

# Article Exploring Motivations and Barriers to Participate in Skill-Sharing Service: Insights from Case Study in Western Part of Tokyo

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Abstract: Skill-sharing services have the potential to foster regional development and mutual aid within a community through residents' social participation. Despite the growing social demand for skill-sharing services, few cases have utilized individuals' knowledge, skills, and other intellectual assets. To widely diffuse such services, it is necessary to clarify user factors (motivations and barriers to use services) and reflect on the service design process. However, there is limited knowledge regarding user analysis and skill-sharing services. Thus, this study explores user factors that affect the intention to use skill-sharing services and derives guidelines for skill-sharing service design and development. A hypothetical user factor model was constructed through a literature review of user research in sharing services and empirical analysis of actual skill-sharing services. The hypothetical model was applied to a survey on the use of skill-sharing services by residents in Hino city, the western part of Tokyo (n = 358). The results revealed that social motivation and selfactualizational motivation significantly affected the service use intention of skill providers. Economic motivations and enjoyment of service activities derive the service use intention of skill receivers. Moreover, familiarity was identified as a significant factor for both skill providers and receivers. These findings generated practical propositions for service designers to foster the further diffusion of skill-sharing services.

**Keywords:** sharing economy; collaborative consumption; skill-sharing services; motivations; service design; structural equation modeling (SEM)

# 1. Introduction

Aging and depopulation are social issues that attract international attention and lead to shrinking regional economies, decline in workforce, and weakening of social security systems [1-6]. Such problems are particularly difficult to be solved using the limited resources of local governments in suburban and rural areas [2,6–8]. To address these issues, the sharing economy [9-12] or collaborative consumption [13-16], a strategy that utilizes idle assets such as goods and labor owned by people, and a solution based on a resident-led approach have been attracting attention [17,18]. For instance, the development of sharing services to support childcare [19], make effective use of accommodation [20], solve regional problems using local human resources, and revitalize the local economy [21] are being actively implemented. In particular, skill-sharing services [22–25] that make use of individuals' knowledge and skills are expected to solve the above-mentioned problems that force local governments to bear high costs (e.g., job creation, childcare environment improvement, and social welfare). However, the use of this service remains significantly limited because of barriers such as anxiety about direct communication between users and unfamiliarity with digital devices [26]. Moreover, the lack of clarity on the user factors that influence the use of skill-sharing services has also hindered its diffusion. To expand this kind of service in society, it is necessary to investigate and clarify the motivations and



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barriers for participating in service use services and reflect them appropriately in the design strategy of the services.

In existing studies related to the sharing economy, motivations and barriers to participating in sharing services have been widely addressed (e.g., [27–29]). However, most existing studies focus on the sharing of specific tangible goods. There is still a lack of research on skill-sharing services that utilize intangible intellectual assets, such as the knowledge and skills of individuals [30,31]. Furthermore, skill-sharing services have different characteristics from the sharing of tangible goods, and it is difficult to apply the findings from the above previous studies to the analysis of this type of service. Thus, this study aims to clarify the user factors (motivations and barriers) that affect the use of skill-sharing services. Based on the results of the analysis, this study discusses the design guidelines that contribute to the social diffusion of skill-sharing services.

The rest of this study proceeds as follows. Section 2 outlines the research design of this study. Section 3 introduces the theoretical foundation of the user factor model constructed in this study through a literature review. Subsequently, based on the findings, we introduce the user factor model for the use of skill-sharing services (Section 4). Section 5 describes the analysis method and target case study. Section 6 presents the case study results. Finally, Section 7 discusses the design strategies of the skill-sharing service, the implications of this study, and the challenges and limitations to be addressed in future work.

#### 2. Research Design

#### 2.1. Step1: Litrature Review of Motivations and Barriers to Participate in Sharing Services

The commonly discussed user factors for the use of sharing services were extracted from a literature review of extant studies investigating the motivations and barriers for the use of sharing services. The Scopus database was used as the data source (https://www.scopus.com) (accessed on 27 April 2020). The literature that fit the purpose of this review were extracted using a keyword search. The following search formula was adopted: "("sharing economy" OR "collaborative consumption") AND (acceptance OR motivation OR barrier)". Articles published in journals with a non-zero number of citations as of the above survey date were selected. Since sharing services is a topic that is actively discussed in the academic field of informatics, it was assumed that there were conference papers that discussed important findings but were not published in academic journals. Therefore, conference papers with more than 100 citations were included in the survey to ensure reliability and quality. The keyword search and preliminary screening yielded 151 articles.

The titles, abstracts, and keywords of the extracted articles were scrutinized, and articles that did not aim to investigate the motivations and barriers to participation in sharing services or collaborative consumption were excluded. After the screening, 27 articles (26 articles and 1 conference paper) were selected for further analysis. Two papers that were unavailable were also excluded. Further, the articles that investigated factors specific to particular sharing services (e.g., cars, accommodation, or clothes) or investigated motivations and barriers for service adoption by service platform providers rather than users were excluded. Consequently, this study compiled a corpus containing 10 papers to identify general motivations and barriers to use sharing services. The results of the literature review are presented in Section 3.2.

#### 2.2. Step2: Investigation of the Characteristics of Skill-Sharing Services

This step investigated the characteristics specific to skill-sharing services through a survey of existing services. Using this survey, the motivational and barrier factors unique to this type of service were derived (Section 3.4). To ensure the reliability of the services to be surveyed, this study focused on services that have the 'Sharing Economy Certification Mark' issued by the Japan Sharing Economy Association and surveyed 12 companies whose service type is classified as skill-sharing services [32]. The sharing economy certification mark certifies that a service meets the compliance requirements established by the IT Strategy Office of the Cabinet Secretariat in Japan.

# 2.3. Step3: Development of a User Factor Model for the Use of Skill-Sharing Service

Based on the results obtained in Steps 1 and 2, this step constructed a user factor model for the use of skill-sharing services, which hypothesizes the motivation and barrier factors that influence users' intention to use skill-sharing services. The users of the service were divided into two groups: skill providers, who provided their skills to others, and skill receivers, who received the skills of others. A hypothetical model was constructed for each group, which is introduced in Section 4.

# 2.4. Step4: Analysis of User Factors with Application in Suburban Context

This step analyzed the factors that significantly affect the intention to use skill-sharing services by applying the user factor model to a user survey in a suburban context. This analysis first conducted a questionnaire to investigate target users' perceptions of each motivation and barrier factor and their intention to use skill-sharing services. Subsequently, the influence of each factor on the intention to use the service was analyzed using the partial least squares structural equation modeling (PLS-SEM) [33] to identify the factors that affect the intention to use the service. The specific analysis process is described in Section 5, and the results are presented in Section 6.

# 3. Theoretical Foundation

#### 3.1. Sharing Economy

The sharing economy (SE) is a new form of economy that aims to realize a sustainable society [9,12,34]. Although this concept emerged in the late 1980s, it still lacks a unified definition and has various definitions provided by researchers and organizations. For example, Belk regards 'sharing' as "the act and process of distributing what is ours to others for their use and/or the act and process of receiving or taking something from others for our use [34,35]." Based on the premise of SE as a social digital innovation based on common general-purpose technology, Martin et al., defined SE as "an online platform that enables citizens to engage in peer-to-peer (PtoP) forms of economic activity at an unprecedented scale," [36,37]. More recently, Ranjbari et al., provided a comprehensive definition of SE as "an economic system, whose intermediary companies utilize online platforms to facilitate and lower the cost of the for-profit transactions of giving temporary access—without the transfer of ownership—to idle resources of consumers in the peer-to-peer networks that it has created, because of the trust built among its members, who may be individuals or business" based on comprehensive review of SE literature [38].

The difference between SE and other economic forms has been discussed in the literature. Frenken et al., regarded the sharing economy as a PtoP economy, in which multiple customers interact with each other [11], and distinguished the business-to-customer (BtoC) economy from the SE. In Japan, SE is defined as "an economic revitalization activity that makes available to other individuals through an Internet matching platform the assets (including intangible assets such as skills and time) that individuals possess that can be utilized [26]." Based on this definition, the Ministry of Internal Affairs and Communications (MICs) in Japan classifies SEs into five categories, as shown in Table 1 [26]. According to Belk's definition, there is a distinction between the sharing of tangible assets (e.g., cars and accommodations) and the sharing of intangible assets (e.g., knowledge and ideas). However, MIC's definition includes both tangible and intangible assets. This study regards SE as an economic form in which idle assets owned by individuals are made available to others through an Internet platform to realize specific values. Namely, the SE referred to in the following sections represents economic forms that involve the sharing of assets for the benefit of others, regardless of whether they are intangible or tangible. This definition is basically consistent with the main characteristics of SE identified by [38].

<b>Object of Sharing</b>	Representative Service
Goods	Flea market, Rental service
Space	Car parks, Accommodations
Skill	Housekeeping service, Childcare, Nursing, Schooling, Cooking
Mobility	Car sharing, Ride sharing
Capital	Cloud funding

 Table 1. Typology of sharing services [26].

3.2. Motivations and Barriers for Use of Sharing Services

The following section describes the motivations and barriers to the use of sharing services among service users (asset providers and receivers) obtained from a survey of the literature identified in Section 2.1. The results are presented in Table 2. Since the corpus did not include literature dealing with the barriers faced by asset providers, only their motivations are mentioned.

		Factors	Definition	References
		Economic motivation	Participation in SE offers monetary value by efficient way.	[28,39–43]
		Environmental motivation	SE contributes to the protection of the natural environment and sustainable consumption behavior.	[28,40-44]
Provider	Motivations	Social motivation	Participation in SE leads to new connections and community building.	[28,39–42]
		Altruistic motivation	SE can contribute to supporting the activities of others.	[39,40,44]
		Utility	Participation in SE reduces inconveniences in daily activities.	[39,44]
		Economic motivation	Participation in SE offers monetary value by efficient way.	[27,28,39-42]
		Environmental motivation	SE contributes to the protection of the natural environment and sustainable consumption behavior.	[27,28,40-44]
	Motivations	Social motivation	Participation in SE leads to new connections and community building.	[27,28,39-42,45]
		Enjoyment	Participation in SE is an enjoyable activity.	[28,39,40,43]
Receiver		Familiarity	Familiarity and knowledgeability in the use of sharing services.	[42]
-		Utility	Participation in SE reduces inconveniences in daily activities.	[27,39,46]
		Trust	Trust Lack of trust toward the platform company and asset providers.	
	Barriers	Sanitation	Sanitary concerns about the condition of shared assets.	[44,45]
		Non-usefulness	Lack of utility/necessity of sharing services.	[27,46]

Table 2. General motivations and barrier factors for sharing service use.

# 3.2.1. Motivations of Providers in Service Use

This study identified five motivating factors for asset providers: economic, social, environmental, altruistic motivation, and usefulness. Most extant studies have identified economic motivations such as earning income by sharing surplus assets [28,39–43]. For example, Böcker et al., confirmed that the higher the price of the goods offered, the stronger the effect on economic motivation [41]. Bellotti et al., and Hamari et al., found that receiving a reward for providing a service was the largest factor affecting the intention to participate in service use [28,39]. Similarly, Bucher et al., found that receiving monetary rewards for sharing assets generates favorable attitudes toward sharing services and affects intentions to participate [40].

Social motivation, such as building new relationships and forming a community, has also been identified a major motivation factor [28,39–42]. Böcker and Meelen revealed that social motivation was particularly evident in ride and food sharing, which involves social interaction during service provision [41]. Bellotti et al., reported the influence of attempts to help others and build social relationships, while providers emphasize economic benefits [39].

Environmental motivation is also a major motivation that drives the use of sharing services [28,40–44]. Among the various service forms, it was confirmed that environmental protection concerns have a significant impact on service usage intentions, especially in product-sharing services, such as car sharing [28]. Moreover, even on platforms without monetary exchange, the guilt of consuming resources by oneself and substituting others to purchase new products are the main motivations influencing service use [44].

On the other hand, free or low-cost asset sharing cannot be explained by economic, environmental, or social motives alone. Some studies identified altruistic motivations that led providers to help others facing certain problems by providing social capital [39,40,44]. Bucher et al., expressed this factor as moral motivation and found that the perception of sharing for the sake of helping others influences service use [40].

The utility of sharing services, such as the omission of management and disposal procedures, is also a motivation for providers [39,44]. For example, Aptekar et al., mentioned personal utility, referring to simply using the service to dispose unnecessary items, as a motivation for sharing assets held by others for free [44].

#### 3.2.2. Motivations and Barriers of Receivers in Service Use

Six motivations for asset receivers were identified: economic, environmental, social motivation, enjoyment, familiarity, and utility.

In extant studies, usefulness and economic, environmental, and social motivation have been identified as motivating factors for both service receivers and providers. Services that cost less than conventional services provide economic motivations to receivers [27,28,39]. In particular, Böcker and Meelen revealed that, compared with providers, receivers' intention to use services is driven by economic motives, regardless of the object of sharing [41]. Furthermore, Edbring et al., confirmed that receivers' motivation factors for use include the opportunity to try products through collaborative consumption and the usefulness of the flexible use of goods [27].

"Enjoyment" of participation in the service activity itself and "familiarity" with the service were confirmed as motivation factors peculiar to service receivers. Enjoyment is an essential factor explaining the intention to use sharing services; some users participate in services for entertainment purposes [28]. Familiarity with sharing services, such as knowledge and familiarity, decreases risk concerns and increases intention to use [42].

Conversely, "low trustworthiness," "sanitation concerns," and "lack of perceived usefulness (non-usefulness)" were identified as barriers that prevent receivers from participating in the service. In the use of sharing services, uncertainty of risk and responsibility, and concerns about trust in personal interactions with unknown providers reduce trustworthiness and hinder service use [27,45,46]. Additionally, a decline in sanitation due to deterioration and damage caused by sharing products and spaces with others frequently [9,23] and the inability to recognize the usefulness and necessity of services due to a strong sense of ownership of assets and lack of clear incentives [27,46] also act as barriers. In particular, trust is considered the most important issue in sharing services, and many services have adopted review systems to ensure reliability and fairness [47,48].

# 3.3. Skill-Sharing Service

Skill-sharing services are a form of services that share intangible assets (knowledge, skills, time, etc.) [23,24,49]. SE is similar to the gig economy, defined as "a market in which one-off job requests and orders are received via the internet" [50]. To the best of our knowledge, although there is no strict distinction between them, the gig economy

is regarded as a broader concept that encompasses consumer-to-business (CtoB), such as freelance work, whereas the sharing economy comprises PtoP interactions. However, these skill-sharing services have a lower recognition and usage rate in Japan than in other countries, and people have a low intention to use them [51]. Therefore, it is necessary to establish an environment where skill-sharing services can be widely disseminated to the public.

As one form of SE, this study defines skill-sharing service as "a service that makes an individual's time, skills, and knowledge available to others via an Internet platform."

# 3.4. Characteristics of Skill-Sharing Services

Based on the definitions in Section 3.3, this study excluded services that take the form of individuals versus companies (e.g., crowdsourcing) from the scope of the survey. Appendix A shows the services included in the survey. The following seven characteristics were extracted by investigating the content of their provision, target customers, and compensation (Table 3). In the following sections, this study divides the users of skill-sharing services into "skill providers" who use skill-sharing services to provide their own skills and "skill receivers" who use the skills of others.

Table 3. Characteristics of skill-sharing services.

Characteristics	Definition	Type of Service
Duality of users	Customers take on the roles of both skill providers and receivers.	1, 2, 3, 4, 5, 6
User dependency	Service quality depends on the ability of the skill providers.	1, 2, 3, 4, 6
Economic efficiency	Capable of delivering/receiving value at a lower cost compared with conventional services.	1, 2, 3, 4
Sociality	Orient to the formation of social connections among users.	1, 2, 3, 5, 6
Digitality	Services are established on the basis of information and communication technology.	1, 2, 3, 4, 5, 6
Network externality	The amplification of the value of service depends on the number of users.	1, 2, 3, 4, 5, 6
Spontaneity	User participation driven by intrinsic motivations other than monetary transactions.	1, 2, 3, 4, 6

#### 3.4.1. Duality of Users

Because a skill-sharing service is a PtoP interaction, it differs from general services in that users may play the roles of both skill providers and skill receivers. This is one of the main characteristics of the sharing platform discussed in the collaborative consumption literature as the two-sided role of the actors involved in the production and consumption of resources [52,53]. To make skill-sharing services sustainable, it is desirable to promote the circulation of skills by designing a structure that provides incentives for both roles.

#### 3.4.2. User Dependency

Since users who do not possess accredited professional qualifications can be providers, the quality of the services provided depends on the capabilities of the skill providers and the delivery method. However, service quality does not necessarily depend entirely on the skill providers' capabilities. This is noted in SE and platform literature as performance risk [54], the discrepancy between the expected value and the actual value due to the lack of professionalism. This phenomenon mainly occurs in accommodation services such as Airbnb [55,56]. Moreover, in a delivery service such as Uber-eats, although the method of delivery may affect the quality of the meal, the value of the service is highly dependent on the quality of the food delivered.

# 3.4.3. Economic Efficiency

Skill-sharing services for housekeeping, childcare, nursing care, and car delivery directly matched individual skill providers with skill receivers. Hence, the fees paid by skill receivers are relatively reasonable compared with those for services via employees of regular companies (e.g., cab services). This is strongly tied to the primary motivation of users to participate in SE as indicated in Section 3.2. In contrast, if the skill provider provides specialized skills, the price may be higher than that of comprehensive services because of the uniqueness of the skills. This tendency is observed in experience-based services (e.g., sightseeing with an interpreter/guide).

#### 3.4.4. Sociality

Some services aim to generate social connections and communities among users. Indeed, a function in childcare services allows one to set a gratuity as a favor, in addition to the basic fee. Moreover, experiencing sharing services enable the sharing of information about local people and the cuisine of one's home country. Similar to other existing sharing services [28,39–42], this is one of the features that promotes participation in the platform.

# 3.4.5. Digitality

Similar to the spread of SE [57], skill-sharing services have been made possible by the development of ICT technologies (e.g., smartphones and blockchain). Platform providers can connect with new customers, shoppers, and buyers. These technologies play a pivotal role in reducing the risk of user interactions and guaranteeing trust [48].

# 3.4.6. Network Externality

Transactions in skill-sharing services are realized based on the premise that the resources provided match the requirements of the skill receivers. The greater the number of users, the more opportunities the skill providers have to demonstrate their skills and the better the skill receivers can select providers who meet their requirements. Similar to existing platform-based business models, this virtuous cycle enhances the value of a service and synergistically promotes the use of skill-sharing services [58–60].

#### 3.4.7. Spontaneity

While this characteristic is not well-investigated in the SE literature, skill-sharing services have a mechanism that allows skill providers to achieve self-actualization by demonstrating their own abilities and gain altruistic satisfaction by supporting the needy. In terms of skill receivers, the incentives include the enjoyment of using the service itself and the sense of specialness.

#### 4. User Factor Model for the Use of Skill-Sharing Services

This study constructed a hypothetical model that assumes motivations and barriers that affect users' intention to use skill-sharing services, based on the general factors of the use of sharing services and the characteristics of skill-sharing services extracted in Section 3 (Figure 1). While this model is constructed based on the general factors for using sharing services, this study added new factors based on the characteristics of skill-sharing services are a form of service in which intangible assets are shared. Therefore, the hypothetical model does not include factors explained based on the premise of product sharing. Specifically, this study eliminated the motivation factor "environmental motivation," which is the motivation to contribute to reducing environmental impact by recycling products instead of disposing of them, and the barrier factor "sanitation," which refers to the damage or deterioration caused by sharing. The details of the hypothesized model for skill providers and skill users are described below.



Figure 1. Constructed user factor model for use of skill-sharing services.

#### 4.1. Skill Providers' Factors

Similar to the motivation in general sharing services, the motivation factors that affect the skill providers' intention to use sharing services include "economic motivation" related to the income earned in exchange for providing one's skills, "social motivation" for building new relationships and connecting with others, and "altruistic motivation" for supporting the others.

Further, "familiarity" and "self-actualization" are newly added as motivational factors based on the characteristics of the skill-sharing service. Understanding the system or procedure to provide the skills and benefits obtained can reduce the unclearness of service use and the gap with prior expectations. Familiarity is expected to be synergistically enhanced by the experience of receiving others' skills in addition to the experience of providing the skill due to the "duality of users" of the skill-sharing service. Based on the "spontaneity of the skill-sharing service," this study added "self-actualization" as a motivating factor for using the service to improve one's own skills or to obtain an environment or opportunity to demonstrate one's skills.

# 4.2. Skill Receivers' Factors

The motivational factors that affect the intention to use include "economic motivation" because of one of the characteristics of the skill-sharing service, "economic efficiency," "social motivation" for the purpose of building social connections among users, and "enjoyment" of participating in the service activity itself. Similar to the motivation of the skill providers, "familiarity" was also added as a motivation factor.

The barrier factors for skill receivers include concern about "service quality" and "trust" due to the "duality of users" and "user dependency." Although trustworthiness was discussed as the main barrier to the use of sharing services, it is assumed that skillsharing services are more pronounced when unqualified users provide skills. Concerns about trust include distrust of the company providing the platform and uncertainty about compensation. Meanwhile, "non-usefulness," which is the perception that no benefit can be obtained from using a service, is also a barrier factor. However, in this model, the perception of "non-usefulness" is considered to be synonymous with a low level of familiarity with the service due to a lack of knowledge and experience, so it is constructed as a factor of "familiarity" with the service.

#### 5. Method

#### 5.1. Sample and Data Collection

The hypothetical model constructed in the previous section assumes motivational and barrier factors that generally affect users' intention to use skill-sharing services. Based on this hypothesis, this study identifies the factors that significantly affect the intention to use a service.

This study investigated users' actual perceptions of each motivation and barrier factor and their intention to use. A questionnaire was used to investigate the perception of each motivation/barrier factor and intention to use the service in the target user group. As each factor and intention to use cannot be observed directly, this questionnaire is composed of multiple items that make each motivation/barrier factor and intention more specific. For example, the motivation of skill receivers, "economic motivation," is explained by low cost, frugality, and cost-effectiveness compared with normal services. Appendix B show the items of the questionnaire. The relationship between the questionnaire items and the user factor model is shown in Figure 2.



Figure 2. The relationship between the questionnaire items and the user factor model.

This study conducted an online questionnaire survey of residents of Hino City, Tokyo, to identify the factors that affect the use of skill-sharing services in the city. Hino City was selected for the "Sharing Economy Activity Promotion Project" by the MIC in 2019, and as part of this initiative, the city has been working on the development of a multi-generational participation skill-sharing service to maintain social connections among residents to promote mutual aid within the community. As a demonstration experiment, the project was working to promote residents' use of skill-sharing services developed and provided by a telecommunication company (from 1 August 2019 to 30 June 2020). The questionnaire was administered from 21 October 2020 to 3 November 2020 after the completion of the demonstration experiment, and 448 responses were obtained. This questionnaire consisted of four parts that contain: awareness and experience of the sharing economy in the first part, 18 skill providers' motive items in the second part, 21 skill receivers' motive/barrier items in the third part, and demographic questions in the fourth part. For each item in second and third part, values were collected on a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree). Moreover, the items were confirmed and verified for clarity by a group of researchers and city officers to ensure face validity. The fourth part investigated demographic information of the survey targets (gender, age, occupation, presence of a roommate, last educational background, experience in using sharing services, and awareness) to explain the market characteristics. This investigation excluded responses with missing values for motivation, barriers, and intention to use, and finally obtained 358 valid responses.

#### 5.2. Data Analysis Method

The factors that affect the intention to use the service were identified based on the data obtained from the questionnaire. This study adopted PLS-SEM [33] to test the hypotheses. This is a statistical method that enables the examination of the relationships among variables that are unobservable and hard-to-measure latent variables. There are rationales to adopt this approach. First, this study attempted to verify the significance

of latent influence of each factor on intention to use skill-sharing service. SEM analyses are the primary technique when using latent psychometric variables. Second, PLS-SEM can identify the major relationships among factors by analyzing a relatively small sample size. The analysis thus can be performed even with 358 samples collected through the questionnaires. For these reasons, this study adopted this approach as the appropriate method for the quantitative analysis. Moreover, SmartPLS 3.0 [61] statistical software for PLS-SEM was used to properly conduct this analysis.

#### 6. Results

# 6.1. Validation of the Measurement Model

To conduct a survey based on the measurement model, it was necessary to conduct an initial assessment of the reliability and validity of the model and questionnaire items. Table 4 shows the reliability and validity of the topics to be verified using PLS-SEM.

Criteria	Content	Standard
Indicator reliability	Whether each question item adequately describes the factor.	0.70 or higher is preferred. If it is exploratory research, 0.4 or higher is acceptable [62].
nternal consistency reliability	Consistency of question items within the same factor.	Composite reliability (CR) should be 0.7 or higher. If it is exploratory research, 0.6 or higher is acceptable [63].
Convergent validity	Whether the questionnaire items within the same factor comprehensively explain the factor.	Average variance extracted (AVE) should be 0.5 or higher [63].
Discriminant validity	Whether there are any correlations with questions outside the factor.	the "square root" of AVE of each latent variable should be greater than the correlations among the latent variables [64].

Table 4. Check list of the reliability and validity [33].

First, the measurement model of the skill providers was assessed based on the questionnaire collection data. The results are shown in Appendix C. CR, which indicates internal consistency reliability, exceeded 0.7 for all factors, and IR exceeded 0.5 for each item. AVE, which indicates convergent validity, also met the criterion value of 0.5. Next, according to [64], the discriminant validity was verified. It was confirmed that the square root value of each factor was greater than the correlation value with other factors; thus, discriminant validity was validated (Appendix D).

Next, we assessed the measurement model for the skilled receivers. Consequently, the IR of the variables comprising the "enjoyment," "service quality," and "trust" did not meet the standard values. Regarding enjoyment, the variable "UFun\_2: Using skill-sharing service is an unusual experience" was 0.35, which is below the standard value for IR. It is presumed that this item explains a different concept from that of enjoyment. Since the enjoyment factor represents "enjoyment felt in the activity itself," this variable was excluded because the essential meaning of enjoyment would not change even if this variable was eliminated. In terms of service quality, the variable "USQ\_3: Quality varies" was 0.31, which is below the standard value of IR. It is presumed that this variable was different from anxiety about quality or low quality compared with normal services. Since the factor of service quality is "concern about the offer" and its essential meaning does not change even if this variable is deleted, this variable was excluded. On the other hand, the variables in trust "UTru\_1: Concern for corporate compensation (IR = 0.15)" and "UTru\_3: Concern for privacy (IR = 0.45)'' were below the standard value. This result suggests that each of the aforementioned variables explains a different concept of trust. Hence, the questionnaire items used to investigate trustworthiness were judged to be inappropriate for this study, and the factor "trust" was excluded from the analysis.

Based on these results, the adjusted models for the factors and variables were assessed again (Appendices C and D). Consequently, the reliability and validity of all criteria of the adjusted model were confirmed.

# 6.2. Analysis Result

The validated model was applied to analyze the motivations and barriers that affect the intention to use. Specifically, this study analyzed the coefficient of determination R2, which indicates the degree to which the target endogenous variable (intention to provide and use) can be explained by the latent variables (each motive and barrier factor) and the significance of the path coefficient between the latent and target variables. The significance of the path coefficient was tested using bootstrapping [30]. This procedure provides approximate T-values for significance testing of the structural path. The bootstrap results approximate the normality of the data. In the following analysis results (Figure 3), the path coefficients and their *p*-values are shown in the form of "path coefficients" on the links between the nodes, and the coefficient of determination ( $\mathbb{R}^2$ ) is shown in the nodes of the endogenous variables of each model (i.e., intentions to provide and receive).



\*p<0.05; \*\*\*p<0.001



This section first explains the results of the analysis of the strength of the influence of motivational factors on skill provision. As shown in Figure 3, the coefficient of determination for the intention to provide skills was approximately 0.5 ( $R^2 = 0.496$ ), which is the standard value, and it was also confirmed that the defined motivation factors can explain the intentions reasonably well. Furthermore, social motivation (p < 0.001), familiarity (p < 0.001), and self-actualization (p < 0.001) had significant effects on the intention to provide skills. This result verified the hypothesis of this study that skill providers have "familiarity" and "self-actualization" as motivating factors specific to skill-sharing services. However, there was no significant tendency for "economic motivation" and "altruistic motivation" identified in extant studies. This result suggests that providers tend to recognize skill-sharing services as an opportunity to demonstrate their skills and build social relationships through them, rather than to obtain money (compensation) or contribute to others as in conventional sharing services. This supports the unique nature of this type of service.

In terms of skill receiver, the coefficient of determination for intention to use was about 0.5 ( $R^2 = 0.506$ ), and it was confirmed that the intention can be moderately explained by the motivation and barrier factors defined in this study. Moreover, economic motivation (p < 0.05), enjoyment (p < 0.001), and familiarity (p < 0.001) had a significant effect on the intention to use the service. However, the hypothesis that "service quality," which is unique to skill-sharing services, affects intention to use as a barrier factor was not found to be significant. This result suggests that the surveyed group is relatively tolerant of the fact that skill providers are ordinary people without special qualifications.

In summary, in the target user group, the factors of "social motivation," "familiarity," and "self-actualization" were estimated to act on the intention to use of skill providers, while the factors of "economic motivation", "enjoyment", and "familiarity" were estimated to act on the intention to use of skill receivers.

# 7. Discussion and Conclusions

# 7.1. Implifications of this Study

This study clarified the motivation and barrier factors that are generally assumed to affect the use of skill-sharing services based on a literature review on motivations and barriers for sharing services and a survey of actual skill-sharing services. Through a survey of users in a suburban area in Tokyo, we confirmed that "social motivation", "familiarity", and "self-actualization" are significant factors affecting skill providers' intention to use, and "economic motivation," "enjoyment," and "familiarity" were significant factors for skill receivers. The above factors, with the exception of "self-actualization," were verified to have a significant effect on intention to use in existing studies. In this sense, these results suggest that skill-sharing services may be a form of sharing service that inherits the characteristics of the sharing economy, even though this type of service emerged through practice. The findings of this study are expected to be applied to derive design guidelines for skill-sharing services referred to in actual business development. In this respect, the results make a practical contribution to the design and development of sharing services.

Meanwhile, this study confirmed that providers' "self-actualization" which were hypothesized as motivation factors specific to skill-sharing services, significantly affected the intention to provide skills. While the discussion on self-actualization through the use of sharing services is very limited [65], it is a fundamental need that is a consequence of the motivation of people's behavior, as addressed in Maslow's human motivation theory [66,67]. The results identified by this study demonstrate that the service is closely linked to this need, especially in terms of providing one's own unique skills.

In addition, while existing studies have reported that women tend to be more aware of economic motivations for using sharing services [29], this study found that they evaluated non-utilitarian aspects such as social motivation and enjoyment. The above results are unique findings newly acquired by targeting skill-sharing services, which have not been investigated before. This result expands the knowledge on the motivations for and barriers to using various forms of sharing services.

#### 7.2. Propositions for Skill-Sharing Service Design

This section suggests design guidelines that may be effective in the design and development of skill-sharing services, based on the results obtained in Section 6 and the questionnaire.

#### 7.2.1. Propositions from the PLS-SEM Analysis

First, the results of the PLS-SEM analysis led to the following two propositions that consider the characteristics of skill providers and receivers.

**Proposition 1.** Establishing a community that connects users to encourage social motivation among skill providers and a system that allows users to specify in detail the skills to be provided as an environment of self-actualization where they can effectively demonstrate their abilities.

**Proposition 2.** A system that is more economical than traditional services and still satisfies the curiosity of skill receivers.

The following proposition was derived from the results, which confirmed the significant effect of familiarity on intention to use for both skill providers and receivers.

**Proposition 3.** *Disseminating the content and usage of skill-sharing services and their utility to potential users.* 

In the following subsections, we compare the measured values of the questionnaire items (mean values of valid responses) for the factors that significantly affect the service usage intentions for different user attributes. In the comparison of each attribute, Welch's *t*-test was used to calculate *p*-values, because the variances of the populations to be compared were not equal. This study further proposes specific design guidelines that consider the attributes of the target users.

# 7.2.2. Differences in Gender

The target user group was categorized as male or female, and the differences in responses between the two groups were analyzed. As shown in Table 5, women perceived social motivation (benefits of connection and community building) more than men in skill provision. While existing studies have confirmed the effects of women's environmental and economic motivations [29,41,68], these results provide new insights into women's motivation for participation in sharing services. In terms of receiving skills, it was found that females had a higher intention to use skills than males, with enjoyment as a motivation. From these results, the following design guidelines were derived:

Table 5. Result of *t*-test (differences in gender).

		Skill P	rovider	Skill Receiver				
Gender	Intention to Use	Social Motivation	Familiarity	Self- Actualization	Intention to Use	Economic Motivation	Enjoyment	Familiarity
Male $(n = 150)$	2.81	3.24	2.70	3.29	2.98	3.24	2.90	2.85
Female $(n = 196)$	2.95	3.44	2.75	3.46	3.24	3.12	3.11	2.85
<i>p</i> -value	0.19	0.04 *	0.65	0.11	0.01 **	0.17	0.02 *	0.99

\* p < 0.05, \*\* p < 0.01.

**Proposition 4.** In the case of skill-sharing services (e.g., housekeeping and childcare), where females are the main users, it is desirable to set up a community to connect users and create a mechanism to satisfy their curiosity to participate in service activities.

# 7.2.3. Differences in Age

In the target case study, because it was expected to activate the interaction between the senior generation and other younger generations through the use of services, the target user group was classified into two groups: over 60 years of age and under 60 years of age. As shown in Table 6, seniors were more aware of their economic motivation for receiving skills. These results are consistent with findings from existing studies, which reported that the elderly tend to be concerned about the cost of using services [25]. However, there was no significant difference in skill provision between the two groups.

	Skill Provider					Skill Receiver			
Age	Intention to Use	Social Motivation	Familiarity	Self- Actualization	Intention to Use	Economic Motivation	Enjoyment	Familiarity	
Under 60s ( <i>n</i> = 241)	2.89	3.29	2.72	3.38	3.17	3.12	2.99	2.87	
Over $60s$ ( <i>n</i> = 107)	2.88	3.46	2.73	3.39	3.03	3.29	3.08	2.80	
<i>p</i> -value	0.98	0.09	0.92	0.94	0.18	0.05 *	0.31	0.51	

Table 6. Result of *t*-test (differences in age).

\* p < 0.05.

Although restrictions on the use of digital devices (i.e., the digital divide) and lack of knowledge about the use of services were reported as barriers for the elderly to the use of sharing services [25], these were not included in the survey items in this study. It is likely that these barrier factors also affect the use of the system by the elderly. Therefore, future work should conduct a more comprehensive analysis by adding these factors.

**Proposition 5.** *In the development of content for skill-sharing services for senior users, it is effective to provide financial incentives for receiving skills.* 

#### 7.2.4. Differences in Familiarity

As skill-sharing is an emerging service, the degree of its recognition varies. Thus, this study categorized the target users according to whether they were aware of the skill-sharing service at the time of the questionnaire survey and compared the factors and intentions of the two groups. The "known group" refers to the users who answered "I know specifically about it" or "I have heard about it" in response to the question "Do you know about the skill-sharing service?", and "unknown group" refers to the users who answered "I don't know about it at all (I heard about it for the first time)."

As this attribute is equivalent to familiarity with skill-sharing services, a significant difference in familiarity was confirmed for both skill provision and receipt (Table 7). In addition, significant differences were found in the intention to provide and receive skills. In self-actualization for skill provision and economic motivation for skill receipt, users who knew about this type of service rated it higher. In addition, to conduct marketing to attract potential users, it is effective to understand and establish the brand personality of the company and design strategies that match the preferences of target users [69]. Based on these results, the following guidelines are proposed:

		Skill P	rovider	Skill Receiver				
Awareness	Intention to Use	Social Motivation	Familiarity	Self- Actualization	Intention to Use	Economic Motivation	Enjoyment	Familiarity
Known ( <i>n</i> = 177)	3.05	3.41	3.03	3.49	3.31	3.25	3.07	3.18
Unknown ( <i>n</i> = 175)	2.69	3.26	2.40	3.25	2.91	3.07	2.94	2.46
<i>p</i> -value	0.00 **	0.11	0.00 **	0.01 *	0.00 **	0.03 *	0.15	0.00 **

Table 7. Result of *t*-test (differences in awareness).

\* p < 0.05, \*\* p < 0.01.

**Proposition 6.** Publicizing the benefits of skill-sharing services and appropriately understanding the brand personality of service company are effective in encouraging (potential) users to participate in these services.

# 7.2.5. Differences in Educational Background

Existing studies have indicated that the higher the educational level of the user, the higher the level of participation in sharing services [29]. In agreement with this fact, this study categorized users into two groups: those with a college degree or higher and those without, and compared the presence of factors and intentions in the two groups. As a result, the former group had a higher intention to receive skills and had higher recognition of the service as a means to enable self-actualization (Table 8). Although a high level of education does not necessarily indicate a high level of ability or skill possessed by an individual, the results lead to the following proposition:

	Skill Provider						eceiver	
Education	Intention to Use	Social Motivation	Familiarity	Self- Actualization	Intention to Use	Economic Motivation	Enjoyment	Familiarity
Less than college $(n = 147)$	2.72	3.29	2.54	3.10	2.94	3.10	3.00	2.73
College or higher $(n = 184)$	2.95	3.40	2.78	3.48	3.20	3.21	3.04	2.89
<i>p</i> -value	0.05	0.33	0.06	0.00 **	0.01 *	0.26	0.66	0.15

**Table 8.** Result of *t*-test (differences in education background).

\* p < 0.05, \*\* p < 0.01.

**Proposition 7.** *In the case of services that provide specialized skills, it is effective to create an environment with a certain degree of freedom as a place for individuals to demonstrate their abilities rather than homogenizing the services provided.* 

#### 7.3. Propositions to Ensure Trust in Skill-Sharing Service

The barrier factor of trust was excluded from the analysis because of the validation of the model in Section 6.1. However, because trust is an important factor in the expansion of skill-sharing services [47,48,70], we discuss the design guidelines for skill-sharing services based on the results of questionnaire responses regarding this factor. The results of the questionnaire are shown in Figure 4. Most respondents were concerned about the compensation of platform companies and the privacy of personal information. This result indicates that the current compensation and privacy protection systems for skill-sharing services are insufficient or not well-recognized. Based on the results, the guideline that the platform provider should meet is established.



Figure 4. Results of the questionnaire about trust (skill receivers).

**Proposition 8.** For skill-sharing service platform providers, it is important to enhance compensation for damages suffered by users because of the use of the service and to ensure privacy protection (e.g., not only a review system for skill providers, but also a system that does not require face-to-face meetings and a system to ensure anonymity of users and transparency of providers).

#### 7.4. Limitations and Future Works

Despite the aforementioned contributions and guidelines described in the previous section, there are still limitations that need to be addressed in future studies. First, it should be noted that these results are specific to the presented case study. The propositions and results regarding skill-sharing services are suggestive but are naturally not conclusive for other cases. For instance, the relationship between the skill provider and receiver can be divided into two types: one is the case where the skill providers' ability is directly embodied as tangible goods, such as hand-fabricated goods, and the other is the case in which the skill provider mediates the delivery of goods created by another entity, such as a delivery service. Because the expected value of skill receivers is different in each case, the motivation and barrier factors that influence their use are also likely to vary. In designing for unique service content, it is necessary to redefine questionnaire items and reexamine the analysis criteria specific to the services to be designed based on the results of this study. Furthermore, this study is limited to the investigation of motivation and barrier factors in the practical phenomenon (i.e., skill-sharing). Therefore, this study does not examine the integration of findings into characterizing a broader SE. On the other hand, the analysis also identified the fact that there are factors unique to this type of service, such as self-actualization. It is thus expected that accumulating exploratory surveys of various types and cases of skill-sharing service will contribute to elucidating the characteristics of the sharing economy.

Moreover, the barriers for skill providers were not included in the scope of analysis in this study. Indeed, there is little knowledge about barriers specific to service and asset providers, which is a limitation of this research. Further empirical research through actual user investigations is necessary to fill this knowledge gap. Furthermore, this study does not examine the motivations and barriers that influence the use of services after its use. However, it can be assumed that there is a gap between the attitude toward using a service and the actual intention to use the service. Indeed, there is a large gap between the number of respondents with high values for intention to use and the number of respondents who used the service in the target user group in this study. Hence, future studies will conduct a survey of customers who have used the service and further analyze the user factors that are key to the use of skill-sharing services by comparing the results of the survey with the findings of this study.

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**Institutional Review Board Statement:** Ethical review and approval were waived for this study due to following reason: (1) Appropriate consideration is given to the protection of the subject, (2) No personal information is handled, (3) Data collection is not commissioned to other organizations or companies not directly related to the research, (4) There is no relationship of financial interest that may affect the results of the research or the protection of the subject, (5) Video and audio data are not collected, (6) The study does not target groups with characteristics that make them vulnerable to social disadvantage, (7) No interventions (including psychological interventions) are included throughout the study, (8) In the questionnaire survey, all the questions and items do not include things that are beyond the scope of what is experienced in social life or what comes up in daily conversation, (9) Procedures for deception (procedures that use false explanations of research objectives) are not included.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

**Data Availability Statement:** The data presented in this study are available on request from the corresponding author. The data are not publicly available due to consideration of privacy.

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

# Appendix A

Table A1. Types of investigated skill-sharing services.

Туре	Service	Content of Service
1	Coconala, REQU, ANYTIME, Share job, MESH Well	Overall skills
2	TASKAJI Housekeeping	Housekeeping
3	Asmama, Kidsna-sitter	Childcare
4	Crawd Care	Nursing care
5	Uber eats	Delivery
6	aini	Experience

# Appendix B

Table A2. The questionnaire items (skill providers).

Factors	Variables	Questionnaire Items
Intention to use	PI_1 PI_2	I would like to be a skill-provider in the future. If an opportunity arises. I would like to use my skills in skill-sharing services.
intention to use	PI_3	I would like to recommend others to use their skills through skill-sharing services.
	PEc_1	Skill-sharing services allow me to make money.
Economic motivation	PEc_2	Skill-sharing services allow me to obtain enough rewards.
	Pec_3	Skill-sharing services can supplement my income.
	PSc_1	I feel connected to people through skill-sharing services.
Social motivation	PSc_2	Skill-sharing services allow me to connect with others.
	PSc_3	Skill-sharing services can be expected to build new relationships.
	PAl_1	Skill-sharing services are useful to someone.
Altruistic motivation	PAl_2	Skill-sharing services can help people in need.
	PAl_3	Skill-sharing services can contribute to the local community and society.
	PFm_1	I understand how to provide skill-sharing services.
Familiarity	PFm_2	I can explain the activities of skill-providers to others.
	PFm_3	I understand the benefits of providing services through skill-sharing services.
	PSR_1	Skill-sharing services allow me to utilize my strengths.
Self-actualization	PSR_2	Skill-sharing services allow me to use my skills.
Sen detunization	PSR_3	Skill-sharing services allow me to develop my skills.

Table A3. The questionnaire items (skill receivers).

Factors	Variables	Questionnaire Items
	UI_1	I would like to use skill-sharing services in the future.
Intention to use	UI_2	If an opportunity arises, I would like to use skill-sharing services.
	UI_3	I would like to recommend others to use skill-sharing services.
	UEc_1	Skill-sharing services are more reasonable than conventional services.
Economic motivation	UEc_2	Using skill-sharing services allows me to save money.
	UEc_3	Skill-sharing services are relatively inexpensive to use.
	USc_1	I feel connected to people through skill-sharing services.
Social motivation	USc_2	Skill-sharing services allow me to connect with others.
	USc_3	Skill-sharing services can be expected to build new relationships.
	UFun_1	Using skill-sharing services is enjoyable.
Enjoyment	UFun_2	Using skill-sharing services is an extraordinary experience.
	UFun_3	Using skill-sharing services fulfills my curiosity.

Factors	Variables	Questionnaire Items
Familiarity	UFm_1 UFm_2 UFm_3	I understand the way to use skill-sharing services. I can explain what skill-sharing services enable me to perform for others. I understand the benefits of using skill-sharing services.
Service quality	USQ_1 USQ_2 USQ_3	I have worries about the quality of the skill-sharing services. The quality of skill-sharing services is lower than standard services. The quality of skill-sharing services is variable.
Trust	UTru_1 UTru_2 UTru_3	I am concerned that the company of skill-sharing services will not provide adequate compensation. Skill-providers cannot be trusted. I am concerned about the privacy of personal information on skill-sharing services.

# Table A3. Cont.

# Appendix C

**Table A4.** Validation results of the measurement model of skill providers (indicator reliability, internal consistency reliability, and convergent validity).

Skill Provider							
Factors	Variables	Loadings	IR	CR	AVE		
	PI_1	0.93	0.86				
Intention to use	PI_2	0.93	0.86	0.93	0.82		
	PI_3	0.87	0.75				
	PEc_1	0.87	0.75				
Economic motivation	PEc_2	0.85	0.73	0.89	0.72		
	Pec_3	0.82	0.68				
	PSc_1	0.94	0.89				
Social motivation	PSc_2	0.95	0.91	0.96	0.88		
	PSc_3	0.93	0.86				
	PAl_1	0.93	0.86				
Altruistic motivation	PAl_2	0.93	0.87	0.95	0.86		
	PAl_3	0.92	0.85				
	PFm_1	0.91	0.83				
Familiarity	PFm_2	0.93	0.87	0.94	0.84		
	PFm_3	0.91	0.83				
	PSR_1	0.93	0.86				
Self-actualization	PSR_2	0.95	0.90	0.95	0.85		
	PSR_3	0.89	0.80				

**Table A5.** Validation results of the measurement model of skill receivers (indicator reliability, internal consistency reliability, and convergent validity).

Skill Receiver (After Adjustment)						
Factors	Variables	Loadings	IR	CR	AVE	
	UI_1	0.92	0.85			
Intention to use	UI_2	0.92	0.84	0.93	0.82	
	UI_3	0.87	0.75			
	UEc_1	0.91	0.83			
Economic motivation	UEc_2	0.88	0.77	0.92	0.78	
	UEc_3	0.86	0.75			
	USc_1	0.93	0.86			
Social motivation	USc_2	0.94	0.89	0.95	0.86	
	USc_3	0.91	0.83			

Skill Receiver (After Adjustment)						
Factors	Variables	Loadings	IR	CR	AVE	
	UFun_1	0.93	0.86			
Enjoyment	UFun_3	0.88	0.78	0.90	0.82	
	UFm_1	0.85	0.72			
Familiarity	UFm_2	0.90	0.80	0.91	0.77	
	UFm_3	0.88	0.77			
	USQ_1	0.79	0.63			
Service quality	USQ_2	0.92	0.85	0.85	0.74	

#### Table A5. Cont.

# Appendix D

Table A6. Correlation coefficient and discriminant validity (skill providers).

	Intention to Use	Economic Motivation	Social Motivation	Altruistic Motivation	Familiarity	Self- Actualization	$\sqrt{AVE}$
Intention to use	1.00						0.91
Economic motivation	0.40	1.00					0.85
Social motivation	0.60	0.42	1.00				0.94
Altruistic motivation	0.58	0.42	0.69	1.00			0.93
Familiarity	0.46	0.30	0.35	0.41	1.00		0.92
Self-actualization	0.62	0.46	0.57	0.70	0.48	1.00	0.92

Table A7. Correlation coefficient and discriminant validity (skill receivers).

	Intention to Use	Economic Motivation	Social Motivation	Enjoyment	Familiarity	Service Quality	$\sqrt{AVE}$
Intention to use	1.00						0.90
Economic motivation	0.49	1.00					0.93
Social motivation	0.50	0.53	1.00				0.89
Enjoyment	0.67	0.54	0.67	1.00			0.91
Familiarity	0.46	0.39	0.34	0.37	1.00		0.88
Service quality	-0.25	-0.21	-0.22	-0.24	-0.13	1.00	0.86

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