effect and Relationship Quality on the Continuous Usage Intention of O2O Service: An Evidence from Food Delivery Service Applications Industry

Min-Jeong Kim¹ and Jaehyung An^{1,*}

¹ College of Business, Hankuk University of Foreign Studies

*Corresponding Author: jbahn85@gmail.com or jaehyung.an@hufs.ac.kr

Abstract: With the spread of smart-phones and the vitalization of mobile apps, O2O (Online-To-Offline) service that draws potential customers from online channels to physical stores has been spread widely. As such, the importance of interacting and networking within O2O services has been bolstered, but academic approaches on relevant problems are still lacking. Therefore, in this paper, we aim to study and develop the relationship-based improvement of O2O service by investigating the value of social and network effects. By focusing on the most popular case of O2O business, food delivery service applications industry, we examine the influence of social impacts characteristics including network effect and relationship quality on continuous usage intention of customers. We find that network colleague, network reputation, interaction and social support make users have positive continuous usage intention.

Network colleague and network reputation are related with reactions of close-acquaintances rather than those of other general user populations. Accordingly, it is expected that the marketing strategy focusing on close network of each individual users (e.g., the coupon system borrowed from social network games and sharing events using users' buddy lists) will be effective for generating continuous usage intention. Furthermore, we demonstrate that interaction and social support factors also generate positive user satisfaction by being connected with trusts. Therefore, it suggests companies should construct efficient communication channel for facilitating frequent interaction among users. Unlike previous literature, our study utilizes social impact factors as an independent variable. Moreover, network colleague and network reputation factors, which are shown not to affect continuous usage intention in previous studies, are proven as significant factors from our study. This implies that companies can increase customer retention rate as well as explicit profitability by emphasizing network and social impact factors of O2O business.

Keywords: O2O service, continuous usage intention, network effect, relationship quality, user satisfaction

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1. INTRODUCTION

1.1. Background

It is no surprise that most of our consuming practices have been carried out through mobile applications since the introduction of smartphones. As the number of smartphone users in Korea has increased rapidly in a short period of time, mobile apps have also developed and extended the volume and range of mobile commerce. The age of distribution revolution led by mobile has increased customers' needs and desire for purchasing products at reasonable prices anytime and anywhere by utilizing various channels online and offline. The concept formed by this change of customers is O2O which has shown a substantial amount of growth recently. O2O has become a primary marketing tool, not the business issue for companies to adapt to the new consumption environment. Most of all, the vitalization of food delivery app services is the most successful case of O2O services. Customers can make a more efficient choice in the decision making process for purchase because it's possible to consider user reviews about service and comments on food in delivery apps.

Food delivery apps which are most significantly associated with the real life of O2O business have high receptivity, so it is expected to use actively in the future. Those service providers are competing desperately to secure more users. Because it is important to understand the factors determining customer's attitude here and now, this study figures out social impact characteristics that influence continuous usage intention of delivery app users so that it can be conducive to sustainable growth of O2O. Social relationships with O2O services on smartphones play an important role in enabling users to have positive intentions (Holmlund, 2008). Nevertheless, existing studies have not given significant importance to social factors such as network effects or relationships. However, it is impossible to ignore the value of social impacts in modern society, focusing on establishing relationships with other people, using O2O services. Therefore, it is believed that this study will be used to ensure that consumers intend to continue to use the O2O Services to keep their customers informed of the social impact. Also, companies may use the study as a reference to build future strategies by measuring success or failure of their products or services.

1.2. Research Methods

Based on the Expectation Confirmation Model, this study investigates the influence of social impacts on the continued usage intention of the delivery apps using O2O services. A total of seven hypotheses have been formulated about network effects and relationship quality which are the social impact factors influencing the continuous usage intention of O2O services derived from existing Expectation Confirmation Model. After performing analysis based on the 68 valid responses of 89 respondents, network colleagues and network reputation, both of which are sub-elements of network effect, and all sub-elements of relationship quality affect continuous usage intention of delivery apps. We expect that both consumers and companies will be able to benefit from improving O2O service on that basis.

In this study, the users of the three main delivery apps, "BaeMin", "Yogiyo" and "Bdtong", are selected for major survey and research subjects. According to a survey conducted by Wise App, an application data analytics company, BaeMin ranked 63rd in terms of active users among the total number of applications registered in the entire Google Play store last February. Yogiyo ranked the 101st and Bdtong 288th place. During the same period, in terms of the number of app users, BaeMin was the most popular with 2.98

million users, Yogiyo followed with 1.78 million users, and Bdtong was used by 0.61 million users. Thus, we select those three apps because they are considered to be the most popular among the domestic delivery apps.

2. THEORETICAL BACKGROUND & PREVIOUS RESEARCH

2.1. O2O Business

The term “Online to Offline (O2O)” was first mentioned in “Tech Crunch” (Alex Rampell, 2010), The U.S. online media in the IT field, in 2010 and began to be used in earnest. Although there are differences depending on the user, O2O is a business strategy to build new business models, expand service areas, and enhance customer management and marketing efficiency by interconnecting online and offline channels (Hyung-Taek Kim, 2015). In other words, O2O refers to a service that creates a new value by correlating both online and offline channels intimately.

The background of O2O is the advancement of information technology. In the early stages of the commodity market that has mass production system after the Industrial Revolution, the supplier’s bargaining power prevailed during the trading process. However, the online market that appeared with the advent of the Internet in the 2000s began to change consumer buying patterns. As people can obtain information regardless of time and place with the spread of smart phones and advances in communications technology, the consumer’s bargaining power is becoming stronger than the provider’s. Companies that understand this situation are eyeing O2O as a new strategy.

Today O2O service is increasingly expanding into diverse industries, starting with ease of use from mobile in everyday life. Among them, the typical O2O service is a food order, leveraging the mobile app to broker the deal with the nearest order vendor. According to ‘2015 Survey on Internet Economic Activity’ released by Korea Internet & Security Agency (KISA) and Ministry of Science, ICT and Future Planning on January 31, 2016, food delivery orders through mobile apps are estimated at approximately 1 trillion won, which is 10 percent of domestic deliveries, and the entire delivery app download has exceeded 40 million. Also, the recognition rate of Korea’s smartphone users for food delivery apps accounts for 61.6 percent of the smartphone users, the highest among other O2O sectors. Only 41 percent of users have real experiences to use delivery apps, and 51.8 percent answer they intended to use them. The main reason why O2O delivery apps could grow rapidly is because Korea has a stable basis for delivery systems, such as the population density of food deliveries and late-night meal cultures. In addition, delivery apps have grown faster because of the increase of single-person households and income levels. Under these circumstances, the delivery app business is considered to be the most common and successful case of the O2O business in Korea, which is chosen as the subject of research.

2.2. Literature Review

(a) *The Social Impacts*

In relation to online services, acceptance intent is primarily conducted using perceived usefulness and perceived ease of use based on the technology acceptance model of Davis (1980). Since then, the concept of continuance intention of online services has been demonstrated using the expectation confirmation

model (Bhattacharjee, 2001), as online services are defined as a technical factor, and the factors such as system quality, information quality, and related issues of security are introduced.

In a prior study regarding mobile commerce, Sang-Hoon Kim, Gye-Young Park and Hyun-Jung Park (2007) explain that usefulness, convenience, and social impact affect intention to use. Social impact refers to a person's influence on others' behaviors in the conduct of a particular individual. Recent studies have highlighted the changing process of decision making due to the combination of social impact and the nature of the service itself. Modern online service users tend to prefer the services chosen by the majority because they value creating social relationships. According to Sung-Yong Jung (2017), the network effect, which is the effect that the particular service becomes more valuable when the user prefers the large-scale service, and the relationship quality, which is a quality factors perceived during the relationship between multiple users, have been useful in explaining the description of social impact. Therefore, in this study, we want to understand the impact of network effects and relationship quality on the intent of continuous use by means of user satisfaction as a parameter, according to the preceding study of Sung-Yong Jung (2017).

(1) *Network Effect*: Online service users tend to participate in relatively larger networks. The greater the size of the network, the greater the chances that they will be able to interact with other users. If the service has many of the network users, it is expected that the service will have higher reliability and provide more benefits. Katz and Shapiro (1985) defines network effect as a rising effect that will increase the value obtained from network participation when the number of users increases. The study of Hee-Taek Kang (2012) on the blog usage intention indicates that the perceived network size is statistically significant in relation to the continuance usage intention.

(2) *Relationship Quality*: Consumers of O2O Services get a positive intention by gaining satisfaction, affected by interacting through relationship formation between users, sharing information, and sympathizing emotional responses. According to most antecedent studies, quality of relationship occurs in interactions between users for long periods of time. Yoo-Kyung Kim and Woong Hur (2003) explain that relationship quality is an expectation of interactivity and positively affects the usage intention. Kim and Ok (2009) find that the benefits from the service provider through long-term relationships between participants, such as removal of uncertainties in the purchase process and increased efficiency of decision making, are important.

(b) Expectation Confirmation Model

In order to explain the relationship between consumers' satisfaction and continuance intention to use, Oliver's expectation disconfirmation theory model (1980) has been widely used. According to the model, consumers determine satisfaction with the actual performance, and the intent of the use is determined by the satisfaction. In other words, consumers will end up using the product because of dissatisfaction when the satisfaction level of the actual purchase is lower than the expectations before buying the actual purchase. Later, expectation confirmation model suggested by Bhattacharjee (2001) claims the limitations of expectation disconfirmation model. The model indicates that consumer's expectation confirmation has a positive effect on perceived usefulness and satisfaction.

Bhattacharjee (2001) stated that the expectation confirmation is a determining factor that affects consumers' satisfaction rather than perceived usefulness. A study of online banking conducted by Bhattacharjee (2001) notes that perceived usefulness and satisfaction for information systems affect the

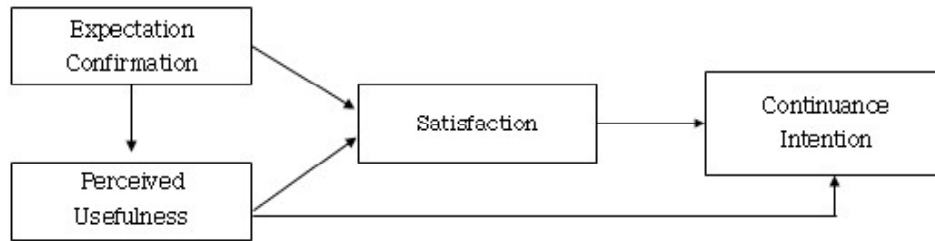


Chart 1: Expectation Confirmation Model (Bhattacharjee, 2001)

continuance intent of the use. However, Dae-Jin Kim (2011) claims that he cannot explain a multipurpose information system only with perceived usefulness and expectation confirmation, which are published in the study of Bhattacharjee (2001). Hun Choi and Jin-Woo Kim (2006) also suggests that the study of Bhattacharjee (2001) is restricted to systems used for specific purposes such as online banking. Therefore, it is difficult to apply only perceived usefulness and expectation confirmation to current information system environments with high complexity and diverse objectives. In the study of the O2O Service Comprehensive Research Model, Sung-Yong Jung (2017) suggests a research model that chooses system quality and information quality as online characteristics, service quality, quality of goods, and shopping experience as offline characteristics, and network effect and relationship quality as social characteristics. Bhattacharjee (2001) deals with the relationship between expectation confirmation and user satisfaction, but in the study, expectation confirmation is replaced by the user's perceived value.

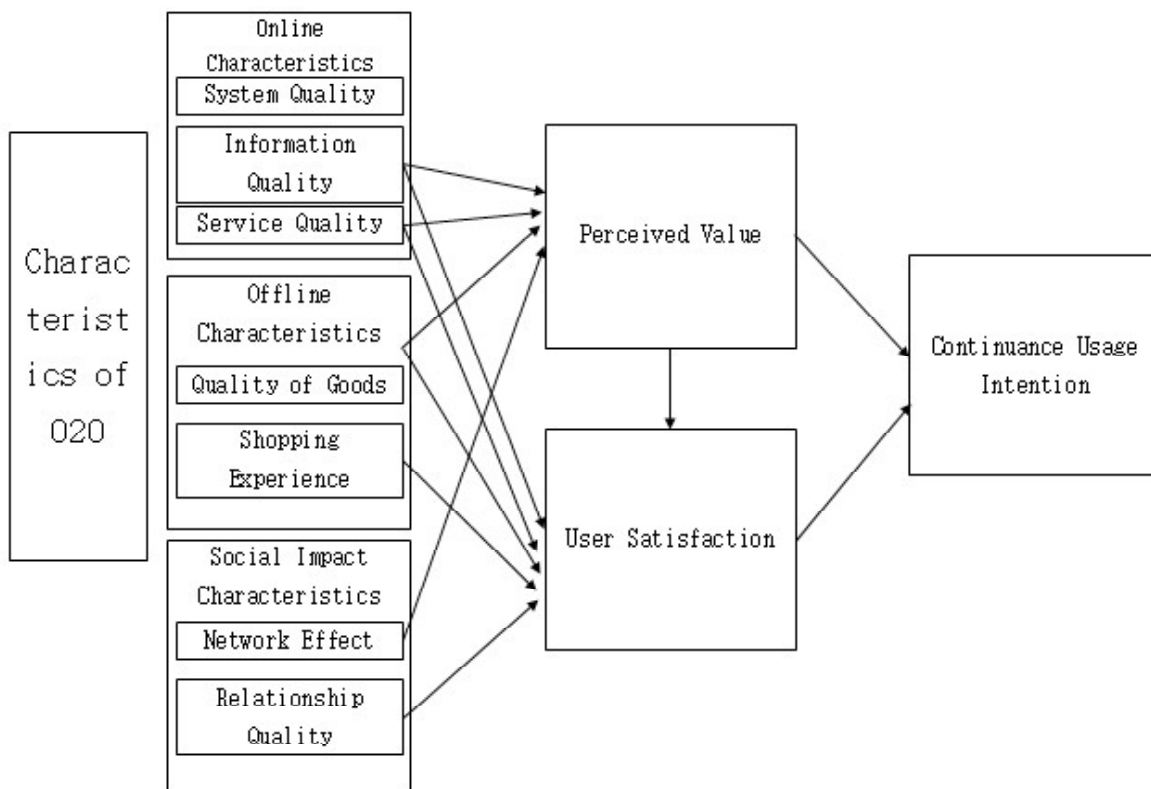


Chart 2: O2O Service Comprehensive Research Model (Sung-Yong Jung, 2017)

(c) User Satisfaction

In a prior study of expectation conformation model, satisfaction is perceived as the most important factor in continuance usage intention. According to Anderson et. al. (1994) and Bolton (1998), the user's satisfaction is a positive response for the company's products or services, affecting the improvement of profitability of business and the maintenance of relationships between corporate and users. Jae-Hoon Kim, Lin-Zheng Bai and Jeoung-Woo Byun (2015) suggests that user satisfaction is a comprehensive assessment of the purchase and consumption experience of a particular service or product, and the extent to which the needs and desires of consumers are met. Moreover, when the user uses the application, satisfaction increases due to the perceived value is a positive contributor to the intent to use, and user satisfaction can be used as a representative factor to describe the intention to use (Jae-Hoon Kim, Lin-Zheng Bai, Jeoung-Woo Byun, 2015). According to Myung-Jin Lee and Hyeon-Suk Park (2012), relationship quality and e-service quality affect consumers' satisfaction and provide positive results for their continuance usage intentions. Similarly, in the same way that users are likely to have positive usage intentions when they are satisfied with both online and offline environment, this study also defines user satisfaction as a key parameter in relation to the relationship between social impact factors and continuance intention of O2O services.

(d) Continuous Usage Intention

Continuous usage occurs after the acceptance stage and takes place over a long period of time. According to Deng (2005), continuous usage is defined as a situation that enables users to perform tasks more quickly, efficiently, and creatively, thereby creating a substantial value for the information system. Since the information system is able to achieve the ultimate success when consumers use the system continuously after the acceptance of it (Bhattacharjee, 2001), continuance usage intention is recognized as an important concept at the same time as user satisfaction in the field of management informatics. Dorsch et al. (2000) states that the continuance usage intention is a key concept for maintaining on-going relationship between users and businesses, and the expected benefits based on the previous experience in the past play an important role. Studies have also shown that user satisfaction has a positive effect directly on the potential behavior, such as the intent of continuous action intent (Oliver, 1980). Like a wide variety of antecedent studies, this study also refers to continuance usage intention as a dependent variable based on the study of Bhattacharjee (2001).

3. RESEARCH MODEL & HYPOTHESIS

3.1. Research Model

This study intends to verify whether the social impact factors affect continuance usage intention by the medium of user satisfaction, through expectation confirmation model. The relationship between user satisfaction and continued intent to use is referred to as the study model proven by Bhattacharjee (2001) and 'An comprehensive research model reflecting the online and offline characteristics, and social characteristics upon consideration of mobile environments', developed by Sung-Yong Jung (2017). However, since the perceived usefulness of the research model of Bhattacharjee (2001) has been implicit in each characteristic of O2O services presented in the study of Sung-Yong Jung (2017), it has been excluded from avoiding duplication. Therefore, the final research model is shown in Chart 3.

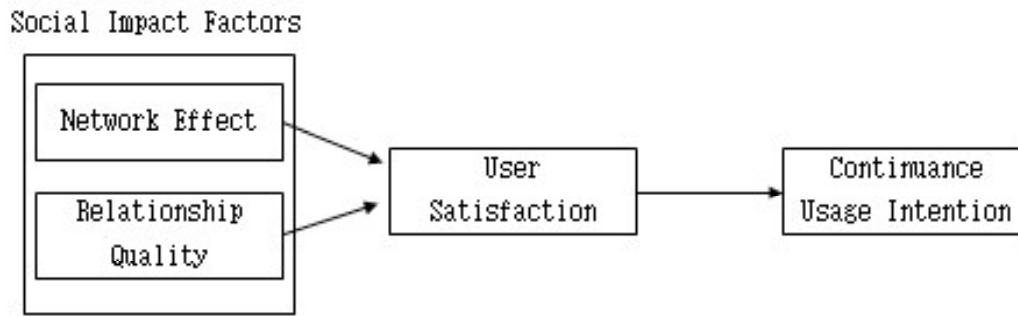


Chart 3: Research Model

3.2. Research Hypothesis

Through prior studies, it is found that social impact factors contributed significantly to the continued usage intention of O2O service. Therefore, the following assumptions are established utilizing the expectation confirmation model (Bhattacharjee, 2001) and the O2O services comprehensive research model (Sung-Yong Jung, 2017). This study establishes the network effect and relationship quality as the subordinate concepts of social impacts according to the preceding study.

(a) Hypothesis of Network Effect

- [H1] Network effect of the O2O service will have a positive influence on user satisfaction.
- [H1-1] Network size of the O2O service will have a positive influence on user satisfaction.
- [H1-2] Network colleague of the O2O service will have a positive influence on user satisfaction.
- [H1-3] Network reputation of the O2O service will have a positive influence on user satisfaction.

(b) Hypothesis of Relationship Quality

- [H2] Relationship quality of the O2O service will have a positive influence on user satisfaction.
- [H2-1] Interaction of the O2O service will have a positive influence on user satisfaction.
- [H2-2] Social support of the O2O service will have a positive influence on user satisfaction.

(c) Hypothesis of User Satisfaction

- [H3] User Satisfaction of the O2O service will have a positive influence on continuous usage intention.

3.3. Operational Definition

(a) Network Effect

Network effects are divided into network size, network colleagues, and network reputation. Network size is defined as “the total number of O2O services using the same O2O service”, the number of network colleagues is “the size of their peers, family and acquaintances using the same O2O service”, and network reputation is “the extent to which the O2O service is perceived to be highly intelligent and favorable”. The configuration of measurement items is shown in Table 1.

(b) Relationship Quality

Relationship quality is divided into interaction and social support. As a prior study, the interaction is “the degree of a reciprocal behavior or process between O2O service users”, and social support is defined as “the extent to which the O2O service users maintain a supportive relationship to solve the problem situation together”. The configuration of measurement items is shown in Table 1.

Table 1
Measurement Items for Network Effects & Relationship Quality

	<i>Variables</i>	<i>No.</i>	<i>Measuring Item</i>	<i>References</i>	
Network Effect	Network Size		<The O2O service that I use>	Lin & Lu (2011), Sang-Hyun Oh, Sang-Hyeon Kim (2008)	
		1	The service is used by most people.		
		2	Those who use the service will continue to increase.		
			3		The service is more popular than other services, so people prefer it.
	Network Colleague	4	Most of the friends and acquaintances use the service.		Lin & Lu (2011), Bhattacharjee (2008)
		5	Friends and acquaintances who use the service will continue to increase.		
		6	Friends and acquaintances prefer the service to other O2O service.		
	Network Reputation	7	The service is highly conscious.		Lin & Lu (2011), Sang-Hyun Oh, Sang Hyeon Kim (2008)
		8	The service has a good reputation.		
9		The service is reputed to be professional.			
Relationship Quality	Interaction	10	The service seeks to co-operate in order to provide useful services.	House (1981), Ki-Hun Han (2012), Sang-Hyeon Kim, Sang-Hyun Oh (2002)	
		11	The service provides the environment for collaboration in the decision-making process.		
		12	The service strives to interact with various participants.		
	Social Support	13	The service gives me information that helps me solve problems when I get a problem.		Chen, Choi (2011), Li, Turban (2012), Rosenbaum, Messiah (2007)
		14	The service provides me with a solution to deal with difficult situations.		
		15	The service is thought to be on my side when a difficult situation arises, such as a service dispute.		

(c) User Satisfaction

User satisfaction is defined as “overall satisfaction of O2O Services” according to the preceding study. The configuration of measurement items is shown in Table 2.

(d) Continuous Usage Intention

Continuance usage intention is a contributory factor resulted in continued use by the person who has used O2O services at least once. The configuration of measurement items is shown in Table 2.

Table 2
Measurement Items for User Satisfaction & Continuous Usage Intention

<i>Variable</i>	<i>No.</i>	<i>Measuring Item</i>	<i>References</i>
User Satisfaction		<Using O2O services>	
	16	Using O2O services can make life easier.	Bhattacharjee (2001),
	17	Using O2O services is more useful than using existing services.	Lin & Lu (2000), Dae-Jin Kim (2011), Ki-Hun
	18	O2O service has its own advantage.	Han (2012), Won-Jin
	19	The use of O2O service was generally satisfactory.	Jung (2012)
		<O2O service that I am currently using>	
Continuance Usage Intention	20	I will continue to use the service without interruption.	Bhattacharjee (2001),
	21	I will use the service rather than the other alternative.	Bagozzi, Dholakia (2006),
	22	I will continue using the service as the same frequency.	Perugini, Bagozzi (2001),
	23	I intend to increase the use of the service in the future.	Dae-Jin Kim (2011)

3.4. Estimation & Methods of Analysis

The survey in this study is conducted for a total of nine days from April 20 to 29, and polled consumers of various ages ranging from teenagers to 50s. Further, the survey is conducted through link attachments using the questionnaire function of Google Docs and written questionnaire surveys. The survey configuration and measurement methods are shown in Table 3.

Table 3
How to Configure and Measure the Survey

<i>Division</i>	<i>Measuring Items</i>	<i>The number of Questions</i>	<i>Measurement Scale</i>	<i>Remarks</i>	
Social Impact	Network Effect	Network Size	3	5-point Likert Scale	Independent Variable
		Network Colleague	3		
		Network Reputation	3		
	Relationship Quality	Interaction	3		
		Social Support	3		
User Satisfaction		4		Parameter	

The analysis method for verifying the hypotheses is using the correlation analysis and regression analysis of the data analysis tool of Excel, based on the survey data. First of all, we obtain the averages of

individual respondents' responses for each survey item, extract data corresponding to the variables of each study hypothesis, and analyze the correlation analysis and regression analysis. Then, the P value is obtained through using R^2 , a coefficient of determination from the regression analysis, and F-test carries out at significance level of 95%. The smaller the P value is less than 0.05, the more likely it is that the regression line can be explained statistically significant. This study also notes that P value is not significant for regression equations larger than 0.05. R^2 refers to the overall explanatory power of independent variables for the dependent variable and has a range of not less than 0 and 1. The closer the R^2 is to 1, the greater the Y value, i.e. the variation of the dependent variable is explained with regression line. The closer the R^2 is to zero, the less likely the Y value is described with a regression line. In this study, the explanation of the hypothesis is possible when the coefficient of determination is higher than 0.5, the mean of the coefficient of determination, considering the limitations of the specimen in small quantities and uneven selection.

The study refers to a research model already validated in the study of Bhattacharjee (2001) and Sung-Yong Jung (2017). According to this study and the prior studies, user satisfaction has a positive effect on continuous usage intentions as a parameter. Thus, analyses between independent variables and dependent variable are omitted in the assumption that mediating effect of user satisfaction exists in the relationship between social impacts characteristics (dependent variables) and continuance usage intention (independent variable).

4. ACTUAL ANALYSIS & RESEARCH FINDINGS

4.1. Demographic Characteristics of Samples

In this study, a total of 89 general consumers are surveyed to verify hypotheses. As a result, we receive a valid response from 68 respondents who had more than one experience using delivery apps, and their questionnaires are finally used for analysis. Respondents who answer that they have no experience using the delivery app service are excluded from analysis.

The gender distribution of the entire respondents consists of 35 males and 54 females, and the percentage of female respondents is higher. Among age groups, there are one respondent aged 0 to 19, 56 aged 20 to 29, 23 aged 30 to 39, 3 aged 40 to 49, and 6 respondents in their 50s and older. Among 68 respondents, there were 26 men and 42 females. There is one respondent aged 0 to 19, 49 aged 20 to 29, 18 aged 30 to 39, and no valid respondent in 40s, 50s and older. This shows that respondents mostly in their 20s and 30s have more than one experience using delivery app.

Meanwhile, in case of 21 respondents who have never experienced delivery app service, 9 men and 12 women are found. Among age groups, there are 7 respondent aged 20 to 29, 5 aged 30 to 39, 3 aged 40 to 49, and 6 respondents in their 50s and older. All of respondents in their 40s and 50s answer that they have no experience in using their delivery apps, which means that the older generation has less experience with the delivery app. However, since the number of samples is low and the survey is randomly selected, and the distribution ratio of the respondents' gender and age is uneven, it is likely that the credibility of results of this research is slightly less reliable.

4.2. Testing of Hypothesis

We use a 5-point Likert scale in the survey, calculate the coefficient of correlation and significance, and analyze the relationship between the items and the impact of the Likert scale questions on the basis of which they are influential. When significant correlation by correlation analysis and the positive sign (+) exists, the positive correlation is established. When significant correlation exists and the sign is negative (-), the negative correlation is established. The correlation analysis results correspond to the positive (+) parameter for all variables, so all variables set in this study have positive correlation.

In the case of regression analysis, we conduct an F-test to demonstrate significance, selected significant explanatory variables, and suggest the final regression model and interpretation. This study assumes that the hypothesis is not statistically valid if P-value is greater than 0.05, and it is rejected. Furthermore, because the total number of respondents is insufficient and the ratio of the age of the age-specific proportion is not consistent, it is deemed that the explanatory power is deficient if R² is lower than 0.5, the average of the coefficient of determination.

As a result of analyzing the hypothesis of this study, seven of the total eight hypotheses are adopted.

Table 4
Result of Hypothesis Testing

<i>The Research Path</i>		<i>Coefficient of Determination R²</i>		<i>P-value</i>	<i>Result</i>	
H1	Network Effect → User Satisfaction	0.543447	Explicable	0.048427	Significant	Adoption
H1-1	Network Size → User Satisfaction	0.527282	Explicable	0.055684	Not Significant	Dismissal
H1-2	Network Colleague → User Satisfaction	0.342686	Less Explicable	0.000271	Significant	Adoption
H1-3	Network Reputation → User Satisfaction	0.539187	Explicable	0.028013	Significant	Adoption
H2	Relationship Quality → User Satisfaction	0.618315	Explicable	0.017171	Significant	Adoption
H2-1	Interaction → User Satisfaction	0.605801	Explicable	0.000464	Significant	Adoption
H2-2	Social Support → User Satisfaction	0.462077	Less Explicable	0.024290	Significant	Adoption
H3	User Satisfaction → Continuance Usage Intention	0.630567	Explicable	0.004966	Significant	Adoption

4.3. Research Findings

(a) Relationship between Network Effect and User Satisfaction

Given the specifics of the network effect, the relationship between network size and user satisfaction is not statistically significant. It can be seen that recognizing the availability and preferences of other users using the corresponding delivery app service does not have a positive effect on the satisfaction of individual consumers. Given that the main targets of the survey are in their 20s, there is a possibility that the users in

20s may have reflected a particular propensity viewed in their social relationships. Currently, as the proliferation of individualism in Korea appears clearly in the younger generation, they put a priority upon one's personal affairs and appear insensitive to human relationships that are not directly related to themselves. When it is applied to the analysis results, satisfaction of the users in their 20s is high when the attributes of the service match the value orientation of individuals before responding to the needs of others and groups externally disclosed. While other preferences may be considered in the process of judgment, the final choice is assumed to influence the criteria that individual users are most important to. Even if many other people use the services, users in their 20s don't feel satisfied unless the services meet their needs. For example, students in their early 20s who are sensitive to the price tend to prefer Yogiyo which has a lot of discount information, rather than BaeMin which takes first place in terms of the number of downloads. Since they are a generation familiar with the Internet and smartphones, they can actively find the information they need. For this reason, the network size factor that simply shows the status of other people's needs is not significantly affecting their decision-making, and it does not seem to be relevant to the user's satisfaction.

On the other hand, the relationship between network colleagues and user satisfaction is statistically significant. It is assumed that the delivery app users are aware of the delivery apps used by friends or acquaintances rather than the needs of other people who do not have social relationships with themselves. As a result, the higher the number of people who use the same app together, the better the satisfaction. This is due to the fact the intimacy and sense of kinship that have been built in the previous relationship has increased because they find that they use the same service.

For network reputation, it can be statistically significant and explained, but R^2 is not significantly above 0.5, like the coefficient of determination of the network size factor. The relationship between network size and user satisfaction is not statistically significant, and the relationship between network colleague and user satisfaction is significant. Based on these results, users are believed to have responded based on recognition and response from peer users, rather than typical other users in network reputation measurement items.

Network effect is the external effect of a change in the individual's demand for certain goods and services, not independent and associated with the needs of others. In online services, as the number of users increases, the value of goods consumed, convenience, and utility also increase. It is because we expect more benefits from social relationships with other users if we use the network with large numbers of users. The validation reveals that network colleague and network reputation among detailed items of network effect have a positive impact on user satisfaction. As a result, the number of fellow users who already have social relationships with individual users suggests higher satisfaction with the use of the delivery app.

The hypothesis that network effect has a positive effect on user satisfaction has been statistically significant and informative. However, considering the fact that network size is not statistically meaningful, it is assumed that the positive effect of network colleague and network reputation on user satisfaction is relatively larger than network size, the other detailed item of network effect. Thus, if the impact of network effect on user satisfaction is determined to be positive, the exclusion of the network size factors should be considered.

(b) Relationship between Relation Quality and User Satisfaction

The impact of relationship quality on user satisfaction is statistically significant and can be explained with higher explanatory power compared to network effect. Relationship quality will be perceived while building the user's social relationships. Users can not only exchange useful information through interactions in the delivery app, but also gain emotional satisfaction or social alignment. Analyses have proven that the value and emotional support in the process of forming relationship among users has a positive effect on the consumer's satisfaction. Thus, to increase user satisfaction, a channel needs to be provided for active interactions among consumers. Companies will need to make technological efforts, such as developing a system of communication and improving user-friendly user interfaces to facilitate seamless connectivity.

For detailed items of relationship quality, the relationship between interaction and user satisfaction have statistically significant results, and the analysis of relationship quality shows similar result. This is as demonstrated in the study of Sung-Yong Jung (2017). Social support also shows a statistically valid implication of the relationship with user satisfaction, but it has lower explanatory power of R^2 below 0.5, the mean of the coefficient of determination. As noted in many prior studies, cooperation and support for users of O2O services are directly linked to consumer satisfaction, which is also proven to be validated in this study. Interaction and social support demonstrate the user's trust in companies that provide services. In the case of delivery apps, when the information posted online and the quality of the food may differ considerably, or when fake reviews or false discount information is provided, the preference of the service may be diminished significantly. If a number of users can verify that the service is trustworthy by sharing information, personal users will feel satisfied by recognizing the benefits of mutual interaction. Thus, delivery app service providers should create an environment for effective interaction between users, thereby facilitating cooperation among users in the event of a problem.

The chronic problem with O2O services is that it is difficult to secure stable revenue models. In particular, in response to BaeMin's elimination of the carriers' charges in 2014, the delivery O2O service sector has failed to pay a total of losses in terms of reducing fees. Since this sector focused only on securing the number of users with the use of social networks for increasing returns of scale, it has failed to achieve a qualitative growth. The delivery app companies need to focus on relationship-marketing, referring to the verification outcome of positive effects of relationship quality on user satisfaction.

(c) Relationship between User Satisfaction and Continuous Usage Intention

The relationship between user satisfaction and continuance intent to use has the highest explanatory power and is statistically significant. This results in a positive effect on the willingness of users to continue to use services, as demonstrated by the previous study. Increasing customer satisfaction is expected to increase the company's revenue growth due to the continuous use of users. Accordingly, for the continuous profitability, the companies providing O2O services should focus on identifying the desires and needs of consumers and maximizing their satisfaction.

5. SUMMARY & CONCLUSION

With the advent of the smartphone, the O2O strategy has become essential for companies realizing a number of potential customers on mobile platforms, and the global O2O market is rapidly developing its

scale. In particular, Korea is regarded as having high growth potential for O2O projects thanks to the high availability of smartphones and high-speed Internet networks. The O2O service provides real-time contact with consumers by connecting online and offline channel organically on the mobile platform. This service is activated by expanding the adoption of smartphones and advances in IT technology and creating new values, extending from everyday sectors to the entire spectrum of society.

South Korea has a well-established base of food order and delivery services, and the proportion of one-person households, the main customers of the service, is increasing. As a result, the number of consumers has increased who prefer more convenient and faster delivery services. Due to these circumstances, the delivery applications can be seen as the most common and evolving O2O services. This study is intended to contribute to the continued growth of the O2O project by paying attention to the processes of establishing and interacting with these delivery apps. Thus, the study has investigated the impact of network effect and relationship quality, which have not been addressed in the prior study, on the user's continuous usage intention.

Our study sets up a research model referring to previous antecedent research, such as expectation confirmation model (Bhattacharjee, 2001), and O2O service comprehensive research model (Sung-Yong Jung, 2017). Given the characteristics of delivery apps that have many mobile users, network effect and relationship quality are chosen as external variables. Based on the fact that modern business focuses more on managing loyal customers rather than attracting new customers, our study emphasizes the importance of continuance usage intention in terms of profitability. High loyalty leads to increased revenue generation by increasing customer life value, tempting them to continue to use their services instead of switching to other competitors. Because users want to continue to use the service when they feel empathy and satisfaction with the value of the service, the parameters including user satisfaction and continuance usage intention are chosen as dependent variables. After setting up a research model and hypotheses, 68 questionnaires are collected for users who had previously used the delivery application one or more times.

To verify the hypotheses, the averages of the individual responses to each measurement item are obtained, and the correlation analysis and regression analysis are conducted. R^2 is obtained in the regression analysis, and P-value is obtained by conducting an F-test at 95 % of the significance level. By examining those results, we show that seven of the eight hypotheses are adopted. Only the network size is not statistically significant among the specifics of network effect. Other detailed items of network colleague and network reputation are shown to have positive impacts on the user satisfaction. Interaction and social support, detailed items of relationship quality, also affect the user's satisfaction in the positive way. Finally, we show user satisfaction also has positive influences on continuance usage intention, as shown in the previous study.

Based on the results of the final analysis, all assumptions are adopted only except for network size factor. This implies that network colleague, network reputation, interaction and social support affect user satisfaction, and thus those factors are important for customers to have a positive continuance usage intention. In the relationship between network effect and user satisfaction, network colleague and network reputation factors that are related to the responses of acquaintances involved in the actual relationship are shown to have positive impacts on continuous usage intention. Therefore, this suggests companies should consider develop marketing strategy based on human networks that individual users already have, rather than emphasizing the objective ranking of the service. For example, existing list of users can be utilized as

a marketing strategy including coupons as borrowing methods of social networking (e.g., Kakao Games), or a link-shared event whose targets are acquaintances connected with high communication frequencies with the user on social media platforms. Since the relationship between social support and user satisfaction appears to be closely related to user satisfaction, it is likely that the creation of communication channels and interface environment will be necessary to facilitate interaction with multiple users. The satisfaction of individual users will continue to drive the continuous usage intention of the delivery app.

This study proves that the delivery O2O service provider can earn more profits by focusing on social impact factors which have not been addressed in previous literature. However, there is also room for improvement in our study such that the number of samples is not sufficient and the demographic characteristics are also uneven. These limitations can be further addressed in our future research.

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