

## Article

# Investigating the Impact of Critical Factors on Continuous Usage Intention towards Enterprise Social Networks: An Integrated Model of IS Success and TTF

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**Abstract:** Due to the outbreak of COVID-19, many people have to accept remote working. However, as COVID-19 has been effectively controlled in China, remote office services provided by enterprise social networks (ESNs) is no longer a necessary choice of users. There has not yet been any referential research for ESN enterprises concerning how to encourage users willing to use ESNs continuously. Therefore, the purpose of this research is to identify the critical factors of ESN continuous usage intention to make up the research gap of ESN continuous usage intention and to help enterprises address the issue of sustained growth. This research combines elements of the task technology fit (TTF) model and D&M information systems success (ISS) model, explaining the continuous usage intention of ESN users. The empirical analysis results are based on the sample data of 668 Chinese respondents with experience in ESNs use and analyzed using structural equation modeling (SEM). Results show that task technology fit, performance expectancy and the satisfaction degree have a significant influence on continuous usage intention of ESNs. The research findings can provide the theoretical basis for sustained development and follow-up research of the ESN industry.

**Keywords:** enterprise social network; performance expectancy; satisfaction; continuous usage intention; TTF; D&M ISS model



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## 1. Introduction

Considering the large-scale diffusion of COVID-19, organizations, such as enterprises, institutions and schools, have launched teleworking to avoid the gathering of crowds and mitigate the risk of transmission caused thereby. In fact, teleworking is not something new, which has, instead, come by for a long time but failed to be accepted widely previously [1]. That is why teleworking is still novel to a majority of Chinese.

Following the outbreak of COVID-19, the mobile workplace has been a popular phenomenon in China. No longer being a choice, teleworking has been a necessity to a great number of people. So many ESN service providers (Dingtalk, Enterprise WeChat etc.) have provided a full set of free solution plan for “SOHO (Small Office, Home Office)”, which can provide a series of ESN services, including contact management, commuting, video conference, cloud hard disk, group flow media, task coordination, etc. It has even offered the beautifying function to those without time to dress themselves up for video phone calls.

Though ESNs have found wide applications in China because of the outbreak of COVID-19, it is probably not enough for any enterprise to attract users and promote their initial adoption. To most users, however, telecommuting becoming mainstream during the pandemic period is just a helpless choice. Recently, the pandemic has been put under control in China, leading to a sharp decline in the public demand for SOHO and decreasing charm of ESNs. In other words, whether ESN enterprises can effectively retain users to whom teleworking was a necessity during the outbreak of the pandemic but no longer

necessary after the transmission of the pandemic is controlled has been a huge test. Hence, in spite of the large user scale of ESNs at present, ESN enterprises should do more than just user acquisition and initial adoption [2]. In spite of the big user base with ESNs, the biggest problem facing ESNs is how to retain the existing customers. This requires the development of the consciousness among users to continuously use ESNs and strengthen the convenient and efficient user experience brought by ESNs.

Research has shown that the cost of acquiring a new customer is five folds of that of retaining an old customer [3]. ESN service providers have invested a large amount in technological R&D. If users stop using these services, service providers will be unable to keep on making profits. On the other hand, as the pandemic gradually comes to an end, ESNs are no longer a necessary choice of users. Therefore, to pay attention to users' continuous usage intention and to take effective measures to retain these users is critically important to the sustained growth of ESN technology. Therefore, service providers should learn which factors can influence the continuous usage intention and take actions to enhance user engagement and ensure successful and sustained growth of ESNs.

Wide applications of ESNs are still a new phenomenon. This explains why research into ESNs is still in the initial stage. Though this research issue has been examined, there has not yet been a concentrated investigation of how ESNs can realize sustained growth from the perspective of user demand. So, factors affecting users' continuous usage intention of ESNs is still limited. Accordingly, there is every reason to suggest that more efforts should be made to promote the understanding of which factors can affect users' post-adoption behavioral intention.

So far, a series of theoretical models has been developed for the adoption of an information system and technology to investigate the user behavioral intention [4–6]. However, the greatest challenge facing an information system is how to provide and maintain user satisfaction [7]. In the customer-centered era, it has become a necessity for every information system to provide a satisfactory user experience and only in this way will users be loyal to the system and willing to use it continuously [8]. Enterprises, in order to acquire a high satisfaction degree among users, should turn out products of superior quality, which can boost consumer behaviors and continuous usage intention [9]. The system quality, information quality and service quality of an information system are critical factors that can affect user satisfaction degree and continuous usage intention [10]. Therefore, two theoretical models that have been verified are combined to form the D&M ISS model [11,12] and TTF model [13]. On the one hand, Zhou [14] thought that the D&M ISS model can effectively explain the satisfaction and continuance intention of information system users. Besides, the uniqueness of the ESN lies in its provision of multiperson coordinated office services, such as video conferences and multiperson online editing of the same document. Additionally, whether the ESN can effectively promote coordinated office administration among users is also an important factor affecting user satisfaction and behavioral intention. Therefore, it is necessary to include the collaboration quality into the D&M ISS model to explain user satisfaction and continuance intention. On the other hand, the TTF model believes that, as long as a technology can support the task completion in the best way, users will adopt the technology, and users' prior technological experience will lead to their tendency to continuously use the technology in the future [15]. Yuan et al. [16] suggests that mobile work support functions, if capable of supporting users to finish tasks efficiently, will be adopted by users. ESN is a tool for a majority of people to finish tasks, and the TTF model can well explain the fit between tasks and ESN technology. The combination between these models can help obtain a better understanding of major driving factors influencing ESN continuous usage intention.

ESNs are a new type of work model, which provide ubiquitous online office services for users via mobile communications devices. In the current pandemic era, though research into ESNs has gained an increasing attention from scholars in China and abroad, scholars mainly focus on examining its concepts, services, design, etc. Therefore, this research examines users' continuous usage intention of ESNs from the personal perspective and

according to characteristics of ESNs as an information system, in users' behavioral intention. ESNs can provide an online work style that is different from the traditional offline one, for the former involves the platform quality, user experience, work experience, etc. Therefore, this research examines which factors can affect users' ESNs continuous usage intention from the perspective of user motives, technological characteristics and platform quality, respectively.

On that basis, the research integrates the D&M ISS model and TTF model into the continuous usage intention of the ESN. Since this research is based on two mature theories, to integrate two models into a single model can promote the sustainability of research into system adoption in the future. Besides, it is expected that this research can provide useful insights for ESN service providers. The purpose of this research is to learn which factors can affect continuous usage intention of ESN and to make up the research gap in this field. Meanwhile, it is hoped that this research can help ESN service providers realize which factors can lead to continuous user intention of a technology, particularly helping them use correct strategies to retain users and realize the sustained development of the technology.

The paper is structured as follows. In the next section we describe the concept of ESNs, literature review and theoretical background. Section 3 reports the research model and hypotheses. Sections 4 and 5 reports the survey instrument development, data collection process, data analysis and results. In Section 6 we discuss these results. Then, we present the theoretical and practical implications in Section 7. We conclude the paper by summarizing the limitations of the study and suggesting avenues for future research in Section 8.

## 2. Theoretical Background and Literature Review

### 2.1. Enterprise Social Networks

ESNs are also referred to as enterprise social networks [17], enterprise social media [18], enterprise social networking systems [19], enterprise social software [20] or the Enterprise App [21]. ESN is defined as a platform for internal organizational communication and social interaction within the organization [17]. Different from the ordinary SNSs (social network services), ESN allows users to build online archives [22], contact other colleagues and track their activities [23], communicate with colleagues via short messages, or release, comment on and edit documents and link oneself with others [24]. Besides, these platforms enable enterprise staff to collaborate with each other on the integration of current communication tools, document storage or knowledge search [25]. All these functions are beyond that of the universally adopted SNS [26].

ESN can be applied for different purposes, such as broadcasting information [27], promoting communication among staff [28], managing knowledge [24], supporting cooperation [29] and creating a mutual contact among staff [30]. Previous research findings suggest that the use of the ESN can improve the working performance [31]. Following the outbreak of this pandemic, ESN has been exhibiting stronger functions, including the management of contacts, attendance, video conferences, cloud hard disks, group streaming media, task coordination, beautifying, etc.

Although the ESN has these advantages, the public suspicion over the ESN still exists [32]. Whether the ESN is successful depends on the public attitude towards the information system [33]. If the public do not believe that the ESN can improve their working performance, they will be unwilling to adopt it [34]. Therefore, this research deems it necessary to help ESN enterprises learn, which factors can affect user satisfaction and performance and expectation, which can generate the continuous usage intention.

### 2.2. D&M ISS Model: Information Systems Success Model

The information systems success model, first developed by DeLong and McLean [11], believes that the system quality and information quality are two major factors influencing the continuous usage intention and user satisfaction of the information system. Later, DeLone and McLean [12] modified the D&M ISS model by introducing the variable of service quality to the primitive D&M ISS model. The D&M ISS model, after modification,

thinks the system quality, information quality and service quality are primary factors affecting user satisfaction and usage, while user satisfaction and usage are decisive factors of net benefits.

The D&M ISS model, since its establishment, has been used to study the continuance intention and continuance behavior of the mobile information system. Zhou [35], by studying the location-based services, verified the validity of the D&M ISS model, finding out that the system quality, information quality and service quality are all major factors affecting users' continuance usage. Pang et al. [36] found that the system quality, information quality and service qualities are three important factors influencing the success of the knowledge sharing platforms and can influence the user satisfaction and continuance use intention. The literature review of this research also indicates that the D&M ISS model has been combined with other theories to study user intention and behavior of the information system. For example, the D&M ISS model can be combined with TAM to explain the user intention and satisfaction of e-learning [37] or combined with GAM to explain MOOC use [38].

The D&M ISS model, either used alone or combined with other theories, has laid a solid foundation for research into ESN user behavioral intention. The purpose of this research is to examine the correlation between variables, including the ESN system quality, information quality, service quality, performance expectancy and satisfaction and the continuous usage intention.

### 2.3. TTF: Task-Technology Fit

Goodhue and Thompson [13] developed the task technology fit model, which mainly examines the fit between the technological capability and task, namely to what extent the technology can support the completion of the task. The TTF model believes that the fit between task characteristics and technology characteristics can influence the use and performance impact [13]. Chang [39] thought that a higher degree of fit between task characteristics and technology characteristics can encourage users to use the information system; otherwise, the user intention will be weakened.

The TTF model has been applied to study different information systems, such as explaining the adoption intention of wireless technology [40], user adoption of banking [41], mobile locatable information systems [42], use of mobile commerce [43], digital library [44] and adoption of the digital textbook service [45]. Some other research, in order to better explain the user behavioral intention, has combined the TTF model with other theories. For example, Wu and Chen [46] integrated TAM with the TTF model to explain the user intention of MOOCs. Wu and Lee [47] sought the combination between UTAUT and TTF model to explain the user intention of mobile payment. Oliveira et al. [48] combined TTF, UTAUT and ITM to explain the adoption of the mobile bank.

### 2.4. TTF and D&M ISS Model

The literature review shows that the D&M ISS model is a theory widely applied to explain user satisfaction and user satisfaction is one of major factors influencing the D&M ISS model [49]. User satisfaction is also a major factor affecting users' continuous behavioral intention [50]. The TTF model believes that, as long as the technology can effectively support users to complete tasks, users will use the technology and users, based on their previous experience in using the technology, tend to continuously use the technology [15]. Therefore, both the TTF model and the D&M ISS model are major theoretical models to explain the continuous behavioral intention of the information system. Nevertheless, these two theories focus on different perspectives. The TTF model does not consider quality factors, such as system quality, information quality and service quality, which directly affect the user satisfaction of ESNs. The weakness of the D&M ISS model lies in the lack of attention paid to the fit between the ESN technology characteristics and the user task characteristics. Currently, there has not yet been any specific theory that can cover respective perspectives of these two models. In order to address this problem,

Wang et al. [51] combined TTF model and D&M ISS model to explain users’ reuse intention and system use. Recently, Isaac et al. [52] also integrated the TTF model and the D&M ISS model to explain the actual usage of online learning users.

On the other hand, the function of ESNs is to support the completion of tasks and promote collaboration among organizations [53,54]. Apart from the system technology, factors that influence mutual collaboration among ESN users is also an important issue requiring further research. Hence, this research suggests the introduction of the collaboration quality to expand the D&M ISS model, but this quality factor has not been covered by the D&M ISS model.

Therefore, this research combines characteristics of ESNs and integrates the D&M ISS model and TTF model to offset and supplements the advantages and disadvantages of these two theories, which can contribute to a more comprehensive understanding of the continuous usage intention of ESNs.

### 3. Research Model and Research Hypotheses

#### 3.1. Research Model

Current scholars mostly define “continuous usage intention” as the behavioral intention after the first use, which can reflect the intensity of user intention to continue using the information system in the future. The cost for an enterprise to acquire a new customer is five times as much as that to retain an old customer [3]. Pereira et al. [55] thought that it is more critical to protect users’ continuous usage intention and that initial adoption is the first step to the success of the information system. Therefore, to explore users’ continuous usage intention is of vital importance to the sustained growth of ESN enterprises in the future. The D&M ISS model and the TTF model are combined to propose an integrated model to explain the continuous usage intention of ESN users. The research model is depicted in Figure 1.

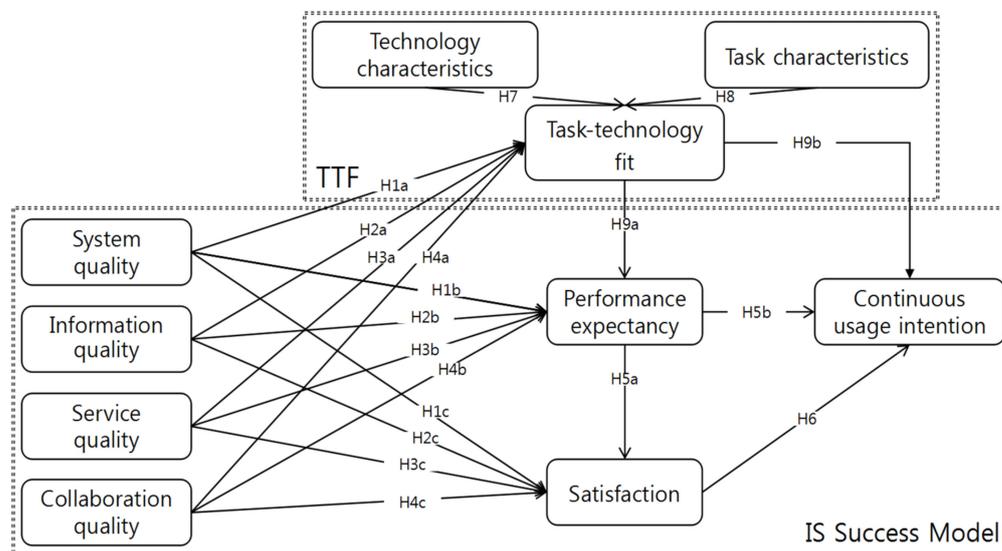


Figure 1. Research model.

#### 3.2. Based on the Research Hypotheses of the TTF Model

Research has indicated that the system quality, information quality and service quality can significantly affect user satisfaction and performance expectancy of mobile payment [56]. Research of Cidral et al. [57] verified that the collaboration quality can significantly influence the user perceived satisfaction and individual performance of e-learning. Research of Tam and Oliveira [58] also suggested that the system quality, information quality and service quality can significantly influence the satisfaction and task-technology fit of m-banking users. All these prior research findings can prove that the D&M ISS model

can be extensively applied to different fields of the information system to explain the user satisfaction, performance expectancy and task-technology fit. Therefore, it is believed that the extended D&M ISS model proposed by this research is applicable to ESN research.

System quality can reflect the visit speed, navigation, ease of use and stability of the information system [36,56]. All these aspects might affect the user evaluation of the ESN practicability. For example, if the ESN is slow to respond and the interface design is poor, users can hardly use the ESN to bring down users' PE. Besides, users hope to visit ESNs of high quality. When this expectancy is confirmed, user satisfaction might be achieved. Based on the above discussions, this research makes the following hypotheses:

**Hypothesis 1a (H1a).** *The system quality has a positive influence on the task-technology fit of the ESNs user.*

**Hypothesis 1b (H1b).** *The system quality has a positive influence on the performance expectancy of the ESNs user.*

**Hypothesis 1c (H1c).** *The system quality has a positive influence on the satisfaction of the ESNs user.*

Information quality can reflect the information timeliness, accuracy and relevance [36,56]. Users hope that they can acquire high-quality information service from ESNs. If the information presented for users is outdated or less accurate, users might not have the expectancy that ESNs can improve their working efficiency. Besides, users can compare the information provided by ESNs with the actual information. If these two information sources are inconsistent, users might lower their expectancy for the information quality and think that ESNs cannot support their tasks. Besides, users hope that they can acquire information from ESNs on a timely and accurate basis. So, poor information quality might impair user satisfaction. Based on the above discussions, this research makes the following hypotheses:

**Hypothesis 2a (H2a).** *The information quality has a positive influence on the task-technology fit of the ESNs user.*

**Hypothesis 2b (H2b).** *The information quality has a positive influence on the performance expectancy of the ESNs user.*

**Hypothesis 2c (H2c).** *The information quality has a positive influence on the satisfaction of the ESNs user.*

Service quality can reflect the service reliability and responsiveness. These two aspects might affect user satisfaction and individual performance of ESNs [36,56]. For example, ESNs, which are teleworking platforms that are known to a small number of people, require users to spend time in learning how to use them. When users need help, users need to wait for the response from the ESN customer service. Under the condition, users might lose their patience and feel dissatisfied. Users might no longer think that ESNs can support the completion of their tasks and improvement of their work performance. On the contrary, if ESNs provide quality services, it can promote user satisfaction and enhance users' perceived usefulness of ESNs. In other words, when users think that ESNs can provide favorable services, users will not only be satisfied with ESN services, but also think that ESNs are useful and consistent with their task requirements. Based on the above discussions, this research makes the following hypotheses:

**Hypothesis 3a (H3a).** *The service quality has a positive influence on the task-technology fit of the ESNs user.*

**Hypothesis 3b (H3b).** *The service quality has a positive influence on the performance expectancy of the ESNs user.*

**Hypothesis 3c (H3c).** *The service quality has a positive influence on the satisfaction of the ESNs user.*

On the other hand, apart from the system quality, information quality and service quality in the D&M ISS model, another important issue is how ESNs can promote users to better collaborate with each other. Collaboration refers to the coordination between individuals in the goal implementation process [57]. In an enterprise, laborers should form a collective effort through collaboration to realize the expected goal of production activities [59,60]. A majority of people use ESNs to get their tasks completed. So, ESNs should be capable of promoting mutual coordination among users, such as better information exchange, resource sharing, a multiperson video conference and the creation of shared workplace. All this can improve users' performance expectancy, satisfaction and task-technology fit. Therefore, this research includes the collaboration quality for the expansion of the D&M ISS model. This can help obtain a more comprehensive explanation of the ESN task technology fit, satisfaction and performance expectancy. Based on the above discussions, this research makes the following hypotheses:

**Hypothesis 4a (H4a).** *The collaboration quality has a positive influence on the task-technology fit of the ESNs user.*

**Hypothesis 4b (H4b).** *The collaboration quality has a positive influence on the performance expectancy of the ESNs user.*

**Hypothesis 4c (H4c).** *The collaboration quality has a positive influence on the satisfaction of the ESNs user.*

The performance expectancy and the perceived usefulness in TAM can reflect users' perceived usefulness of ESNs [60]. The expectation confirmation model also thinks that users always hope that they can acquire useful services from the information system [61]. For example, the technological functions of ESNs can help users finish their tasks. When ESN users' expectancy is confirmed, they will be satisfied. Therefore, the performance expectancy can influence user satisfaction. Besides, the performance expectancy will influence the user continuous intention. When users form a positive expectancy of ESNs, they are more willing to continue using ESNs.

User satisfaction can reflect users' actual perception after using ESNs [62,63]. If users are dissatisfied with ESNs, they will stop using them. Current research also shows that satisfaction is a decisive factor that can influence users' continuous behavior intention [64–68]. Based on the above discussions, this research makes the following hypotheses:

**Hypothesis 5a (H5a).** *The performance expectancy has a positive influence on the satisfaction of the ESNs user.*

**Hypothesis 5b (H5b).** *The performance expectancy has a positive influence on the continuous usage intention of the ESNs user.*

**Hypothesis 6 (H6).** *The satisfaction has a positive influence on the continuous usage intention of the ESNs user.*

The task technology fit can reflect the fit between the information system and the user task and can exert a positive influence on the performance expectancy and behavior intention [47]. A good task technology fit can encourage users to adopt ESNs, while a lack of the task technology fit might lower users' performance expectancy and continuous

usage intention of ESNs. For example, when users think ESNs can support the completion of their tasks, users will regard ESNs as useful, and thus be willing to continuously use ESNs. On the contrary, if ESNs cannot help users finish their tasks, users will lose their expectancy of ESNs to improve their work performance and stop continuously using ESNs. Therefore, the task technology fit has been deemed as a predictor of the performance expectancy and continuous usage intention.

On the other hand, ESNs can provide functions, including a video conference, office administration and online editing of files. All these characteristics can vigorously support users to complete their tasks and improve their task technology fit. However, the TTF model thinks that, when the task difficulty increases, technology can hardly support tasks. For example, when users' tasks become increasingly complex, ESNs can hardly help users finish users' tasks. Hence, task characteristics and technology characteristics are major factors that will also influence the task technology fit. Based on the above discussions, this research makes the following hypotheses:

**Hypothesis 7 (H7).** *The technology characteristics has a positive influence on the task technology fit of the ESNs user.*

**Hypothesis 8 (H8).** *The task characteristics has a positive influence on the task technology fit of the ESNs user.*

**Hypothesis 9a (H9a).** *The task technology fit has a positive influence on the performance expectancy of the ESNs user.*

**Hypothesis 9b (H9b).** *The task technology fit has a positive influence on the continuous usage intention of the ESNs user.*

#### 4. Method

To test the research model, a survey instrument was developed based on previously published literature. The items and scales for the continuous usage intention constructs were adapted from Zhou [14] and Pang [36]. The items and the scales for the system quality, information quality and service quality constructs were chosen from DeLone and McLean [12] and Lin et al. [56]. The items and scales for the collaboration quality constructs were adapted from Cidral et al. [57] and Chen et al. [68]. The items and scales for the satisfaction constructs were adapted from Kuo et al. [63] and Gu et al. [64]. The items and scales for the performance expectancy constructs were adapted from Venkatesh et al. [5,6] and Wu and Lee [60]. The items and scales for the TTF model constructs were adapted from Oliveira [48] and Wu et al. [67]. The unit of analysis focused on the individual and the responses were measured using a 5-point Likert scale on an interval level ranging from "strongly agree" to "strongly disagree" (refer to Appendix A).

The research model includes ten influencing factors, with each factor measured with multiple items. In order to improve the content validity, all questions of this research are adapted from the current literatures. Before the start of the questionnaire, ten users with the experience in using ESNs are chosen for the test. According to their suggestions, some questions are modified to ensure the accuracy and comprehensibility of the questionnaire. Attached is the final questionnaire and citation sources.

This research adopted Chinese users with the ESN user experience as the research objects. From 1 April 2021 to 1 May 2021, 668 copies of the valid questionnaire were collected, of which 394 were collected online and 274 were collected offline. The data analysis was completed via the structural equation modeling (SEM), using SPSS 23.0 and AMOS 23.0.

Sample characteristics of 668 respondents were examined. Results suggest that males took up 54.2% of ESN users, with the remaining 45.8% being female respondents. So, the distribution of the age structure was relatively even. The percentage of undergraduates

was the highest, reaching around 37.6% and majority of users were corporate staff. Table 1 shows the result of demographic information.

**Table 1.** Sample characteristics.

	Variable	Number	Percentage
Gender	Male	362	54.2%
	Female	306	45.8%
Age	21–30	162	24.3%
	31–40	186	27.8%
	41–50	168	25.1%
	Above 50	152	22.8%
Education	Middle school or below	42	6.3%
	Senior high school	107	16%
	Junior college	165	24.7%
	Undergraduate	251	37.6%
	Postgraduate or above	103	15.4%
Occupation	Public servant	151	22.6%
	Freelancer	113	16.6%
	Company employee	378	56.6%
	Others	26	3.9%
Experience	Yes	668	100%

## 5. Results

### 5.1. Measurement Model

First, we conducted a convergent validity and reliability. Table 2 lists the standardized item loadings, the composite reliability (CR), the average variance extracted (AVE) and Cronbach alpha values. As listed in the table, most item loadings were larger than 0.7. Each CR exceeded 0.7 and each AVE exceeded 0.5. In addition, all Cronbach alpha values were larger than 0.7. This indicated the excellent convergent validity and reliability [65].

**Table 2.** Standardized item loadings, CR, AVE and alpha values.

Factor	Item	Standardized Loading	Alpha	AVE	CR
System quality (SQ)	SQ1	0.811	0.815	0.532	0.819
	SQ2	0.679			
	SQ3	0.732			
	SQ4	0.688			
Information quality (IQ)	IQ1	0.768	0.798	0.502	0.801
	IQ2	0.708			
	IQ3	0.689			
	IQ4	0.666			
Service quality (SEQ)	SEQ1	0.771	0.850	0.587	0.850
	SEQ2	0.737			
	SEQ3	0.766			
	SEQ4	0.790			
Collaboration quality (CQ)	CQ1	0.794	0.880	0.650	0.881
	CQ2	0.825			
	CQ3	0.802			
	CQ4	0.803			

Table 2. Cont.

Factor	Item	Standardized Loading	Alpha	AVE	CR
Performance expectancy (PE)	PE1	0.770	0.831	0.554	0.832
	PE2	0.706			
	PE3	0.785			
	PE4	0.712			
Satisfaction (SA)	SA1	0.722	0.848	0.586	0.850
	SA2	0.817			
	SA3	0.741			
	SA4	0.779			
Continuous behavior intention (CI)	CI1	0.737	0.860	0.611	0.862
	CI2	0.752			
	CI3	0.801			
	CI4	0.832			
Technology characteristics (TC)	TC1	0.810	0.810	0.594	0.814
	TC2	0.753			
	TC3	0.747			
Task characteristics (TaC)	TaC1	0.824	0.785	0.560	0.792
	TaC2	0.743			
	TaC3	0.671			
Task technology fit (TTF)	TTF1	0.820	0.825	0.627	0.835
	TTF2	0.776			
	TTF3	0.779			

Table 3 lists the square root of AVE (shown as bold on the diagonal) and the factor correlation coefficients; for each factor, the square root of AVE was significantly larger than its correlation coefficients with other factors, suggesting an excellent discriminant validity [65].

Table 3. Matrix of correlation constructs and discriminant validity.

	SQ	IQ	SEQ	CQ	PE	SA	CI	TC	TaC	TTF
SQ	<b>0.810</b>									
IQ	0.565	<b>0.759</b>								
SEQ	0.424	0.474	<b>0.837</b>							
CQ	0.528	0.577	0.395	<b>0.866</b>						
PE	0.575	0.611	0.418	0.548	<b>0.821</b>					
SA	0.555	0.588	0.373	0.589	0.652	<b>0.837</b>				
CI	0.571	0.498	0.384	0.506	0.721	0.644	<b>0.849</b>			
TC	0.399	0.449	0.328	0.374	0.389	0.344	0.424	<b>0.841</b>		
TaC	0.429	0.445	0.35	0.364	0.445	0.397	0.45	0.409	<b>0.824</b>	
TTF	0.518	0.548	0.369	0.502	0.591	0.456	0.593	0.552	0.513	<b>0.856</b>

Note: The square root of AVE (shown as bold at diagonal) and factor correlation coefficients.

Further, as presented by Henseler et al. [66], we tested the heterotrait–monotrait ratio (HTMT). If the HTMT value is below 0.85, discriminant validity has been established between two reflective constructs. Table 4 shows the result of HTMT against our data. All the values meet the threshold.

**Table 4.** Matrix of correlation constructs and discriminant validity.

	SQ	IQ	SEQ	CQ	PE	SA	CI	TC	TaC	TTF
SQ										
IQ	0.577									
SEQ	0.426	0.478								
CQ	0.536	0.584	0.395							
PE	0.582	0.621	0.422	0.546						
SA	0.565	0.601	0.378	0.597	0.657					
CI	0.588	0.514	0.387	0.52	0.725	0.659				
TC	0.404	0.46	0.332	0.378	0.393	0.354	0.427			
TaC	0.446	0.455	0.36	0.375	0.457	0.419	0.463	0.427		
TTF	0.522	0.55	0.374	0.499	0.591	0.452	0.598	0.557	0.514	

### 5.2. Structural Model

We adopted structural equation modeling software AOMS 23.0 to estimate the structural model. Table 5 lists the recommended value [65] and actual values of the structural model fit, all fit indices have better actual values than the recommended values.

**Table 5.** Fit indicators of the structural models.

Model Fit Indices	$\chi^2/DF$	NFI	CFI	GFI	IFI	AGFI	RMSEA
Recommended value	1–3	>0.90	>0.90	>0.90	>0.90	>0.80	<0.08
Actual value	0.271	0.940	0.986	0.942	0.987	0.931	0.02

Notes:  $\chi^2/DF$ , chi-squared divided by degrees of freedom; NFI, normed fit index; CFI, comparative fit index; GFI, goodness-of-fit index; IFI, incremental fit index; AGFI, adjusted goodness-of-fit index; RMSEA, root mean square error of approximation.

Table 6 presents the results. Except H3a, H3b and H3c, other hypotheses were supported. Factors' performance expectancy have high loadings on the continuous usage intention. In Figure 2, the explained variance of the task technology fit, performance expectancy, satisfaction and continuous usage intention was 50.6%, 52.5%, 53.4% and 61.2%, respectively. The analysis results can be summarized as follows.

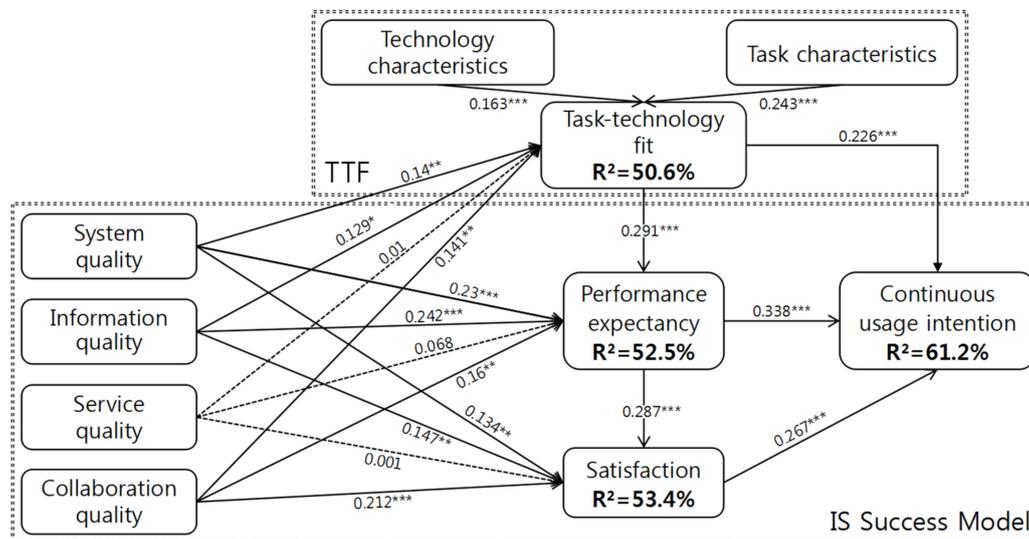
**Table 6.** Results of the hypotheses tests.

	Path	Estimate	S.E.	C.R.	p-Value	Results
H1a	System quality→Task technology fit	0.140	0.048	2.895	0.004	Supported
H1b	System quality→Performance expectancy	0.230	0.056	4.126	***	Supported
H1c	System quality→Satisfaction	0.134	0.047	2.834	0.005	Supported
H2a	Information quality→Task technology fit	0.129	0.053	2.421	0.015	Supported
H2b	Information quality→Performance expectancy	0.242	0.061	3.962	***	Supported
H2c	Information quality→Satisfaction	0.147	0.051	2.855	0.004	Supported
H3a	Service quality→Task technology fit	0.010	0.037	0.261	0.794	Not supported
H3b	Service quality→Performance expectancy	0.068	0.042	1.627	0.104	Not supported
H3c	Service quality→Satisfaction	0.001	0.035	0.036	0.971	Not supported

Table 6. Cont.

	Path	Estimate	S.E.	C.R.	p-Value	Results
H4a	Collaboration quality→Task technology fit	0.141	0.046	3.052	0.002	Supported
H4b	quality→Performance expectancy	0.160	0.053	3.013	0.003	Supported
H4c	Collaboration quality→Satisfaction	0.212	0.045	4.682	***	Supported
H5a	Performance expectancy→Satisfaction	0.287	0.048	5.994	***	Supported
H5b	expectancy→Continuous usage intention	0.338	0.048	7.067	***	Supported
H6	Satisfaction→Continuous usage intention	0.267	0.049	5.491	***	Supported
H7	characteristics→Task technology fit	0.163	0.035	4.586	***	Supported
H8	Task characteristics→Task technology fit	0.243	0.040	6.071	***	Supported
H9a	Task technology fit→Performance expectancy	0.291	0.058	5.057	***	Supported
H9b	fit→Continuous usage intention	0.226	0.043	5.204	***	Supported

Note: \*\*\* &lt;0.001.

Figure 2. Structural model results. Note: \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ ; the dotted line represents the insignificant path.

The system quality ( $\beta = 0.14$ ;  $p < 0.01$ ), information quality ( $\beta = 0.129$ ,  $p < 0.01$ ), collaboration quality ( $\beta = 0.141$ ;  $p < 0.01$ ), technology characteristics ( $\beta = 0.163$ ;  $p < 0.01$ ) and task characteristics ( $\beta = 0.243$ ;  $p < 0.01$ ) were statistically significant in explaining the task technology fit, thus confirming hypotheses H1a, H2a, H4a, H7 and H8. However, the results suggest that service quality was not statistically significant ( $\beta = 0.010$ ;  $p > 0.10$ ). Consequently, H3a was not confirmed. The results indicate that task characteristics were the most important constructs in explaining the task technology fit in the ESNs. In other words, when task characteristics increased one standardized unit, task technology fit increased 0.243 standardized units, ceteris paribus. The model explained 50.6% of the variation in the task technology fit.

The system quality ( $\beta = 0.23$ ;  $p < 0.01$ ), information quality ( $\beta = 0.242$ ,  $p < 0.01$ ), collaboration quality ( $\beta = 0.16$ ;  $p < 0.01$ ) and task technology fit ( $\beta = 0.291$ ;  $p < 0.01$ ) were statistically significant in explaining the performance expectancy, thus confirming hypotheses H1b, H2b, H4b and H9a. However, the results suggest that service quality ( $\beta = 0.068$ ;  $p > 0.10$ ) was not statistically significant. Consequently, H3a was not confirmed. The results indicate that task technology fit was the most important construct to explain the performance expectancy given that when the task technology fit increased one standardized unit, performance expectancy increased 0.291 standardized units, *ceteris paribus*. The model explained 52.5% of the variation in the continuous usage intention of ESNs.

The system quality ( $\beta = 0.134$ ;  $p < 0.01$ ), information quality ( $\beta = 0.147$ ,  $p < 0.01$ ), collaboration quality ( $\beta = 0.212$ ;  $p < 0.01$ ) and performance expectancy ( $\beta = 0.287$ ,  $p < 0.01$ ) were statistically significant in explaining satisfaction, thus confirming hypotheses H1c, H2c, H4c and H5a. However, service quality ( $\beta = 0.001$ ,  $p > 0.10$ ) was not statistically significant in explaining the satisfaction; consequently, H3a was not confirmed. The results indicate that performance expectancy, system quality, information quality and collaboration quality were the most important constructs in explaining the satisfaction in the ESNs. The model explained 53.4% of the variation in the satisfaction.

This study hypothesized that ESNs continuous usage intention was explained by the task technology fit, performance expectancy and satisfaction. Hypothesis H5b, H6 and H9b were confirmed, as the task technology fit ( $\beta = 0.226$ ;  $p < 0.01$ ), performance expectancy ( $\beta = 0.338$ ;  $p < 0.01$ ) and satisfaction ( $\beta = 0.267$ ;  $p < 0.01$ ) were statistically significant, thus confirming hypotheses H5b and H6. Performance expectancy was the most important construct to explain the continuous usage intention given that when performance expectancy increased one standardized unit, continuous usage intention increased 0.338 standardized units, *ceteris paribus*. The model explained 61.2% of the variation in the continuous usage intention of ESNs.

## 6. Discussion

As the COVID-19 pandemic has been under control, how to retain current users and achieve sustained growth has been a huge challenge facing ESN enterprises. In order to address the issue of sustained growth facing ESN enterprises, this research adopted Chinese users with the ESN user experience to test the model, which integrates the D&M ISS model with the TTF model. This model can explain the continuous usage intention of ESN users. The hypotheses made by this research are presented in Figure 2 and Table 6. All the hypotheses but H3a, H3b and H3c were substantiated.

First of all, task characteristics ( $\beta = 0.243$ ) and technology characteristics ( $\beta = 0.163$ ) could both significantly affect the task technology fit, while the task technology fit had a significant impact on the performance expectancy ( $\beta = 0.291$ ) and continuous usage intention ( $\beta = 0.226$ ). Research results suggest that all hypotheses about TTF are supported by data evidence. The task characteristics and technology characteristics could significantly affect the task technology fit and then decide users' continuous usage intention. This finding shows good agreement with the conclusion of Wu and Lee [47] and Wu et al. [67]. This can also provide solid evidence for whether ESN functions can meet users' task needs, which exists as an important influencing factor of whether ESNs users are willing to continue using it. When ESN functions can satisfy users' task needs, users will not only feel that the ESNs are useful, but also be willing to continue using it. This means that enterprises should draw up the future development direction in accordance with user needs, and consider the fit between users' task needs and functions of the mobile bank so as to provide functions more consistent with users' task needs.

On the other hand, system quality has a positive impact on users' task technology fit ( $\beta = 0.14$ ), performance expectancy ( $\beta = 0.23$ ) and satisfaction ( $\beta = 0.134$ ). This finding coincides with that of Lin et al. [56] and Tam and Oliveira [58]. First of all, the system quality platform lays the foundation for user interaction and reflects the technological level of ESNs in terms of the access speed, interface design, functional stability, etc. If the

interface of ESNs is not user-friendly or is hard to use, users can hardly obtain favorable user experience, which might cause hindrances to their social interaction and information exchange, making it impossible for them to communicate effectively with others and achieve a consensus over one topic. This will impair users' working efficiency and trigger users' dissatisfaction. Hence, service providers should improve the system quality, enabling users to access the system at any time and in any place. They also need to develop different systems to adapt to different mobile operation systems, such as Android, Apple IOS and Windows. This is a challenge for service providers, but it is worthwhile for service providers to tackle the challenge, because user satisfaction can stimulate users to continue using their system. Besides, information quality also had a significant impact on users' task technology fit ( $\beta = 0.129$ ), performance expectancy ( $\beta = 0.242$ ) and satisfaction ( $\beta = 0.147$ ). This finding is consistent with that of Pang et al. [36] and Lin et al. [56]. Information that is poor in quality or which is outdated or irrelevant will increase the time and energy spent by users in check. This will negatively affect their working efficiency and user experience. Users might think that ESN enterprises have no ability to provide high-quality information for them. Besides, poor information quality will also impede information communication and development of shared languages. Therefore, enterprises should not only pursue a real-time update of the information provided by ESNs, but also ensure the accuracy of information, avoiding recommending some irrelevant information to users. For example, they can use the organization's internal information services. This can improve the information relevance and promote user interaction. In addition, collaboration quality had a significant impact on the task technology fit ( $\beta = 0.141$ ), performance expectancy ( $\beta = 0.160$ ) and satisfaction ( $\beta = 0.212$ ). This finding is in line with that of Cidral et al. [57], Ku et al. [63] and Chen et al. [68]. The interaction constitutes the basis for users to use a certain piece of information and it is also decisive to the relationship quality. High collaboration quality can fuel interactions among users. In contrast, collaboration of poor quality might negatively affect user interactions. If users cannot socialize with each other and exchange information with each other, they cannot efficiently communicate with each other and form a consensus. Therefore, ESNs should strengthen its function of coordinating users' work so that users can tighten their ties and have their diverse needs satisfied. Service providers can also consider diversifying functions to promote user interactions. For example, online office, video meetings, file sharing, chatting, payment, games and other services can be integrated onto one platform. This can provide great convenience to users and ensure users' continuous usage.

We also find that service quality had no impact on the task technology fit ( $\beta = 0.01$ ), performance expectancy ( $\beta = 0.068$ ) and satisfaction ( $\beta = 0.001$ ). This is contrary to the research finding of Pang et al. [36] and Tam and Oliveira [58]. Pang et al. [36] pointed out that service quality can significantly affect the perceived usefulness and satisfaction of knowledge-sharing platform users, and indirectly affect users' continuous use intention. According to the research carried out by Tam and Oliveira [58], service quality has a significant impact on mobile payment users' task technology fit and satisfaction. This finding is probably caused by the following two aspects. First, our samples were made up of young adult users, who had rich experience in using the Internet and have good knowledge of the Internet and relevant technologies. Second, collaboration quality of this research had a significant impact on users' task technology fit, performance expectancy and satisfaction. This suggests that users might pay more attention to the help they can get from other members rather than from service providers. Probably, they might think that other members are more helpful to their work than service providers.

In the end, performance expectancy could significantly affect users' satisfaction ( $\beta = 0.287$ ) and continuous usage intention ( $\beta = 0.338$ ). Users' satisfaction could significantly affect users' continuous usage intention of ESNs ( $\beta = 0.267$ ). In addition to the task technology fit, users' performance expectancy and satisfaction are also decisive factors of users' continuous usage intention. This can provide solid evidence for previous research findings [58,65,67], and indicate that users' performance expectancy and satisfaction of

ESNs is a main way to strengthen users' continuous usage intention. When users' use of ESNs can help improve their work performance, users will feel satisfied and their continuous usage intention of ESNs will be gradually strengthening. Besides, we also observe that, among factors affecting users' continuous usage intention, performance expectancy plays a big role. Thereby, ESN enterprises should take into account users' expectancy of these functions before function development and should spare no effort to develop users' understanding of their ESNs functional advantages and remind them of what ESNs can do for them. After that, they can improve their ESN products according to user suggestions so as to better meet users' performance expectancy and to further strengthen users' continuous usage intention.

## 7. Theoretical and Practical Implications

From the theoretical perspective, this research integrates the TTF model with the D&M ISS model to explain users' continuous usage intention of ESNs. Compared with the TTF model and D&M ISS model, the integrated model can better explain users' continuous usage intention. This can promote the sustained growth of research into ESNs, and is of vital academic significance to research into the whole information system subject. Therefore, future research can combine these two kinds of viewpoints to study user adoption of other information system fields. It is believed that, compared with the singular research perspective, the integrated model can provide more insights. Additionally, this research makes a necessary extension on the basis of the D&M ISS model, and the collaboration quality is introduced to verify its validity. This can enrich and deepen the theoretical system of the D&M ISS model, and lay a solid foundation for the sustained growth of relevant theoretical research of the D&M ISS model. In the future, research can also extend the D&M ISS model for verification and research of other fields, such as mobile payment or SNS. At last, the TTF model and D&M ISS model have been applied to study and verify various information systems, respectively, such as mobile payment [56] and shared knowledge [36]. This research applies the TTF model and D&M ISS model to an emerging field: ESN.

From the practical perspective, research findings indicate that the task technology fit, performance expectancy and satisfaction are decisive factors that affect users' continuous usage intention of ESNs. Among them, the performance expectancy has the strongest direct influence on the continuous usage intention and can exert an indirect influence on continuous usage intention via satisfaction. Therefore, when developing ESN functions, enterprises pay attention to users' expectancy of these functions, and improve the products according to user suggestions to better satisfy users' expectancy of ESN functions. This can not only improve user satisfaction, but also promote users' continuous usage intention of ESNs. Besides, the TTF had a significant influence on the performance expectancy and can directly influence the continuous usage intention. So, it is necessary for ESN enterprises to consider the fit between users' task demands and ESN functions. For example, ESNs might be more suitable for those usually on business rather than those staying in office. Those usually on business might need ESNs to remain in contact with colleagues at any time and in any place for communication, sharing of materials and even video conferences. Therefore, ESN enterprises should divide the market into different segments, analyzing the demand characteristics of different user groups. By providing different user groups with personalized functions and services, enterprises can strengthen the user engagement. On the other hand, system quality, information quality and collaboration quality are all major factors affecting the performance expectancy, satisfaction and task technology fit. Therefore, ESN enterprises should provide not only a reliable platform that is easy to use, but also immediate, accurate and relevant information for users. Additionally, ESNs should be capable of interacting with others at any time and in any place. All these measures can help enterprises establish users' performance expectancy, technology task fit and satisfaction of ESNs, which will finally promote users' continuous usage intention.

## 8. Conclusions

With the rapid development of information technology, ESNs have been capable of serving users at any time and in any place. Based on the advantages of ESNs, the online to offline office will win favor of more users. However, actually current users have a low rating of ESNs. The idea that ESNs are used by the majority of people is a new phenomenon. So, research into ESNs is at the initial stage. Though research into ESNs has gained attention from more and more scholars either at home or abroad, current literature have not yet discussed factors affecting users' ESN adoption behaviors thoroughly and comprehensively, for users' use behaviors are the prerequisite and basis for ESNs to develop. For the time being, the academic circles focus on studying users' adoption of new technologies, service design, product development, etc. Research into ESNs adoption behaviors still lacks diversification. Factors affecting users' behavioral intention after using ESNs have not yet been investigated. Research findings of which factors can affect users' ESNs' continuous usage intention are limited. Hence, it is necessary to identify decisive factors of users' behavioral intention after using ESNs. On the other hand, ESNs emerge as a new office model that combines the mobile communication technology and office. It can provide an online working mode that is different from the traditional offline working mode, for the former involves technology, platform quality, work performance, etc. In order to deepen the understanding of influencing factors of ESNs users' continuous usage intention, this research focuses on discussing users' satisfaction, performance expectancy and technology task fit in an attempt to examine which factors can affect users' behavioral intention after using ESNs, make up the research gap and provide theoretical evidence for the follow-up research of this field. The questionnaire is designed to test the TTF and ISS integrated model and factors influencing users' ESNs' continuous usage intention are studied from the perspective of the TTF and ISS model. Results show that all hypotheses other than those related to service quality are supported by data analysis. This means that users' adoption degree of ESNs is subject to the influence of not only their cognition of and satisfaction with ESNs functions, but also the fit between users tasks and ESN functions. To sum up, this research can boost users' continuous usage intention and contribute its share to the sustained growth of the ESN industry.

Nevertheless, this research has the following limitations. First of all, users' continuous usage intention of ESNs is examined from the perspective of the TTF model and D&M ISS model. In the future, other theories, such as the trust theory or perceived risk theory, can be made use of to discuss other influencing factors, such as the perceived privacy and perceived security. Second, this research is set against the background of China, so the research findings might be hardly applicable to other countries. Therefore, the scope of respondents can be extended in the future to compare users in different countries and regions. Third, there are many ESN platforms in China, including Dingtalk, Enterprise WeChat and so on. Future scholars can more elaborately examine the differences among them.

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## Appendix A

**Table A1.** The study's measurement items.

Dimensions	Texts of Items
System quality [12,56]	System response to the ESN is fast. System performance of the ESN is steady. ESN is easy to use. It is convenient to operate the ESN.
Information quality [12,56]	ESN provide me with sufficient information. ESN provide me with accurate information. ESN provide me with up-to-date information. The information provided by ESN is reliable.
Service quality [12,56]	Service quality of the ESN is beyond my expectation. The ESN provides excellent service quality on the whole. The ESN provides reliable service for me. The ESN can soon respond to my request.
Collaboration quality [57,68]	Our ESN enables an easy and comfortable communication with my colleagues. Our ESN supports an effective and efficient sharing of information with my colleagues. Our ESN enables a comfortable storing and sharing of documents with my colleagues. Our ESN allows me to easily and quickly locate my colleagues' contact information.
Satisfaction [64,65]	I feel satisfied with using ESN. I feel contented with using ESN. I feel pleased with using ESN. I feel happy with using ESN.
Performance expectancy [5,6,61]	The ESN enables me to accomplish jobs more quickly. The ESN increases my productivity. The ESN makes it easier to accomplish tasks. The ESN is useful for my job.
Continuous usage intention [14,36]	I will continue using the ESN in the future. I will maintain my ESN use frequency in the future. I tend to use the ESN rather than other software in the future. I will recommend the ESN to others.
Task characteristics [48,68]	I need to store and share documents anytime anywhere. I need to publish information anytime anywhere. I need to communicate with colleagues anytime anywhere.
Technology characteristics [48,68]	ESN provides ubiquitous services. ESN provides real-time services. ESN provides secure services.
Task technology fit [48,68]	In helping complete my job tasks, the functions of ESN are enough. In helping complete my job tasks, the functions of ESN are appropriate. In general, the functions of ESN fully meet my job needs.

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