



Analysis of Signing Civil Contracts Online Using PLS-Sem Deep Neural Network

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Abstract

The Covid-19 pandemic has caused great losses to the Vietnamese economy and the world. All economic, social, agricultural, forestry and industrial activities must stop. Along with the Covid-19 pandemic situation, trading companies, shops, factories, hotel services, motels, etc. cannot directly sign business contracts, recruit, rent, buy and sell. Besides, in addition to the factor affected by Covid-19, geographical distance is also a problem that makes it difficult to sign contracts. Therefore, objective factors create a large amount of demand for an online method of concluding contracts. This study uses a 2-layer research model (PLS-SEM Neural network) to analyze the survey results of factors affecting the intention to continuously use online contracts and satisfaction, factors related to importance because service expectations are useful, and satisfaction expectations when using services using information technology. This study, grounded in the Technology Acceptance Model (TAM) theory, aims to employ an artificial neural network (ANN) method for thorough analysis, resulting in more precise outcomes compared to the SEM model. The research unfolds in a series of steps: Firstly, the PLS-SEM model assesses the factors influencing the intention to utilize the facial gender recognition system. Subsequently, the ANN ranks the impact factors of key predictors derived important from the PLS-SEM model. Moreover, the ANN performs both linear and non-linear relational modeling with remarkable predictive accuracy when contrasted with the SEM model. Additionally, the study employs Critical Performance Map Analysis (IPMA) to meticulously evaluate the outcomes, particularly focusing on the pivotal performance of the factors. The analysis involved 255 questionnaire samples and utilized Partially Squared Structural Equation Modeling (PLS-SEM). The analysis results show that the perceived usefulness factor has a strong correlation with the intention to continuously use the online contracting service of the user. The expectation factor has a beneficial effect, so satisfaction and the information technology model also have a beneficial impact on user satisfaction and raise the expectation of continuous use of online contracts. However, service quality, information security, and information quality are still not highly trusted by users. This study uses the PLS-SEM model and analyzes and evaluates the factors affecting the signing of civil contracts online.

1. Introduction

The great development of science and technology, especially information technology, telecommunications, or the Internet has brought satisfaction to the needs of connection, communication, and business on a virtual platform. With the wide popularity of information technology, the worldwide Internet has become a necessity for human life. This greatly challenges the maintenance of the trading system (H.Fu et al., 2021). Therefore, there is much demand for all areas of the Internet system, including the business sector. Information technology has been applied to business activities, namely signing cooperation contracts on online platforms. The advent of electronic contracts has revolutionized the laborious process of signing paper contracts and significantly improved the efficiency of contract management. (L.Guo et al., 2021). The virtual reality of signing a contract online is defined and accepted by the Electronic Transactions Law. In addition, the national legal system agency has developed and established legal provisions related to online contract signing. Nevertheless, despite the advantages of electronic contracts, there are inherent risks associated with their centralized system architecture and database-based storage scheme. These risks include the potential for information leakage, data tampering, and vulnerability to hacker attacks. (L.Guo et al., 2021).

Users, organizations, or companies all have to install relevant user information when using online contract signing. Ensure transactional privacy to safeguard sensitive personal information, including social identifiers, contact details, income data, etc. included in the contract (S.Yeom et al., 2021). During the process of installing and setting up information on the system about privacy policy, user and partner information will be saved into the service provider's system. Thus, the question of the matter. Service providers have exactly the commitment to protect the confidentiality of customers, especially in financial-related contracts. This is the concern of users of this online signing form. Distrust in data integrity and concerns about manipulation have impeded user satisfaction. To address this, blockchain technology has been integrated into the suggested rating system due to its inherent support for smart contracts. (M.Shaker et al., 2021). The great destruction of the Covid-19 pandemic has

caused the demand for online signing to increase rapidly in a short period of time, specifically during the time of social distancing. The factor of speed and guaranteed business operations has caused the demand to increase very high. In addition, the difficulty of geographical distance between two service users is also a factor affecting the growth of demand.

Models with new structures or just in design form need to learn the characteristics to develop, then using the Model PLS-SEM (Partial Least Squares SEM) model is suitable. In addition, the PLS-SEM model is also used to re-evaluate existing models with a sample size greater than 200. The observed variables of the model are built based on the theories used for the model to research related new latent variables. The dataset for PLS-SEM does not require a normal distribution and non-parametric datasets can be used for the model. PLS-SEM is used to evaluate the relationship between the factors that reflect and form ideas for the research model. However, the limitation of the PLS-SEM model is that it is not really feasible to assess the suitability for the effects of the overall model. Therefore, PLS-SEM is difficult to use in evaluating models with limited theories.

The use of Artificial Neural Network (ANN) analysis offers several advantages over the PLS-SEM model, primarily in building both linear and non-linear models with higher accuracy. ANN is understood by the human brain's structure, with interconnected nodes or neurons organized in layers. This design allows computers to create adaptive systems capable of learning from mistakes and continuously improving their performance. One key advantage of ANN is its ability to handle complex problems effectively. It excels at learning and modeling intricate, non-linear relationships between input and output data. Moreover, ANN can comprehensively comprehend unstructured data and generate general conclusions without specific training. As a result, the ANN model's recommendations have been widely adopted in previous studies. However, it is essential to acknowledge that the ANN model follows a single hidden layer approach within the neural network model. (Hao, Wenhai, and Li)

Signing contracts online based on Internet telecommunications and information technology, specifically through a service provider that has been licensed and inspected by the State. And laws have

been issued regarding this form. But, all activities must take place on the Internet, personal accounts and security, privacy, or authenticity at all stages of signing is the top concern of customers using the signing service. online contract. (Weipin, David, and Pavneet)

The research paper brings benefits to users in the process of using and operating the form of signing an online contract. The negative effects start from many factors, affecting the user's usage behavior and especially the intention to continue using this form. This study evaluates the interactive impact of the online usage platform, how to rank and evaluate the influence on the user's intention to use the online contract through the characteristics, commercialization. Along with the convenience in management and quick interaction between users and objects in contract signing, it has improved the user's satisfaction with the online contract platform. (S.Hussain et al., 2021).

To reject the gaps in the research, the proposal suggests employing a deep learning-based ANN model with multiple hidden layers to enhance prediction accuracy. The research model focuses on evaluating factors influencing electric power quality through a multi-step process. Initially, the approach involves using PLS-SEM for structural equation modeling and then training the ANN for comprehensive analysis. (Barbara, Laura, and Andrea) This integrated approach aims to provide valuable insights into electric power quality determinants. The latent variables built in the PLS-SEM model relate to a new meaning, a new content of the model. To evaluate the level of performance of the relationship and the importance of hidden variables in the PLS-SEM model. This paper provides a Performance Critical Mapping Analysis (IPMA) model that meets the above requirement. IPMA analysis method performs analysis and specifically identifies each hidden variable and specifically classifies which latent variable has high importance but low performance and vice versa. The results of this analysis provide an overview and a premise for researchers to analyze and give new ideas to build research models. The study provides the following specific objectives:

- Detailed analysis of relevant regulations on online contract performance and management.
- Analyze the advantages and disadvantages of

online contract management and operation and clarify each requirement of the operational process of managing online contracts.

- Highlight the important role STEM resources play in developing online contract management regulations;

- The PLS-SEM model performs an overall assessment of complex management regulations on regulatory contents related to online contracts and especially civil contracts related to individual users.

- Demonstrates the impact and development of risk perception in different directions on users' online contracting activities. Analysis of factors affecting the Internet of telecommunications networks, where the main operation of the online contract signing model is handled. The behavior of using the risk structure appears to have effects, which are disseminated and deployed in the solutions and expressions of this research paper.

Part II delves into the content of research papers related to the topic under consideration. Moving on to Part III, we explore the theoretical background and examine the factors influencing online contracting products to construct a comprehensive research model. In Part IV, we present the research content and methodologies employed. Finally, we conclude the research paper with a discussion section, outlining our key findings, signification, and study limitations. Additionally, we propose promising and suitable research directions for the future.

2. Literature review

2.1. Sign a contract online (Electric Contract)

During in the curved by paper-based contracts, the entire process of creating, signing, executing, and making payments for contracts demands significant time, labor, and expenses. (L.Guo et al., 2021). The great advancement of technology, the Internet telecommunications transmission network brings positive things to people's lives. However, the multi-sector destructive factor that started with the Covid-19 pandemic became the first step to developing a great demand for this type of online contracting service. The advent of electronic contracts streamlines the cumbersome procedure of signing paper contracts, resulting in enhanced efficiency in contract management. (L.Guo et al., 2021). Bringing favorable factors, partners sign with each other through online platforms, create a scale to pull the

economy to develop, develop information technology and satisfy the cooperation needs of individuals, businesses, and organizations. (Farhah et al.)

Combining digital technology to create electronic signatures that authenticate individual signing rights approved and sponsored by the Government. Nonetheless, challenges like miscellaneous attacks, privacy breaches, and sluggish processing speeds have impeded their widespread adoption and implementation. (B.Hu et al., 2021). Users are still hesitant about the level of satisfaction and trust for this type of service related to the information technology model. Because of the centralized system architecture and reliance on database-based storage, contract data stored in this manner is highly susceptible to risks like information leakage, data manipulation, and cyberattacks from hackers. (L. Guo et al., 2021). Influencing customers' continued intention to use the online form of contracting. The reason related to this problem is that Vietnam has not really strictly controlled the security of telecommunications networks and information technology, which still contains many risks. (Shahbaz et al.)

2.2. Factors affecting intention to use continuously Sign a contract online

In addition to the convenience supporting properties for users, there are many theories related to the model, namely the information technology model in the form of online contract signing. Like the theory of rational action (TRA), the diffusion of innovation (DOI), the technology acceptance model (TAM) is widely applied in activities that take place on the basis of information technology. believe. Records and contracts when signed by users, users expect to receive useful and confidential information. (C. Ting, Rong, and L. Ting) Once deployed, these systems cannot be altered, which consequently introduces distinctive maintenance complexities when compared to traditional software solutions. (J.Chen et al., 2021). The security factor is necessary when using the service, creating a motivation to have a positive impact on society and the usefulness and convenience for users. The development of the digital age creates novelty, completely improving the satisfaction of users of contract and cooperation services of all industries. Positively affect customers' lives with the elements of service quality, information quality, and confidentiality. Pub-

licly build awareness of user demand and psychology for digital delivery businesses that enter into online contracts and bring competitiveness to the industry. Smart contracts stand as one of the most promising and captivating concepts within the realm of blockchain technology. (Gabe and Guadalupe) Their attributes of self-execution and event-driven functionality enable certain online activities to occur without necessitating the involvement of a trusted third party. (B.Hu et al., 2021). During the outbreak of the Covid-19 pandemic, the online contract signing service model on digital and information technology platforms was applied to a variety of current and future industries. (Sanghui et al.)

2.3. Raw material and Hypotheses theory

2.3.1. Expectation factor (Exp)

The Expectation factor (Exp) has been influenced by various factors including the emergence of the Covid-19 pandemic and the remarkable advancement of information technology and digital technology. This progression has led to an increased demand for online contracting services from users. However, the lack of trust in data integrity and concerns about manipulation have acted as barriers, impeding user satisfaction. (M.Shaker et al., 2021). Has created user expectations for the quality of information security and the actual satisfaction of this form affects the intention of users and potential users to continue using it. The minimalism in applications and websites related to the development of services resonates with the development of technology. Offering ease, simple operation, and access to extensive quality research. Impact on consumer satisfaction about the strong development of Internet telecommunications, following the strong development to help businesses do business, popularize this type of online contracting service widely, bigger. (Wenlong et al.)

H1: "Expectations" have a correlated effect on the perceived usefulness of online contracting. H2: "Expectations" affect consumer satisfaction with online contract signing. H3: "Beneficial perception" affects consumer satisfaction. H4: "Beneficial perception" is a factor affecting the user's intention to continuously use for signing an online contract.

2.3.2. Information Technology System (IS)

The theoretical factor is the type of service operating on the technology platform, therefore the user's

willingness to accept the information technology model. Besides, expectations and trust affect the overall lifetime of the service form, flexible and stable operation. Next, address the user's key concerns for this online form of signing in order to transform the novelty of technology, positively with a flexible, fast society, eliminating the difficulties of geographical distance, Covid-19 epidemic. The rating system proposal has incorporated blockchain technology, specifically due to its integration of smart contracts. The Ethereum platform is pivotal in this context due to its robust support for smart contracts, which can be utilized to formulate contract ratings using the Solidity programming language. (M.Shaker et al., 2021). To rectify market imperfections that result in vulnerabilities for consumers during transactions in global markets, it is imperative to initiate both judicial and legislative measures. (F. Abdullah et al., 2021).

Model for assessing and adjusting risks during the operation of online signing services, affecting many criteria such as the usefulness of the form and many factors that need to be checked accurately related to the quality of the information technology model in online contracting products. (Philipp et al.) Proposing and providing meaningful theories on improving performance when using online signing services, and the quality of information technology systems in products, helping to improve the positive factors of society. conference on the evolving flexibility of collaboration and collaboration. In order to promote and encourage consumer participation, it is essential to implement regulatory and legislative measures. (F. Abdullah et al., 2021)

H5: "Information security" affects user satisfaction. H6: "Quality of service" of online contracting affects user satisfaction. H7: "Information quality" affects user satisfaction. H8: "Satisfaction" synthesizes many influencing factors, consumers' satisfaction strongly influences the intention to use continuously for this type of online contracting service. (Bin, Z Zongyang, and Jianwei)

3. Materials and Methods

3.1. Collect and analyze data.

The user opinion survey questionnaire was conducted through an overview of previous research papers. The survey questionnaire was built according to the Likert 5 scale and sent to 3 experts on

information technology application in contract management and the survey questionnaire was revised according to the experts' comments. . The data results were carried out from November 1, 2021, to December 1, 2022, with 312 survey questionnaires sent and 100% of the survey questionnaires collected. In, there are 22 unsatisfactory questionnaires, possibly because the surveyors have not carefully considered the content of the survey questions. As a result, there were 290 questionnaires that met the requirements and were used as data for smart-PLS 3.3.3 software to run the PLS-SEM model and IBM SPSS software to run artificial neural network (ANN) analysis.

Subjects of the survey are guaranteed according to 3 criteria classified as follows: gender, age, and education level. Details are shown in table .1.

TABLE 1. Sample attribute characteristic

Label	Items	Frequency	Percentage
Gender	Male	198	68.28%
	Female	92	31.72%
Age	21~30	275	94.83%
	31~40	15	5.17%
Profession	Student	235	81.03%
	Teacher	5	1.7%
	Other	50	17.27%

Bootstrapping analysis results from the PLS-SEM model using smartPLS 3.3.3 software give the results that the Cronbach's Alpha values of all variables are greater than 0.8 and the mean value of variation (AVE) of the large variables more than 0.5. This proves that the observed and latent variables of the collected data respond well to the PLS-SEM analysis model (Tab .2).

With: CR = Composite confidence

AVE = Mean variable extraction

Hypothesis Testing

Verification results of the research model show that information quality (t-value = 8,981) is useful or convenient during use (t-value = 10.521) and user expectations (t) -value = 9.125) has a positive effect on user satisfaction with the online form of contracting and on the intention to continue using the online form of contracting. Service quality (t-value = 3.721) strongly conveys positivity on user satisfaction, security of user information (t-value = 2.851). This factor affects satisfaction and expectations (**t-value = 2.218**) and has a positive impact on user

TABLE 2. Characteristics of the analyzed sample

Construct	Indicators	Factor loading	AVE	CR	Cronbach's Alpha
Expectation	Exp 1	1.223	1.101	1.352	1.311
	Exp 2				
	Exp 3	0.321			
Awareness is helpful	Useful1	1.311	0.081	0.377	0.302
	Useful2	1.289			
	Useful3	0.291			
Satisfaction	Sat 1	0.381	1.111	1.301	1.379
	Sat 2				
	Sat 3	1.256			
Service Quality	SerQ 1	1.303	0.079	0.381	0.277
	SerQ 2	0.271			
	SerQ 3	1.321			
Information Quality	InfQ 1	0.371	1.099	1.361	1.269
	InfQ 2	1.292			
	InfQ 3	0.313			
Continued use intention	Cont 1	1.311	0.201	0.358	0.378
	Cont 2	0.257			
	Cont 3	1.258			
Information Security	InfS 1	0.311	1.102	1.351	1.289
	InfS 2				
	InfS 3	1.271			
		0.256			

satisfaction for this type of online contracting service.

PLS-SEM model analyzed by bootstrapping method of smartPLS 3.3.3 software shown in Figure 1 indicates that the p-values of both pre-hidden and observed variables are below 0.05. This substantiates the strong connection between the observed variables and the latent variable, and there is no the absence of multicollinearity. Furthermore, it under-

TABLE 3. Effect assessment

Construct	SEQ	SYQ	IQ	EC	PU	SAT	CUD
SEQ	1.00						
SYQ	0.836	1.00					
IQ	0.364	-	1.00				
			0.227				
EC	0.652	0.672	0.71	1.00			
PU	-	0.138	-	0.989	1.00		
	0.273		0.222				
SAT	0.899	0.159	0.917	-	0.827	1.00	
				0.158			
CUD	0.682	0.669	-	0.972	-	0.867	1.00
			0.224		0.028		

TABLE 4. Result of hypothesis analysis

Hypot	Path	Estim	+ - Value	P - Value	Result
H1	Exp -> Useful	0.831	8.625	0.010	Supported
H2	Exp -> Sat	0.162	2.718	0.014	Supported
H3	Aih -> Sat	0.101	3.531	0.034	Supported
H4	Aih -> Cont	0.662	11.021	0.018	Supported
H5	InfS -> Sat	0.073	2.351	0.005	Supported
H6	SerQ -> Sat	0.402	9.481	0.012	Supported
H7	InfQ -> Sat	0.431	3.221	0.009	Supported
H8	Sat -> Cont	0.312	2.321	0.007	Supported

scores the positive influence of the latent variables on the research subject. Observed variables are constructed and specifically represent a corresponding latent variable. Therefore, removing the observed variable or misaligning the observed variable for latent variables in the model causes the model evaluation performance to be reduced, leading to erroneous analysis results.

Artificial Neural network analysis

The analysis of the artificial neural network (ANN) serves as the second step in the analysis of the SEM model of this study. The ANN model is applied to conduct in-depth analyses of the Expec-

tation Theory model and the information technology model (Information Quality, Service Quality, System Quality), which influence the intention to continue using the online contracting system. The ANN model offers more accurate prediction results compared to the SEM model due to its ability to analyze non-linear data with related relationships. SEM analysis, on the other hand, can sometimes oversimplify the complexity of processes. The combined use of the SEM model and ANN model aims to complement each other. During ANN analysis, the data is supported by multilayer perceptron (MLP) and organized into three layers: input layer, hidden layer, and output layer (Fig. 2). IBM SPSS 20 is utilized to run the ANN model in this study. The ANN-1 model consists of an output layer of INT 1 and three inputs (Quality of Service, Quality of Information) from the information technology model. The ANN-2 model comprises an output factor of INT 2 and two inputs (Perceived Ease of Use and Perceived Usefulness). To ensure the accuracy of the ANN network's prediction results, 10-fold cross-validation is employed to prevent overfitting errors in the data. The dataset is divided into two parts: 90% of the data for training and 10% for testing. The accuracy of the predictive model is calculated using the Root Square Error (RMSE) index based on formulas (1) and (2), where SSE is the sum of squared errors, and MSE stands for mean squared prediction error.

$$MSE = \left(\frac{1}{n} \right) \times SSE \tag{1}$$

$$RMSE = \sqrt{MSE} \tag{2}$$

5 to 6 present the RMSE values for both the training and test data of the representative data obtained from the ANN model. A low RMSE indicates more accurate predictions and superior data visualization. These results highlight the effectiveness and reliability of the ANN model in providing precise estimations and enhancing the overall quality of data representation.

7 and 8 display the sensitivity analysis index. The analysis results depicted in Figures 3 and 4 reveal the influence of the system quality factor from the information technology model and the usefulness factor on the expectation, ultimately impacting the intention to continue using the contracting system.

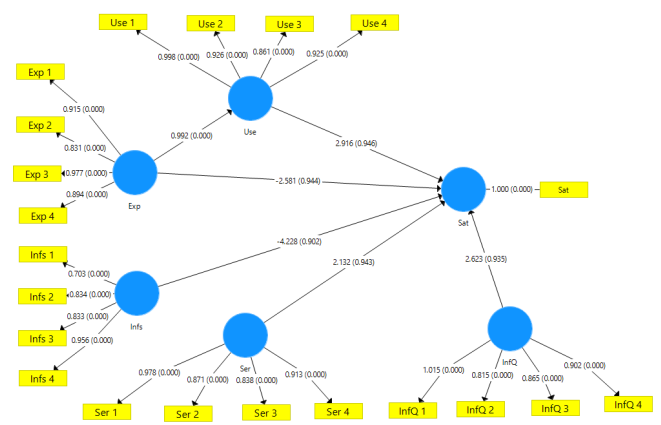


FIGURE 1. PLS-SEM model

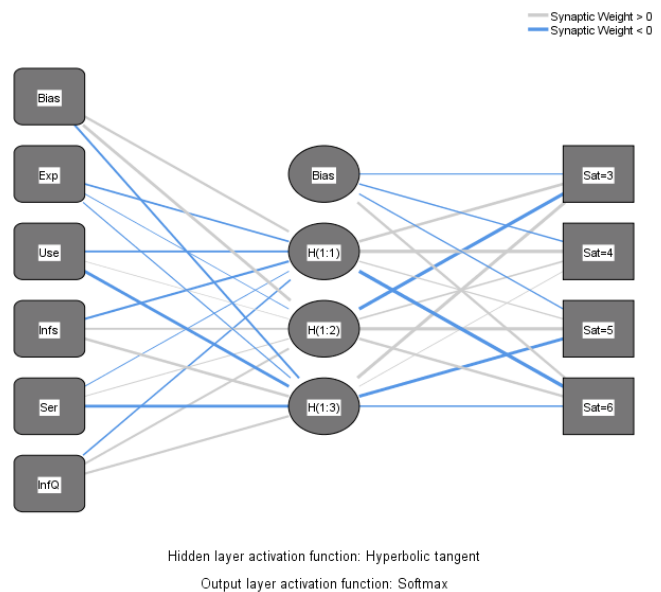


FIGURE 2. Artificial Neural network model

, 10 The comparison between the outcomes of the ANN analysis and the SEM analysis is centered around evaluating path strength through SEM coefficient and the significance of the normalized relative index of the ANN. The comparative assessment, as presented in Table 9 (Output: INT1), ranks the information quality factors for both the ANN and SEM models. Notably, the ANN model excels in capturing both linear and nonlinear correlations between variables with exceptional precision, thereby enhancing the accuracy of the analysis. Table 10, with output: INT 2, Ease of use, and expectation validation rated 1 to 2 for the SEM and ANN analysis model.

4. Results and Discussion

The SEM model was explicitly analyzed using the performance-importance map analysis (IPMA)

TABLE 5. RMSE values for the ANN-1

Input factors: Quality of System, Quality of Service, and Quality of Information.				
Output factor: INT 1				
Neural network	Training (90% of data sample 255); N=230		Testing (10% of data sample 255); N=25	
	MSE	RMSE	MSE	RMSE
ANN1	0.1178	0.0366	0.1204	0.0856
ANN2	0.1169	0.0389	0.1160	0.0778
ANN3	0.1176	0.0395	0.1356	0.0792
ANN4	0.1253	0.0391	0.1314	0.0983
ANN5	0.1271	0.0397	0.1256	0.0965
ANN6	0.1264	0.0371	0.1247	0.0934
ANN7	0.1293	0.0332	0.1169	0.0935
ANN8	0.1234	0.0323	0.1245	0.0979
ANN9	0.1371	0.0319	0.1343	0.0993
ANN10	0.1191	0.0336	0.1289	0.0867

TABLE 6. RMSE values for the ANN-2

Input factors: Perceived usefulness and Expectation confirmation				
Output factor: INT 2				
Neural network	Training (90% of data sample 255); N=230		Testing (10% of data sample 255); N=25	
	MSE	RMSE	RMSE	RMSE
ANN1	0.1298	0.0398	0.1040	0.0339
ANN2	0.1389	0.0214	0.1986	0.0398
ANN3	0.1194	0.0398	0.1297	0.0386
ANN4	0.1131	0.0219	0.1232	0.0295
ANN5	0.1109	0.0266	0.1342	0.0299
ANN6	0.1207	0.0208	0.1259	0.0399
ANN7	0.1206	0.0257	0.1262	0.0398
ANN8	0.1198	0.0202	0.1398	0.0197
ANN9	0.1097	0.0358	0.1267	0.0329
ANN10	0.1189	0.0289	0.1968	0.0292

chart to more clearly assess the influencing factors involved in the SEM model. Establishing a precise correlation between the significance and performance of the latent variables within the research model holds substantial importance. Verify the analysis results of the two PLS-SEM and ANN models by IPMA method running on smartPLS 3.3.3 software and evaluate specifically by viewing the distribution positions of latent variables of the model shown in the IPMA chart. Based on the IPMA chart,

TABLE 7. Normalized variable relation importance (Output: INT 1)

Predators (Output: INT 1)	Average relative importance	Normalized relative importance (%)	Ranking
Quality of System	0.073	78.31	3
Quality of Information	0.431	100	1
Quality of Service	0.402	87.79	2

TABLE 8. Normalized variable relation importance (Output: INT 2)

Predators (Output: INT 2)	Average relative importance	Normalized relative importance (%)	Ranking
Expectation confirmation	0.162	89.09	2
Perceived usefulness	0.662	100	1

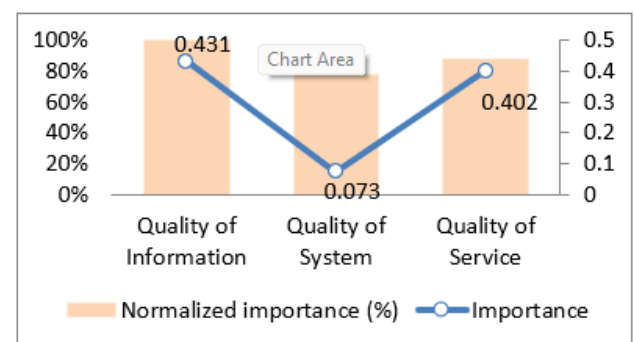


FIGURE 3. Normalized variable relation importance (Output: INT 1)

the author classifies the latent variables with high importance but low performance and vice versa to clearly identify the problem to be solved and plan improvement activities. IPMA histogram performs analysis based on two parameters, performance, and significance. Figure 5 shows the correlation between performance and the importance of the INT1 out-

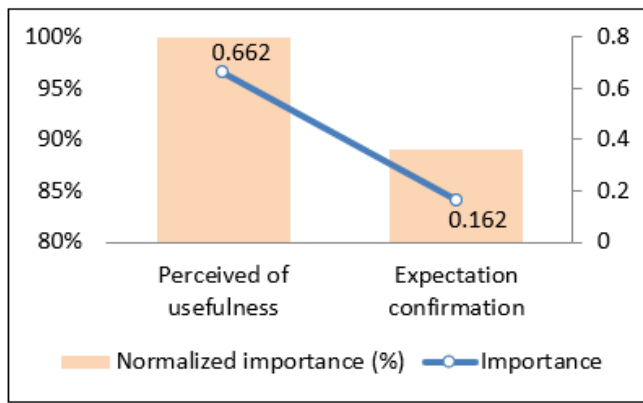


FIGURE 4. Normalized variable relation importance (Output: INT 2)

TABLE 9. Comparison between SEM and ANN analysis (Output: INT 1)

Path	PLS-means SEM Ranking	ANN normalized relative importance (%)	ANN Ranking	Matched?
QSy	0.073 3	78.31	3	Yes
QInf	0.431 1	100	1	Yes
QSe	0.402 2	87.79	2	Yes

TABLE 10. Comparison between SEM and ANN analysis (Output: INT 2)

Path	PLS-mean SEM Ranking	ANN normalized relative importance (%)	ANN Ranking	Matched?
Expectation confirmation	0.1622	89.09	2	Yes
Perceived of usefulness	0.6621	100	1	Yes

put. The IPMA analysis graph (Figure 5) shows the results related to the identification of the target structure in the PLS-SEM path model. The information quality factor from the information technology model has a direct impact on the intention to consistently utilize the online contracting system. This is an element of the information technology paradigm

that requires online contracting system vendors and manufacturers to think more about it, and the ANN ratings show consensus on the weakest point of view information quality factors, Table 14 summarizes the significance values of the three factors within the information technology model that impact the intent to maintain usage of the online contracting system.

The Theoretical Technology Acceptance Model (TAM) is built upon two principal components: ease of use and usefulness. In this construct, the factor of perceived ease of use exhibits a more pronounced influence on the user’s inclination for continuous usage, surpassing the level of usefulness. This relationship is depicted in Figure 6 and detailed in Table 15. Both IPMA and ANN analyses affirm the highest impact of usefulness on the intent utilize the attribution system.

The rate of competition increases in parallel with the development of information technology, and digital implementation for the digital market, the tool can be the current online contracting application service. Therefore, service usefulness, user expectations, service quality, information quality, security information quality, and especially user satisfaction are directly weak performance. continued and strongly influenced the idea of continuous use of online contract notation. Research results are shown, the above elements are prime samples, and the key impact on user satisfaction with the path is 0.297, 0.063, and 0.601, respectively. It shows that the quality of information security is a factor that users are especially interested in when using online contracting products, the quality of information security can be displayed safely, and personal information is protected. Confidentiality, business users, and related content and finance in the contract. The professional quality of service manufacturers, and online business models used on the Internet platform is not uniform. Quality services, quality information, and useful features satisfy the needs of use and increase users.

TABLE 11. Summary of relative importance ranking (output: INT 1)

Output: INT 1	Qser	QSys	QInf
PLS-SEM	2	3	1
ANN sensitivity analysis	2	3	1
IPMA	2	3	1

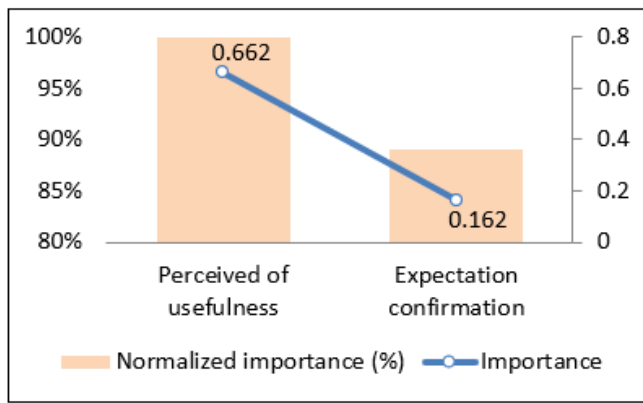


FIGURE 5. The correlation between the performance and the importance of the INT 1 output factor

TABLE 12. Summary of relative importance ranking (output: INT 2)

Output: INT 2	Ease	Useful
PLS-SEM	2	1
ANN sensitivity analysis	2	1
IPMA	2	1

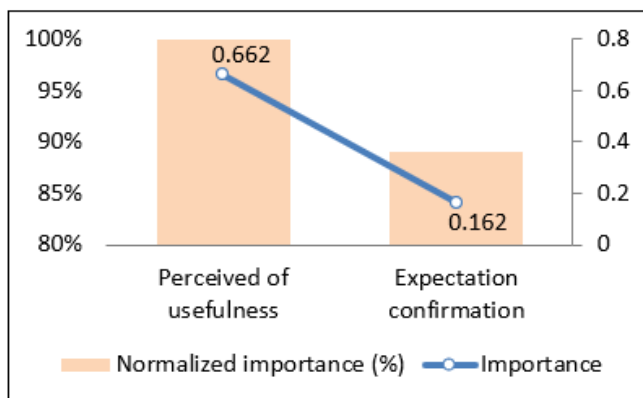


FIGURE 6. The correlation between the performance and the importance of the INT 2 output factor

In addition, user expectations increased for satisfaction and useful features along with uptime satisfaction numerically at 0.062 and 0.031, respectively. Another face, the user needs to be the owner of the product and hope to get up the funny when using the product, it has a strong impact on the user’s idea of continuous use. In addition, the perception that has a direct effect on the intention to use the product link directly with the link is only 0.712. Add to That, the Quality of the model of the job information helps the

communication with the owner of the product and strongly promotes the idea of users’ continued use of online product co-signing. In conclusion, user satisfaction is directly related to the intention to continue using the product with a numerical path of 0.341. When the user satisfaction index of the online contract product is high, the milestone that defines the continuous use of the product also increases. As such, improving the user satisfaction column only enhances the idea of continued use for the product.

5. Conclusion

The ANN research model in this study is evaluated by the MSE value (Mean squared error). The MSE of an estimator is the average of the difference between the estimates and what is evaluated. The results of the ANN analysis show that the standard deviation of the MSE values of training and testing ranges from 0.005 to 0.008. This result shows the impact of observed variables on the latent variable that meets the requirements, there is no difference. The Importance Performance Map Analysis (IPMA) chart assists in pinpointing latent variables within the model that exhibit relatively high importance but low performance.

The results of the IPMA analysis (Figure 5) show that optimization and innovation factors have a great influence on the interest in online contracts. This analysis result is consistent with the results of PLS-SEM and ANN analysis and the research results of recent online contract studies. This proves that advanced research techniques on smartwatches are always interesting and constantly developed. The results of the IPMA analysis in Figure 6 show the convenience factor and the expectation that the new technology applied in the online contract has the greatest impact. This speaks to the expectation of a new technology technique to improve the online contract, which is more and more simple to use and convenient in thousands of operations. This is also a promising research direction for future researchers.

The Covid-19 epidemic presents an opportunity as well as a great challenge for the 4.0 industry to thrive in business management activities and specifically related to document management activities to meet the target Social distancing or limiting close contact to ensure the prevention of the Covid-19 epidemic. The online public administration system is gradually developed and the electronic signature

system is also increasingly improved based on 4.0 technology, where the management and signing of contracts in the online form is carried out. The PLS-SEM model analyzes the models with new pre-latent variables and new observed variables corresponding to the latent variables of the model. The disadvantage of the PLS-SEM model is that it has not been able to specifically evaluate the model with non-linear data. The ANN method is a perfect solution to eliminate this weakness of the PLS-SEM model.

The study underscores the theoretical necessity for technology products to prioritize the optimization of information security and service quality. This strategic approach ensures enhanced customer satisfaction while utilizing the service. Improving customer satisfaction builds the trust and loyalty of users and attracts more potential users to online contracting. Information quality, service quality, and information security quality affect the satisfaction and satisfaction of users, a strong stepping stone positively affecting the intention to continuously use technology products. Expecting all the advancements of ever-evolving technology, ensuring the quality of information technology models, building positive opportunities for the sustainable development of technology products, exactly the signed technology in the online contract.

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