Factors of the Adoption of O2O Service Platforms: Evidence from Small Businesses in Korea

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Abstract: O2O service platforms, which combine online and offline channels to provide more convenient services, are drawing attention as a new way of commerce that can revitalize small businesses that are losing competitiveness and struggling due to the coronavirus disease 2019 pandemic. In this study, we investigated and empirically analyzed the factors affecting the adoption of O2O service platforms in small businesses. We developed a research model that combines the technology acceptance model (TAM), an individual-level theory of IT acceptance, and the technology-organization-environment (TOE) framework, an organizational-level theory of information systems adoption. Data from 279 valid questionnaires were collected from small business owners and analyzed using structural equation modeling. The results show that the technical characteristics of the TOE framework, namely, relative advantage, compatibility, and trialability, and small business owners’ characteristics, namely, innovativeness, risk-taking tendency, and IT knowledge, affect the adoption of O2O service platforms through perceived usefulness and perceived ease of use. The environmental variables of the TOE framework, namely, government support, digital environment change, and competitive pressure, affect the adoption of O2O service platforms through subjective norms. We identify practical implications for the adoption of O2O service platforms by small businesses.

Keywords: small business; O2O service platform; TAM; TOE framework; IT adoption

1. Introduction

Small businesses in Korea are beleaguered by a decline in traditional business, growing competition among the same types of businesses, rising costs of raw materials, increasing minimum wage and rent, and forays of large corporations into back alleys formerly occupied by small businesses. The decrease in offline customers due to the spread of the coronavirus disease (COVID-19) is making it even more difficult for small businesses. Thus, many small businesses in Korea are at the crossroads of survival or demise. Small businesses are desperate to come up with self-help measures for these difficult situations and may consider introducing an online-to-offline (O2O) service platform as a realistic alternative. An O2O service is an Information and Communications Technology (ICT)-based online and offline service that allows the online processing of information, orders, and approval related to sales products and supports offline consumption activities. With the rapid spread of smartphones, O2O services based on the latest IT have become a new form of commerce. Unlike conventional commerce, O2O services have the advantage of providing both online practicality and offline emotional satisfaction by making orders and payments online for offline products or services. Therefore, O2O service platforms that support a variety of online services, such as shopping, simple payments, promotional marketing, and community building, are expected to maximize the competitiveness of small businesses in the market.

O2O services are emerging as the center of commerce, and O2O service platforms can increase the competitiveness of related small businesses [1]. However, the spread of O2O...
service platforms in small businesses has been rather slow. Although many studies have been conducted on the O2O services in the industry [2,3], most of them have focused on the acceptance of O2O services from the customers’ point of view; little is known about small businesses that are O2O service providers [4]. argue that the lack of research on the adoption of O2O platform services by organizations causes a knowledge gap. Thus, this study attempts to analyze the factors that affect small businesses’ decisions to adopt O2O service platforms. To this end, we propose and empirically analyze a research model that combines the individual-level technology acceptance model [5], the organizational-level technology-organization-environment (TOE) framework [6] and the characteristics of small business owners. The results of this study will provide a theoretical basis for the factors affecting the adoption of O2O service platforms in small businesses. The results could also promote the use of this new service by providing preliminary data for small businesses that accommodate the rising business model of the O2O service platform and for policymaking by government organizations.

2. Theoretical Background

2.1. O2O Service Platform

An O2O service is a service that implements offline economic activities, such as trading goods, renting assets, and providing services, on a platform linked to online channels using ICT convergence technology [7]. Whereas online business was generally focused on e-commerce for product sales, O2O service focuses on service products that were previously conducted offline. In other words, if B2C (Business to Consumer) simply means that a company sells products based on the Internet to consumers, O2O service includes transactions in which products sold online are provided as services offline [8]. Thus, An O2O service platform is an ICT-based online service platform that allows consumers to process information, orders, and approval related to products sold online and to conduct final consumer activities offline. It is an IT-driven business that mediates suppliers and consumers through mobile smart devices, such as the internet and smartphones [9], enabling a timely response to customers’ needs and providing personalized services beyond collecting and immediately responding to their needs. With the rapid growth of the O2O service market around the world, alongside online companies entering the offline market, offline companies, which have exhibited relatively lukewarm attitudes, have also jumped into the O2O service platform market and accelerated the establishment of O2O service platforms.

According to the technology roadmap for SMEs in Korea [10], O2O service platforms are classified into three broad categories: service-linked, asset rental, and commerce. Service-linked platforms mediate existing offline services through a mobile app, including delivery services (e.g., food ordering and payment), reservation and payment services for accommodation facilities, taxi calls and payment services, home support services (e.g., housekeeping, babysitting, professional cleaning, and postpartum care), and medical services (e.g., consultation with doctors, setting appointments for medical services, and surgical estimates). Asset rental platforms lend offline assets online, such as cars, spaces, and accommodations. These include car-sharing services that allow people to book and use vehicles in real-time, accommodation-sharing services that rent out residential spaces to people who need a place to stay, and space-sharing services for various purposes such as parties and business. Finally, commerce platforms are e-commerce platforms based on showrooming and webrooming, such as Syrup and Kakao Gifticon. These include coupon services that provide discounts on fees and restaurants through smartphones, offline delivery services that directly receive goods at a store at the selected time, and information, orders, and payment services offered in offline stores in conjunction with online shopping platforms [11]. New types of services continue to emerge from O2O service platforms, and existing services are continuously evolving.

Although O2O service, a new business model, can be applied to large corporations, in general, O2O service is a form that consumers order online and then consume at a physical
Therefore, O2O service is a more suitable business model for small businesses such as food sales and living services than large enterprises.

2.2. Characteristics of Small Business in Korea

Small businesses refer to privately owned businesses, partnerships, or individual entrepreneurs with fewer employees or lower annual revenue than a regular-sized business. In most countries, small businesses are the basis of the economy, so countries provide them with various benefits, such as government support and tax reductions. Small businesses include lifestyle services, such as restaurants, small grocery stores, bakeries or coffee shops, hairdressers, sporting goods stores, guest houses, photo studios, interior design stores, micromanufacturers, and wholesale and retail operations. As many small businesses mainly provide lifestyle services close to consumers, O2O services that consumers can conveniently use online and offline are suitable IT for small businesses.

According to studies related to small businesses in Korea, the main characteristics of small businesses in Korea are as follows: First, the organizational structure is simple, and the organization’s decision-making is dependent on the individual owner. Since many small businesses are family-oriented, they tend to rely on the owners’ individual abilities. Their owners do everything necessary for management decisions and tend to run their businesses mainly based on experience or informal management techniques [12]. Second, competition among small businesses is high due to low entry barriers. Since small business owners are able to enter the business on a small scale, with little manpower and capital, and most industries do not require a high level of professional skills, it is easy to start a business. Young people who are unable to find a job and unemployed or retired individuals are actively entering the business because they do not have any alternatives [13]. Third, management capacity is generally weak. In general, small businesses are free to enter and leave the small business market due to the low funds needed for start-ups and the low specificity of the technology. Due to the smallness of scale, management methods tend to be premodern, and due to the ease of start-up, they tend to start management without systematic preparation for start-ups [14]. Finally, small businesses are highly dependent on government policies and support. Because small businesses are widely distributed locally and are the foundation of the local economy, governments are implementing various support programs for small businesses that lack internal resources, and the use of external resources for government support is an important factor in improving business performance [15]. Due to the characteristics of small businesses, factors in the external environment (e.g., government support, competitive pressure, and changes in the online business environment) and the capabilities of small business owners will have an important impact on small businesses’ decisions, such as their decision to adopt O2O service platforms.

2.3. Models and Theories of Technology Acceptance and Adoption

The technology acceptance and adoption theories in the field of information systems can be divided into individual-level theories used to analyze the use of new technologies by individuals and organizational-level theories used to analyze the adoption of information systems by organizations. Individual-level technology acceptance theories that have been used in IT and information systems research include TAM [5], Theory of Reasoned Action (TRA) [16], Theory of Planned Behavior [17], Diffusion of Innovations (DOI) theory [18], and the Unified Theory of Acceptance and Use of Technology (UTAUT) by [19].

Ref. [5] TAM has been widely used in research related to innovation, e-business, service acceptance, and new technologies. It is the most commonly used theory in individual-level technology acceptance studies. The TAM posits that perceived usefulness and perceived ease of use have a significant impact on individuals’ acceptance of new IT [5]. Perceived usefulness refers to “the degree to which a person believes that using a particular system would enhance his or her job performance” [5]. Davis derived the theoretical basis of perceived usefulness as a determinant of end-user use of information systems from a
variety of theories, including self-efficacy theory, the cost–benefit paradigm, and innovation theory. Perceived ease of use refers to “the degree to which a person believes that using a particular system would be free from effort” [5]. It has a direct impact on the intention to use IT and on perceived usefulness.

The theory of information systems adoption at the organizational level has been almost exclusively used by the TOE framework proposed by [6]. The TOE framework describes the factors that affect the adoption of information systems in a particular organization from three perspectives: the technological context, organizational context, and environmental context. The technological context refers to all internal and external technologies related to the organization, including the current company practices and equipment and the technologies in the market. The organizational context refers to the organizational characteristics and resources, such as communication processes, firm size, management structure, and free resources. The environmental context refers to the environmental characteristics of an organization’s business through transactions with industries, competitors, and governments, including industrial structures and regulatory environments.

2.4. Organizational Information Systems Adoption

Most studies related to the adoption and diffusion of IT or information systems in an organization have used the TOE framework as a theoretical basis [20]. Studies on organizational-level information systems adoption based on the TOE framework have focused on various IT and information systems, such as electronic data interchange (EDI) [21], open systems [22], websites [23], e-business [24–26], enterprise resource planning (ERP) [27–29], knowledge management systems [30], supply chain management [31], customer relationship management systems [32], radio-frequency identification (RFID) technology [33] and smart farms [34].

In these studies, instead of the internal and external technologies related to the organization, the variables in the technological context were replaced by the characteristics of the technology or information system to be introduced. Since most new technologies have innovative characteristics, several researchers [29,35–37] have used the innovation attributes of [18] DOI theory, such as relative advantage, complexity, compatibility, trialability, and observability, as the variables in the technological context of the TOE framework [20]. Because the CEO strongly influences the company’s key decisions, some studies on SMEs [34,38] have used a research model combining the TOE framework with the CEO’s characteristics or capabilities, such as CEO innovativeness and the CEO’s IT/information systems knowledge.

3. Hypothesis Development

3.1. Perceived Usefulness, Perceived Ease of Use, and Subjective Norms

Although a small business is an organization, the owner has a great influence on important organizational decisions. Therefore, perceived usefulness and perceived ease of use, the main variables of TAM that have been widely used in research on individuals’ IT acceptance [39] are expected to have a positive effect on the adoption of new technology, namely, O2O service platforms. From the perspective of small business owners, the O2O platform service is an information system that supports business processing. The perceived usefulness has been analyzed to have a significant impact on users’ intention in using utilitarian information systems [40]. Therefore, it is expected that small business owners will actively introduce O2O platform services if they believe that O2O platform services bring efficiency and convenience to business processes and ultimately help increase sales, like various existing information systems. Thus, we propose the following hypothesis:

H1. Perceived usefulness positively affects the intention to adopt an O2O service platform.

Small business owners use typical information technology devices such as PCs and smartphones to process orders and payments provided by O2O platform services. Perceived ease of use in the use of information technologies has been proven to have a positive effect on the intention to use and perceived usefulness [40]. Therefore, if small business owners
believe that using the O2O platform service is easy and simple, the perceived usefulness of the O2O platform service and intention to use will increase. Thus, we propose the following hypotheses:

**H2.** *Perceived ease of use positively affects the perceived usefulness of O2O service platforms.*

**H3.** *Perceived ease of use positively affects the intention to adopt an O2O service platform.*

Subjective norms, a key variable of TRA, refer to an individual’s perceptions of people who have a significant influence on the individual’s behavior [17]. They have an important influence on the use of compulsory information systems in an organization and the acceptance of IT used for information exchange with other people, such as social networking sites and messengers [41]. Although the O2O service platform is not used to connect with other people, the opinions of friends and family and the perceptions of colleagues regarding the O2O service platform are expected to play an important role in the introduction of an O2O service platform suitable for one’s business. Therefore, we propose the following hypothesis:

**H4.** *Subjective norms positively affect the intention to adopt an O2O service platform.*

### 3.2. Technological Context

This study used the variables of the DOI, namely relative advantage, compatibility, and trialability, which have been frequently used in TOE framework-based studies, as variables in the technological context. Relative advantage refers to the degree of benefit that a new technology or innovation brings to an organization or user compared to the existing technology or method [18]. In general, since technologies or innovations with relative advantages provide benefits, such as economic benefits or improved social reputations, people perceive new technologies or innovations as useful. Thus, some studies [42] have argued that high relative advantage has a positive effect on perceived usefulness in technology acceptance.

The use of O2O service platforms enables small businesses to handle their business and deal with consumers more efficiently with regard to delivery and payment, among others. For example, the O2O delivery service platform, which is used by food and grocery stores, significantly reduces the work of small businesses by directly processing food information, orders, and payments online. Therefore, these efficient work processes are expected to have a positive impact on the perceived usefulness of the O2O service platform.

**H5.** *Relative advantage positively affects the perceived usefulness of an O2O service platform.*

Compatibility refers to the degree to which a technology or innovation is perceived to be consistent with the potential users’ values, experiences, and needs [18]. In the literature on IT adoption, compatibility has been proven to have a great influence on the favorable attitude toward or adoption of new technology or innovation. Most O2O service platforms offer functions that conform to the existing environment, industry, and work style of small businesses and increase their efficiency. For example, the O2O laundry service platform is an app specialized for the laundry business that helps in receiving orders from customers and expedites laundry collection and delivery. Therefore, the functions of these industry-tailored O2O service platforms are expected to have a positive impact on the perceived usefulness of O2O service platforms. We thus propose the following hypothesis:

**H6.** *Compatibility positively affects the perceived usefulness of an O2O service platform.*

Trialability refers to the extent to which an innovation or technology can be tested within a limited range [18]. New ideas tend to be accepted more quickly if they can be tested in installments. According to empirical studies on IT acceptance, although trialability has less influence than relative advantage or compatibility, it has a significant influence on the acceptance of new technologies [29]. Most O2O service platforms provide functions
that can dramatically improve the current business of small businesses using the internet and mobile technology. For example, a small business owner who runs a laundry shop can collect and deliver laundry for a locker even if they do not have to do laundry or delivery, and the owner can conveniently check the laundry inspection process through a mobile app. If small business owners can experience innovative services to some extent, they will perceive the O2O service platform as highly useful. Therefore, we propose the following hypothesis:

**H7.** Trialability positively affects the perceived usefulness of an O2O service platform.

### 3.3. Environmental Context

We used government support, competitive pressure, and digital environment change based on the characteristics of small businesses as the variables in the environmental context. Many studies on IT adoption by small organizations have identified government support and competitive pressure as major factors in the environmental context [43]. Government support refers to administrative and financial support from the government in the process of introducing and utilizing new IT by small businesses [34]. Most governments provide administrative and financial support for the utilization of and training on new and innovative IT so that small businesses that lack internal resources can use these technologies to increase their competitiveness since small businesses are the basis of the national economy. In Korea, the Small Business Market Promotion Corporation, an affiliate of the government, implemented a program in 2020 to promote the use of O2O service platforms by small businesses, resulting in the activation of O2O service platforms by many small business owners. We, therefore, propose the following hypothesis:

**H8.** Government support positively affects subjective norms regarding O2O service platforms.

Competitive pressure refers to the degree of pressure that a small business feels from competitors in the industry [44]. Many researchers have argued that a fiercely competitive environment is an important determinant for SMEs to adopt new IT [23,25,43]. Because the consumer industry is characterized by rapid changes, companies should raise awareness of and follow their competitors’ adoption of new technologies. Pressure from competitors using O2O service platforms will make small businesses that have not yet introduced these platforms promptly recognize the necessity of doing so. Therefore, we propose the following hypothesis:

**H9.** Competitive pressure positively affects subjective norms regarding O2O service platforms.

Since the online industry has a profound influence on all industries regardless of company size, digital environment change is an important factor in the external environment. Digital environment change is the degree to which the necessity of an online business is based on the Internet and digital technologies [34]. Online business is a trend that is becoming an inevitable reality for small businesses. Even in the negative economic growth phase due to COVID-19, online business is growing rapidly, and the paradigm of the consumer industry is changing. Therefore, we propose the following hypothesis:

**H10.** Digital environment change positively affects subjective norms regarding O2O service platforms.

### 3.4. Characteristics of Small Business Owners

We focused on innovativeness, risk aversion, and IT knowledge as characteristics of small business owners based on study findings that small business owners generally have a high entrepreneurial spirit and that IT knowledge and competency are important in IT adoption [38,43,45]. Innovativeness refers to progressive thinking and the innovative tendencies that creative entrepreneurs have [46]. Highly innovative managers tend to deviate from the existing framework by carrying out new ideas, new products, experiments, and creative processes, and they actively accept new management techniques for the
organization. These behaviors are based on the belief that the new technique or technology is ultimately valuable to the organization. In other words, innovativeness is expected to have a positive effect on the perceived usefulness of O2O service platforms.

H11. Innovativeness positively affects the perceived usefulness of O2O service platforms.

Risk-taking tendency refers to individuals’ propensity to engage in risky business activities, such as making challenging management decisions or promoting projects despite high uncertainty [46]. It has been treated as a major factor in entrepreneurship along with innovativeness [46]. Those with risk-taking tendencies are more likely to capture opportunities despite the risks. Managers with high risk-taking tendencies are expected to perceive O2O service platforms as useful, albeit unfamiliar and risky. Therefore, we propose the following hypotheses:

H12. Risk-taking tendency positively affects the perceived usefulness of O2O service platforms.

Studies on information systems adoption by SMEs have argued that the CEO’s IT knowledge has a positive influence on the adoption of information systems [38,43,45]. The CEO’s IT knowledge refers to the CEO’s understanding of the use of IT and its benefits and the CEO’s level of IT skills. The use of O2O service platforms based on IT is expected to be easy if the CEO has a high general knowledge of and high ability to use IT. Therefore, we propose the following hypothesis:

H13. IT knowledge positively affects the perceived ease of use of an O2O service platform.

Additionally, Ref. [38] noted that if a CEO is educated about the merits of a specific IT, they can quickly adopt that technology. In other words, if small business owners fully understand the benefits of using IT in business operations, they will believe that O2O service platforms that can effectively improve the work of small businesses are useful. Therefore, we propose the following hypothesis:

H14. IT knowledge positively affects the perceived usefulness of an O2O service platform.

3.5. Research Model

This study uses a theoretical model that combines the TAM, an individual-level IT acceptance theory, and the TOE framework, an organizational-level information systems adoption model because small businesses have the characteristics of both individuals and organizations. In addition, the research model includes the characteristics of the small business owners, reflecting the nature of small businesses, whose important decisions depend on the owners’ individual capabilities. Since individuals are surrounded by organizations, the perceived usefulness and perceived ease of use of the TAM and the subjective norms of the TRA which are individual-level variables, have been set as mediators between the organizational-level variables of the TOE and the intention to adopt O2O service platforms.

Although the TOE framework consists of the technological context, organizational context, and environmental context, variables in the organizational context were excluded from the research model because the O2O service platforms were not information systems that required much organizational effort or capability, such as ERP systems. In conclusion, the research model posits that relative advantage, compatibility, trialability, innovativeness, risk-taking tendency, IT knowledge, and perceived ease of use affect perceived usefulness; government support, digital environment change, and competitive pressure affect subjective norms; and perceived ease of use, perceived usefulness, and subjective norms affect the intention to adopt. Figure 1 presents the research model.
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Figure 1. Research model.

4. Methodology

4.1. Data Collection

According to the Korean Enforcement Decree of the Special Measures Act for Small Business and Small Businesses, a small business means a business with fewer than 10 full-time workers regardless of business type. Therefore, the subject of the study was set as a business with fewer than 10 employees. In addition, based on statistics from the Ministry of SMEs and Startups in Korea in 2019, the size of the research population is expected to be around 2.77 million.

The sample comprised employers running small businesses in Gwangju, one of Korea’s five major cities. In order to increase the reliability of the research results, employees were excluded from data collection. Data for empirical analysis were collected through an offline survey conducted during individual visits and an online survey conducted through internet messengers provided by the cloud-based social science research automation site (ss.or.kr). Data collection was assisted by the Gwangsan Business Support Center, which is a government agency that solves the difficulties of small business owners. A total of 285 questionnaires were collected; after excluding six questionnaires with missing data, 279 valid questionnaires were used for the empirical analysis of the research model. Of the respondents, 171 were males and 108 were females, and 62.7% were in their 40s or older. Detailed descriptive statistics for the respondents and small businesses are shown in Table 1.
Table 1. Descriptive statistics of respondents’ characteristics.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Value</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>171</td>
<td>61.3</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>108</td>
<td>38.7</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>279</td>
<td>100.0</td>
</tr>
<tr>
<td>Age</td>
<td>Younger than 20</td>
<td>2</td>
<td>0.7</td>
</tr>
<tr>
<td></td>
<td>20–29</td>
<td>32</td>
<td>11.5</td>
</tr>
<tr>
<td></td>
<td>30–34</td>
<td>70</td>
<td>25.1</td>
</tr>
<tr>
<td></td>
<td>40–44</td>
<td>106</td>
<td>38.0</td>
</tr>
<tr>
<td></td>
<td>Older than 50</td>
<td>69</td>
<td>24.7</td>
</tr>
<tr>
<td>Industry</td>
<td>Food industry</td>
<td>96</td>
<td>34.4</td>
</tr>
<tr>
<td></td>
<td>Wholesale and retail</td>
<td>45</td>
<td>16.1</td>
</tr>
<tr>
<td></td>
<td>manufacturing</td>
<td>29</td>
<td>10.4</td>
</tr>
<tr>
<td></td>
<td>Service industry</td>
<td>72</td>
<td>25.8</td>
</tr>
<tr>
<td></td>
<td>Construction</td>
<td>9</td>
<td>3.2</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>28</td>
<td>10.0</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>279</td>
<td>100.0</td>
</tr>
<tr>
<td>Number of employees</td>
<td>1 person</td>
<td>75</td>
<td>26.9</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>93</td>
<td>33.3</td>
</tr>
<tr>
<td></td>
<td>3–4</td>
<td>60</td>
<td>21.5</td>
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<tr>
<td></td>
<td>5–6</td>
<td>27</td>
<td>9.7</td>
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<tr>
<td></td>
<td>More than 7 people</td>
<td>24</td>
<td>8.6</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>279</td>
<td>100.0</td>
</tr>
<tr>
<td>Business period</td>
<td>Less than 1 year</td>
<td>32</td>
<td>11.5</td>
</tr>
<tr>
<td></td>
<td>1–2</td>
<td>74</td>
<td>26.5</td>
</tr>
<tr>
<td></td>
<td>3–6</td>
<td>99</td>
<td>35.5</td>
</tr>
<tr>
<td></td>
<td>7–9</td>
<td>35</td>
<td>12.5</td>
</tr>
<tr>
<td></td>
<td>10–19</td>
<td>34</td>
<td>12.2</td>
</tr>
<tr>
<td></td>
<td>More than 20 years</td>
<td>5</td>
<td>1.8</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>279</td>
<td>100.0</td>
</tr>
<tr>
<td>Annual sales</td>
<td>Less than 50,000 dollars</td>
<td>51</td>
<td>18.3</td>
</tr>
<tr>
<td></td>
<td>50,000–100,000</td>
<td>77</td>
<td>27.6</td>
</tr>
<tr>
<td></td>
<td>100,000–300,000</td>
<td>82</td>
<td>29.4</td>
</tr>
<tr>
<td></td>
<td>300,000–500,000</td>
<td>36</td>
<td>12.9</td>
</tr>
<tr>
<td></td>
<td>500,000 or more</td>
<td>33</td>
<td>11.8</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>279</td>
<td>100.0</td>
</tr>
</tbody>
</table>

4.2. Measurement Items

To increase the reliability and face validity of the measurements for the constructs in the research model, we used items from previous studies where possible. The items measuring relative advantage and compatibility, which are variables in the technological context, were adopted from the studies by [34,47] and the items measuring trialability were developed for this research. The measurement items for perceived usefulness and perceived ease of use, which are variables of the TAM, were adopted from the study by [5] and the items for subjective norms were adopted from the study by [48]. The items measuring government support, digital environment change, and competitive pressure, which are variables in the environmental context, were adopted from the studies by [26,34]. The items measuring innovativeness and IT knowledge, which are individual characteristics of small business owners, were adopted from [38] study. Lastly, the measurement items
for risk-taking tendency were developed for this research. All items used in this study are listed in Appendix A.

5. Data Analysis and Results

We assessed the measurement items and research model by performing confirmatory factor analysis and path analysis between latent variables (i.e., constructs in the research model) using Structural Equation Modeling (SEM). The path analysis between the latent variables of the SEM was performed using the Partial Least Squares (PLS) technique based on bootstrapping for subsamples. Compared to covariance-based SEM, PLS-SEM is less stringent in terms of sample size and residual distribution requirements, so it is advantageous for conducting exploratory research and analyzing complex models. We chose the PLS-SEM technique for analyzing the research model because this study is exploratory [49] the research model contains many latent variables [50] and the sample size is small compared to the number of research variables [49]. To analyze the research model using PLS-SEM, we used the statistical analysis function of the cloud-based social science research automation site developed based on the plsSEM package of the open-source software R [51].

5.1. Measurement Model

To evaluate the reliability of the measurement items, we employed the Cronbach’s alpha values and composite reliability (CR) values of the latent variables. Table 2 shows the Cronbach’s alpha and CR of all latent variables. Competitive pressure had the lowest Cronbach’s alpha value among the latent variables ($\alpha = 0.837$), and all latent variables had CR values of 0.90 or higher, which is much higher than the recommended level of 0.70 [52]. Therefore, the measurement items of the latent variables have a reasonable level of reliability.

Table 2. Reliability.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Item No.</th>
<th>C. Alpha *</th>
<th>CR **</th>
<th>AVE ***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatibility</td>
<td>3</td>
<td>0.937</td>
<td>0.960</td>
<td>0.888</td>
</tr>
<tr>
<td>Relative Advantage</td>
<td>4</td>
<td>0.906</td>
<td>0.934</td>
<td>0.779</td>
</tr>
<tr>
<td>Trialability</td>
<td>3</td>
<td>0.913</td>
<td>0.945</td>
<td>0.853</td>
</tr>
<tr>
<td>Perceived Usefulness</td>
<td>3</td>
<td>0.921</td>
<td>0.950</td>
<td>0.864</td>
</tr>
<tr>
<td>Perceived Ease of use</td>
<td>3</td>
<td>0.902</td>
<td>0.939</td>
<td>0.835</td>
</tr>
<tr>
<td>Subjective Norms</td>
<td>3</td>
<td>0.915</td>
<td>0.947</td>
<td>0.855</td>
</tr>
<tr>
<td>Government Support</td>
<td>3</td>
<td>0.838</td>
<td>0.903</td>
<td>0.753</td>
</tr>
<tr>
<td>Digital Environment Change</td>
<td>3</td>
<td>0.875</td>
<td>0.923</td>
<td>0.800</td>
</tr>
<tr>
<td>Competitive Pressure</td>
<td>3</td>
<td>0.837</td>
<td>0.902</td>
<td>0.754</td>
</tr>
<tr>
<td>Innovativeness</td>
<td>3</td>
<td>0.901</td>
<td>0.938</td>
<td>0.835</td>
</tr>
<tr>
<td>Risk-taking Tendency</td>
<td>3</td>
<td>0.873</td>
<td>0.922</td>
<td>0.798</td>
</tr>
<tr>
<td>IT Knowledge</td>
<td>3</td>
<td>0.923</td>
<td>0.951</td>
<td>0.867</td>
</tr>
<tr>
<td>Intention to Adopt</td>
<td>3</td>
<td>0.915</td>
<td>0.946</td>
<td>0.855</td>
</tr>
</tbody>
</table>

* Cronbach’s alpha, ** Composite Reliability, *** AVE: Average Variance Extracted.

To evaluate the validity of the latent variables, we conducted a convergent validity test and discriminant validity test based on confirmatory factor analysis (CFA) using PLS-SEM. Convergent validity is verified when the average variance extracted (AVE) of the latent variables is higher than 0.50 [53]. Table 2 shows that the AVEs of all latent variables are 0.7 or higher (government support has the lowest AVE at 0.753). Discriminant validity is verified when the square root of the AVE of the latent variables is larger than their correlation values with the other latent variables [53]. Table 3 shows that all correlation values between latent variables are less than the square root of the AVE of the latent variable. Therefore, the results demonstrate the validity of all latent variables.
Table 3. Average Variance Extracted and Correlation Matrix.

<table>
<thead>
<tr>
<th>Construct</th>
<th>IK</th>
<th>PEOU</th>
<th>CA</th>
<th>RA</th>
<th>TP</th>
<th>RTT</th>
<th>INV</th>
<th>PU</th>
<th>GS</th>
<th>DEC</th>
<th>CP</th>
<th>SN</th>
<th>AI</th>
</tr>
</thead>
<tbody>
<tr>
<td>IK</td>
<td>(0.93)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEOU</td>
<td>0.59 (0.91)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CA</td>
<td>0.43</td>
<td>0.52 (0.94)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RA</td>
<td>0.49</td>
<td>0.58</td>
<td>0.8</td>
<td>(0.88)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP</td>
<td>0.5</td>
<td>0.63</td>
<td>0.6</td>
<td>0.73</td>
<td>(0.92)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RTT</td>
<td>0.64</td>
<td>0.59</td>
<td>0.42</td>
<td>0.4</td>
<td>0.45</td>
<td>(0.89)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INV</td>
<td>0.66</td>
<td>0.62</td>
<td>0.52</td>
<td>0.52</td>
<td>0.51</td>
<td>0.8</td>
<td>(0.91)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PU</td>
<td>0.53</td>
<td>0.68</td>
<td>0.71</td>
<td>0.76</td>
<td>0.71</td>
<td>0.57</td>
<td>0.63</td>
<td>(0.93)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GS</td>
<td>0.51</td>
<td>0.64</td>
<td>0.52</td>
<td>0.54</td>
<td>0.61</td>
<td>0.57</td>
<td>0.51</td>
<td>0.57</td>
<td>(0.87)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEC</td>
<td>0.54</td>
<td>0.64</td>
<td>0.52</td>
<td>0.66</td>
<td>0.54</td>
<td>0.54</td>
<td>0.59</td>
<td>0.69</td>
<td>0.59</td>
<td>(0.89)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CP</td>
<td>0.54</td>
<td>0.6</td>
<td>0.66</td>
<td>0.7</td>
<td>0.6</td>
<td>0.43</td>
<td>0.49</td>
<td>0.61</td>
<td>0.6</td>
<td>0.58</td>
<td>(0.87)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SN</td>
<td>0.54</td>
<td>0.71</td>
<td>0.66</td>
<td>0.75</td>
<td>0.71</td>
<td>0.51</td>
<td>0.52</td>
<td>0.71</td>
<td>0.66</td>
<td>0.61</td>
<td>0.72</td>
<td>(0.86)</td>
<td></td>
</tr>
<tr>
<td>AI</td>
<td>0.64</td>
<td>0.64</td>
<td>0.64</td>
<td>0.71</td>
<td>0.66</td>
<td>0.59</td>
<td>0.62</td>
<td>0.71</td>
<td>0.6</td>
<td>0.64</td>
<td>0.67</td>
<td>-0.26</td>
<td>(0.98)</td>
</tr>
<tr>
<td>Mean</td>
<td>4.89</td>
<td>5.27</td>
<td>5.03</td>
<td>5.21</td>
<td>5.19</td>
<td>5.11</td>
<td>4.91</td>
<td>5.57</td>
<td>5.06</td>
<td>5.00</td>
<td>5.12</td>
<td>4.93</td>
<td>5.20</td>
</tr>
<tr>
<td>SD</td>
<td>1.62</td>
<td>1.41</td>
<td>1.60</td>
<td>1.61</td>
<td>1.48</td>
<td>1.48</td>
<td>1.42</td>
<td>1.36</td>
<td>1.45</td>
<td>1.43</td>
<td>1.49</td>
<td>1.48</td>
<td>1.62</td>
</tr>
</tbody>
</table>


5.2. Structural Model

To test the hypotheses, we generated a structural model by performing a path analysis between the latent variables using PLS-SEM. We performed the hypothesis testing using the path coefficients between latent variables and their significance. Figure 2 shows the structural model, including the path coefficients and significance between the latent variables.

Figure 2. Path diagram of the research model.
The structural model shows that perceived usefulness, perceived ease of use, and subjective norms significantly affected the intention to adopt an O2O service platform and that perceived ease of use significantly affected perceived usefulness (see Figure 2). H1 to H4 were therefore supported. Relative advantage, compatibility, and trialability had a significant effect on perceived usefulness, and government support, competitive pressure, and digital environment change had a significant effect on subjective norms. Therefore, H5 to H10 were all supported. Small business owners’ risk-taking tendency had a significant effect on perceived usefulness, and IT knowledge had a significant effect on perceived ease of use. However, Innovativeness and IT knowledge had no effect on perceived usefulness. Therefore, H12 and H13 were supported, but H11 and H14 were rejected.

In addition, 71.6% of the variance in perceived usefulness was explained by perceived ease of use, relative advantage, compatibility, trialability, risk-taking tendency, innovativeness, and IT knowledge. Government support, competitive pressure, and digital environment change explained 62.3% of the variance in subjective norms, and perceived usefulness, perceived ease of use, and subjective norms explained 62.2% of the variance in the intention to adopt O2O service platforms. Table 4 shows the path coefficients between the latent variables, the t-values and p-values of the structural model, and the coefficients of determination ($R^2$) for the latent variables.

**Table 4.** Hypothesis testing results.

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Sign</th>
<th>Path Coefficient</th>
<th>t-Value</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1. Perceived Usefulness → Intention to Adopt</td>
<td>(+)</td>
<td>0.336</td>
<td>4.021</td>
<td>0.000</td>
</tr>
<tr>
<td>H2. Perceived Ease of use → Perceived Usefulness</td>
<td>(+)</td>
<td>0.184</td>
<td>2.337</td>
<td>0.010</td>
</tr>
<tr>
<td>H3. Perceived Ease of use → Intention to Adopt</td>
<td>(+)</td>
<td>0.117</td>
<td>1.854</td>
<td>0.032</td>
</tr>
<tr>
<td>H4. Subjective Norms → Intention to Adopt</td>
<td>(+)</td>
<td>0.417</td>
<td>5.040</td>
<td>0.000</td>
</tr>
<tr>
<td>H5. Relative Advantage → Perceived Usefulness</td>
<td>(+)</td>
<td>0.280</td>
<td>2.357</td>
<td>0.010</td>
</tr>
<tr>
<td>H6. Compatibility → Perceived Usefulness</td>
<td>(+)</td>
<td>0.189</td>
<td>1.896</td>
<td>0.029</td>
</tr>
<tr>
<td>H7. Trialability → Perceived Usefulness</td>
<td>(+)</td>
<td>0.180</td>
<td>2.049</td>
<td>0.021</td>
</tr>
<tr>
<td>H8. Government Support → Subjective Norms</td>
<td>(+)</td>
<td>0.297</td>
<td>4.908</td>
<td>0.000</td>
</tr>
<tr>
<td>H9. Competitive Pressure → Subjective Norms</td>
<td>(+)</td>
<td>0.441</td>
<td>6.009</td>
<td>0.000</td>
</tr>
<tr>
<td>H10. Digital Environment Change → Subjective Norms</td>
<td>(+)</td>
<td>0.177</td>
<td>3.315</td>
<td>0.001</td>
</tr>
<tr>
<td>H11. Innovativeness → Perceived Usefulness</td>
<td>(+)</td>
<td>0.081</td>
<td>1.030</td>
<td>0.152</td>
</tr>
<tr>
<td>H12. Risk-taking Tendency → Perceived Usefulness</td>
<td>(+)</td>
<td>0.148</td>
<td>2.009</td>
<td>0.023</td>
</tr>
<tr>
<td>H13. IT Knowledge → Perceived Ease of use</td>
<td>(+)</td>
<td>0.589</td>
<td>14.052</td>
<td>0.000</td>
</tr>
<tr>
<td>H14. IT Knowledge → Perceived Usefulness</td>
<td>(+)</td>
<td>−0.033</td>
<td>−0.577</td>
<td>0.282</td>
</tr>
</tbody>
</table>

Perceived Usefulness $R^2$: 0.716. Subjective Norms $R^2$: 0.623. Intention to Adopt $R^2$: 0.622.

6. Discussion

This study presented and empirically analyzed the factors affecting the introduction of O2O service platforms by small businesses. The results of the study are summarized as follows: Perceived usefulness, perceived ease of use, and subjective norms had a positive impact on small businesses’ adoption of O2O service platforms, and perceived ease of use had a significant impact on perceived usefulness. Technological context variables, namely, relative advantage, compatibility, and trialability, had a positive impact on perceived usefulness. The risk-taking tendencies of small business owners had a significant impact on perceived usefulness, and IT knowledge had a positive impact on perceived ease of use. However, innovativeness and IT knowledge had no significant impact on perceived usefulness. The environmental context variables, namely, government support, competitive pressure, and digital environment change, had a significant influence on subjective norms.

First, perceived usefulness and perceived ease of use, which are the variables of the individual-level TAM, and subjective norms had a direct influence on the intention to adopt an O2O service platform. These results are consistent with those of numerous existing
studies on the acceptance of information technology at the individual level [54]. Subjective norms had the greatest influence on the intention to adopt an O2O service platform (path coefficient = 0.417). Subjective norms are formed by social influence [48]. In many cases, small businesses are run as family companies and do business for their neighbors, so small business owners may be strongly influenced by family, neighbors, and friends when making management decisions. Therefore, subjective norms seem to have a greater influence on decision-making regarding the introduction of O2O service platforms.

Second, unlike [34] study on smart farm adoption in Korea, environmental factors, namely, government support, competitive pressure, and digital environment change, had a significant effect on the adoption of O2O platforms through subjective norms. As the level of government support necessary for the spread of O2O service platforms has recently increased, small businesses seem to feel the need for O2O service platforms. As offline competition intensifies amid the COVID-19 pandemic, small businesses seem to feel the need for digital-based O2O service platforms.

Third, innovative technology characteristics, namely, relative advantage, compatibility, and trialability, had a positive effect on the perceived usefulness of O2O service platforms. These results are similar to those of studies on the adoption of cloud computing by organizations conducted by [55]. Namely, this may be because many small business owners think that the O2O service platform is superior to their existing work operations and is developed through industry-oriented practices with high compatibility with the existing operations and infrastructure. In addition, as many O2O service platform companies provide several opportunities to experience trials without burden, small business owners seem to appreciate that the usefulness of O2O service platforms appears to be growing.

Finally, the hypothesis about the influence of small business owners’ risk-taking tendencies on perceived usefulness was supported, but the hypotheses on the influence of small business owners’ innovativeness and IT knowledge on perceived usefulness were rejected. This is in contrast to previous research [38,45] that found that individual innovativeness had a significant influence on the perceived usefulness of new technologies. These results may be due to the fact that small business owners do not recognize the O2O service platform as a new technology and are familiar with successful O2O service platforms in various industries, such as Delivery Hero and Airbnb. Although IT knowledge did not have a direct effect on the perceived usefulness of O2O service platforms (the path coefficient was close to 0), IT knowledge had an effect on perceived usefulness through the complete mediation of perceived ease of use. Therefore, as in previous studies, this study found that small business owners’ IT knowledge plays an important role in introducing new technologies in small businesses.

7. Conclusions

This study provides the following theoretical contributions to the information systems literature. First, this study is an exploratory study on the factors affecting the adoption of O2O service platforms by small businesses and is expected to contribute to revitalizing research in this field. Most studies related to O2O services have focused on the use of O2O services from the consumers’ perspective [4]. This study was conducted from the perspective of O2O service providers, which are small businesses. Therefore, this study contributes to revitalizing research from the perspective of O2O service providers. Second, this study proposes a research model on the adoption of O2O service platforms that combines theories of IT acceptance at the individual level and information systems theories at the organizational level. Most studies on IT acceptance have presented and empirically analyzed research models at either the individual or organizational level. The research model of this study can be used as a basis for studies on IT adoption in areas that combine organizational and individual characteristics, such as small businesses.
7.1. Managerial Implications

The results of this study provide the following practical implications in addition to the theoretical contributions described above. First, relative advantage, compatibility, and trialability had a significant influence on perceived usefulness. O2O service platform companies need to develop functions that streamline work for small businesses to spread the use of O2O service platforms, configure O2O service functions that are compatible with the existing infrastructure of small businesses, and allow small businesses to access the service in advance through demonstration versions. Second, subjective norms had the greatest influence on the adoption of O2O service platforms, and government support had a significant influence along with competitive pressure and digital environment change. These results imply that small businesses need O2O service platforms to deal with pressure from competitors and digital environment change; thus, the government should expand education and support for small businesses to facilitate the introduction of O2O service platforms. Such education should include the fact that the O2O service platform is a competitive weapon for survival and is a trend of the times. Third, although small business owners’ IT knowledge had no direct influence on perceived usefulness, it influenced the perceived usefulness and the intention to adopt an O2O service platform through perceived ease of use. Therefore, it is necessary for the government and small business support organizations to actively implement IT education and training for small businesses in order to spread the use of O2O service platforms. Finally, the risk-taking tendency had a significant influence on perceived usefulness. Therefore, small business owners need an active mindset to take appropriate risks for the introduction of the O2O platform.

7.2. Limitations and Recommendations for Future Research

Future research directions based on the limitations of this study are as follows: First, other organizational factors, owner characteristics, and technical characteristics of the O2O platform (e.g., firm’s age, leadership style, and platform usage fee) can affect the adoption of O2O service platforms by small businesses. Future studies can identify variables other than those presented in this study and add them to the research model to develop a more predictive adoption model. Second, this study used the quantitative survey method for empirical analysis. Future studies can use in-depth interviews with small business owners alongside surveys for more comprehensive results and theoretical contributions. Third, this study analyzed the research model with a small sample size compared to the number of research variables. Future research needs to collect more data and analyze the research model. Finally, this study focused on O2O service platforms used in Korea. O2O service platforms are developed and operated in accordance with the country’s industries and characteristics. If research is conducted on O2O service platforms used in other countries, the results may differ from those of this study. Further research needs to be conducted on various O2O service platforms in different countries to expand the research findings.

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Informed Consent Statement: Not applicable.

Data Availability Statement: The data can be obtained through the request.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Appendix A.1. Compatibility
A1. The O2O service platform fits well with our company’s industry.
A2. The O2O service platform fits well with our company’s work style.
A3. The O2O service platform will be compatible with the existing environment of our company.

Appendix A.2. Relative Advantage
A4. The O2O service platform can be used to perform work in a more efficient manner.
A5. The use of the O2O service platform promotes innovation in our company’s products or services.
A6. Using the O2O service platform will reduce the time required for orders and customer response.
A7. The O2O service platform will provide new opportunities.

Appendix A.3. Trialability
A8. The O2O service platform companies provide many opportunities for pilot use.
A9. The O2O service platform can be easily used on a trial basis.
A10. You can feel free to use the O2O service platform before receiving the official service.

Appendix A.4. Perceived Usefulness
A11. The O2O service platform can improve work efficiency.
A12. The O2O service platform can increase work productivity.
A13. Overall, the O2O service platform is useful.

Appendix A.5. Perceived Ease of Use
A14. The O2O service platform is easy to use.
A15. It is easy to use the O2O service platform skillfully.
A16. The process of using the O2O service platform is easy.

Appendix A.6. Subjective Norms
A17. People who influence my behavior will think that I should use the O2O service platform.
A18. People who are important to me will think that I should use the O2O service platform.
A19. People around me will say that it is good to use O2O service platforms.

Appendix A.7. Government Support
A20. The government is implementing various support policies for the introduction of O2O service platforms to small businesses.
A21. The government considers the spread of O2O service platforms an important policy for small business owners.
A22. The government policy for the spread of O2O service platforms is specific and well implemented.

Appendix A.8. Digital Environment Change
A23. Having an online business using the internet and mobile technology is a trend of the times.
A24. The use of cutting-edge IT is being actively discussed in small businesses.
A25. Internet-based e-commerce is an essential business activity today.

Appendix A.9. Competitive Pressure
A26. If competitors used the O2O service platform, the competitiveness of our business would be affected.
A27. Competition among companies is intensifying, and some competitors are already using the O2O service platform.
A28. Customers/partners are asking our company to introduce its O2O service platform.
Appendix A.10. Innovativeness
A29. When solving problems related to business, I choose a creative method rather than a conventional method.
A30. I try to improve management performance by introducing innovative management techniques.
A31. When improving management performance, I try to find a new method rather than use the existing one.

Appendix A.11. Risk-Taking Tendency
A32. Even in uncertain situations, I boldly invest when I need to invest.
A33. Rather than waiting for the uncertainty to get better, I actively work through it.
A34. I enjoy dangerous things or taking risks.

Appendix A.12. IT Knowledge
A35. I have a relatively good understanding of IT.
A36. I have the ability to learn or apply IT skills quickly.
A37. Overall, I have high IT skills and knowledge.

Appendix A.13. Intention to Adopt
A38. I will adopt the O2O service platform sooner or later.
A39. I will actively utilize the O2O service platform.
A40. I would recommend that the people around you actively use the O2O service platform.

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42. Yoon, C.; Lim, D. An empirical study on factors affecting customers’ acceptance of internet-only banks in Korea. *Cogent Bus.* 2020, 7, 1792259. [CrossRef]


