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Retraction

Retracted: Credibility Analysis of Accounting Cloud Service Based on Complex Network

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Manipulated or compromised peer review

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] X. Chen, C. Guang, and D. Hua, "Credibility Analysis of Accounting Cloud Service Based on Complex Network," *Journal of Sensors*, vol. 2022, Article ID 5420772, 11 pages, 2022.

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Research Article

Credibility Analysis of Accounting Cloud Service Based on Complex Network

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Compared with the previous accounting information system (hereinafter referred to as AIS), the dynamic and changing environment of accounting cloud service, cloud storage away from enterprise entities, service modules selected for purchase, and seamless dynamic configuration. With the emergence of new situations such as the reconstruction of accounting information processing process, the emergence of new features increases the information risk of enterprises. Therefore, taking reasonable and effective measures can enable enterprises to intuitively understand whether AIS is credible in the accounting cloud service environment. Referring to the existing research system in the field of reliability evaluation, this paper analyzes the current situation of accounting cloud service and its characteristics compared with the previous AIS and divides it into four parts: normative inspection, index calculation, and reliability calculation to illustrate the method system for measuring the reliability of accounting cloud service. This paper analyzes the reliability requirements and reliability attributes of accounting cloud services and constructs a reliability evaluation grade model combined with fuzzy comprehensive evaluation to guide the selection of users and the quality management of cloud accounting suppliers. Considering the complexity and dynamics of AIS reliability evaluation in accounting cloud service environment, the reliability of AIS is also affected by the complex call relationship between modules; combined with the complex network theory, a reliability analysis and evaluation method of accounting cloud service based on complex network are proposed.

1. Introduction

The concept of "Internet plus" has always been well known by all walks of life. Today, enterprises are increasingly aware that with the advent of the era of big data, advanced data processing and information management mode will bring unlimited pioneers and practical benefits to enterprises [1]. Cloud accounting applies cloud computing, a big data solution, to the field of accounting informationization. While reducing the cost of accounting informatization construction and maintenance of enterprises, it will provide high-quality services such as seamless connection with external information systems of enterprises and auxiliary scheme analysis of big data processing with efficient and convenient financial business processing and optimized service resources updated by cloud computing in real time [2]. Compared with the previous accounting information systems, the dynamic environment of cloud accounting is full of changes, far away from the service modules selected by enterprise entities for cloud storage and purchase, seamlessly connected and dynamically configured, and the emergence of new conditions and new features such as the reconstruction of accounting information processing flow increases the informationization risk of enterprises [3]. Therefore, reasonable and effective measures should be taken to let enterprises know whether AIS can be trusted in the cloud accounting environment that they want to purchase intuitively or have already used. Its informatization risk is very important in the popularization and development of accounting cloud services.

2. Complex Network Theory

2.1. Related Indicators of Complex Networks. There are various indexes to highlight the characteristics of complex networks [4]. Combined with the key points of this paper, the following indexes are selected and introduced.

2.1.1. The Diagram of the Network. In theory, a graph allows for multiple lines. However, if a graph is simple, it means that the graph has no multiple edges. In addition, there is no ring in the simple pattern, and the simple pattern contains rings [5]. When each arc has a corresponding line value, it is a weighted network; otherwise, it becomes a powerless network. For example, Figure 1 is a complex network diagram of metal trade and a visual description of system structure. Visualization technology is one of the most important technical tools when using complex network theory to study [6]. So without explanation, readers can read this picture.

In Figure 1, the connections between different network nodes are represented, and the connections between different enterprises illustrate the correlation and economic business connection of enterprises. By calculating the entry, exit, and related indicators of complex networks, we can evaluate those core enterprises.

2.1.2. Network Density. This indicates the tightness between the vertices of the network. In complex networks, network density is usually used to describe the overall density and development trend [7]. In a complex network with N vertices, the network density can be expressed by

$$d(G) = \frac{2M}{N(N-1)}. \tag{1}$$

The acquisition range of network density is always within the interval [0, 1]. In the actual network, it is found that the maximum value of network density is 0.5.

Centrality and center potential can be near centrality and near center potential and intermediate centrality and intermediate center potential.

2.1.3. Spot Degree and Spot Degree Distribution. This is the number of rows owned by vertex i degree k vertex i. In directivity network, point degree is divided into input degree and output degree. The input of a vertex is the number of arcs entering the vertex, and the outgoing degree of the corresponding vertex is the number of arcs outgoing from the vertex. They are the same only in the case of simple graphs. In addition, we can refer to the concept of point distribution, which refers to the distribution of each vertex point degree and is used to explain the overall distribution of network point degree.

2.1.4. Average Shortest Path. Path refers to the distance between vertex i and vertex j, which is denoted as d_{ij}. At the same time, the network diameter refers to the longest path between any two vertices, which is denoted as D, that is,

$$D = \max d_{ij}. \tag{2}$$

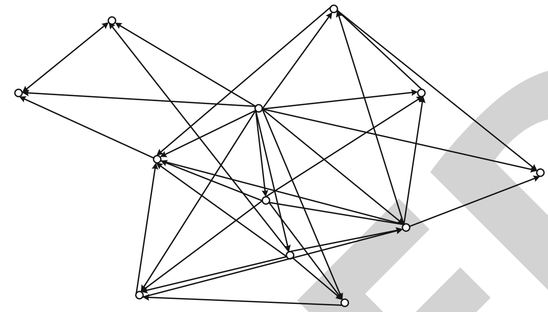

FIGURE 1: Complex network diagram of metal trade in a certain place.

In addition, the so-called average path refers to the average value obtained from the distance between any two vertices, which is denoted as L, that is,

$$L = \frac{1}{(1/2)N(N+1)} \sum_{i \geq j} d_{ij}, \tag{3}$$

where N is the number of network nodes.

K kernel defines a relatively dense subnet, which is helpful to find a vertex set with closer relationship, and can describe several characteristics that cannot be expressed in degree distribution.

2.2. Basic Model of Complex Network. K-shell algorithm measures the node influence of projects in the network, and PageRank algorithm integrates the node influence of projects and the diffusion relationship between projects to realize project portfolio selection [8], where the importance of nodes is measured based on the location attributes of nodes in the network.

$$Cs(i) = \left[K(i)^{\gamma} \times \left(\sum_{j=1}^{N} w_{ij} \right)^{\mu} \right]^{1/\gamma+\mu}, \tag{4}$$

where $K(i)$ denotes the degree value of the i-th node, w_{ij} denotes the weight value of the connection between node i and its adjacent node j, and γ and μ are adjustable parameters.

The classical PageRank ranking algorithm for web pages mainly pays attention to the transfer relationship between nodes in the network, and the priority ranking matrix constructed is as follows:

$$\mathrm{PR}(p_i) = \frac{1-d}{N} + d \sum_{p_j \in M(p_i)} \frac{\mathrm{PR}\left(p_j\right)}{L\left(p_j\right)}, \tag{5}$$

where $P_1, P_2, \cdots, P_N$ denotes web pages, $M(p_i)$ denotes the set of web pages linked to web pages p, $L(p_j)$ denotes the number of web pages linked to web pages p_j, N is the total number of web pages, and d is the damping coefficient, which is usually 0.85.

The maximum eigenvalue of the priority ranking matrix PR is entered into the corresponding eigenvector R, which can lead to the priority ranking of each node in the network, as shown in

$$MR^* = \lambda^* R^*. \tag{6}$$

2.2.1. Regular Network Model

(1) Global Coupled Network Model. Globally coupled network is the most typical regular network model. As shown in Figure 2(a), it refers to the arc connected between any two vertices in the network. The results show that if the network size is the same, the globally coupled network has significant characteristics, such as the shortest average path and the largest cluster coefficient, compared with other types of network models. This network model can reflect the cluster characteristics or small-world characteristics of the actual network to a certain extent, but because most living networks cannot be described in this model, the study of the actual network of global coupled networks has considerable defects.

(2) Nearest Neighbor Coupled Network Model. The nearest adjacent coupling network is a network model with low aggregation degree, but it is also a model studied by theory and practice. As shown in Figure 2(b), each vertex is connected to a nearby $K/2$ vertex arc (K is even). This model belongs to a highly clustered network. Therefore, the average path when K is large is as follows.

$$L \approx \frac{N}{2K} \longrightarrow \infty, \tag{7}$$

where K is even and $N \longrightarrow \infty$.

And the clustering coefficient of the nearest neighbor coupling network is

$$C = \frac{3(K-2)}{4(K-1)} \approx \frac{3}{4}. \tag{8}$$

As a result, it is difficult for this model to realize the process that requires overall coordination.

(3) Star Coupled Network (Star Coupled Network). Star coupled network is also a typical complex network model. Its structural feature is that the center is a vertex, and all vertices other than that are only connected to the middle vertex, but there is no interconnected relationship between them as shown in Figure 2(c). The average path of the model is approximate to 2, and the class coefficient is approximate to 1.

2.2.2. Scale-Free Network Model. The research on complex network patterns in the past usually ignores two very important characteristics. One is growth; that is to say, the overall scale of the network expands with the increase of time and information. Second, it is priority connectivity, which means that the newly generated vertices of the network are easily connected with vertices with high point value.

Based on the above-mentioned two-point characteristics, the formation mechanism of BA scale-free network model is to add new vertices in turn to the existing network and connect n original vertices. In addition, the probability that the newly added vertex and the cause vertex are connected with each other is set to p.

$$P = \frac{k_i}{\sum k_j} (i \neq j), \tag{9}$$

where k represents the point degree value of vertices. Therefore, the average path length of BA scale-free network is

$$L \propto \frac{\log N}{\log \log N}. \tag{10}$$

After t-step priority connection, the clustering coefficient is

$$C = \frac{n^2(n+1)^2}{4(n-1)} \left[\ln \left(\frac{m+1}{m} \right) - \frac{1}{m+1} \right] \frac{[\ln (t)]^2}{t}. \tag{11}$$

At present, there are three methods to describe the point degree distribution of BA dimensionless network, including continuous field theory, rate equation method, and master equation method. The asymptotic results obtained are identical, in which the point distribution function of BA dimensionless network derived using the master equation method is shown.

$$P(k) = \frac{2n(n+1)}{k(k+1)(k+2)} \propto 2n^2 k^{-3}. \tag{12}$$

It is found that the point degree distribution of BA dimensionless network model can be expressed by power law function approximation.

As mentioned above, the characteristics of the complex network model are summarized as shown in Table 1.

3. Construction of Accounting Cloud Service Credibility Analysis Method System

In this chapter, in the accounting cloud service, 10 modules that enterprises often customize are taken as research objects, and the reliability measurement method system is constructed. In addition, it is assumed that all enterprises have the conditions to obtain the same accounting services, and all suppliers can provide similar services. This chapter selects and constructs a complex network model from reliability indicators and divides it into four parts: normative inspection, index calculation, and reliability calculation to explain the method system of measuring the reliability of accounting cloud services (Figure 3).

3.1. Credibility Index Selection Based on Complex Network

3.1.1. Principle of Selecting Credible Indicators. In this paper, complex network is used as a tool to measure the reliability of accounting cloud services, but there are many indicators in complex network theory. In order to choose the indicators

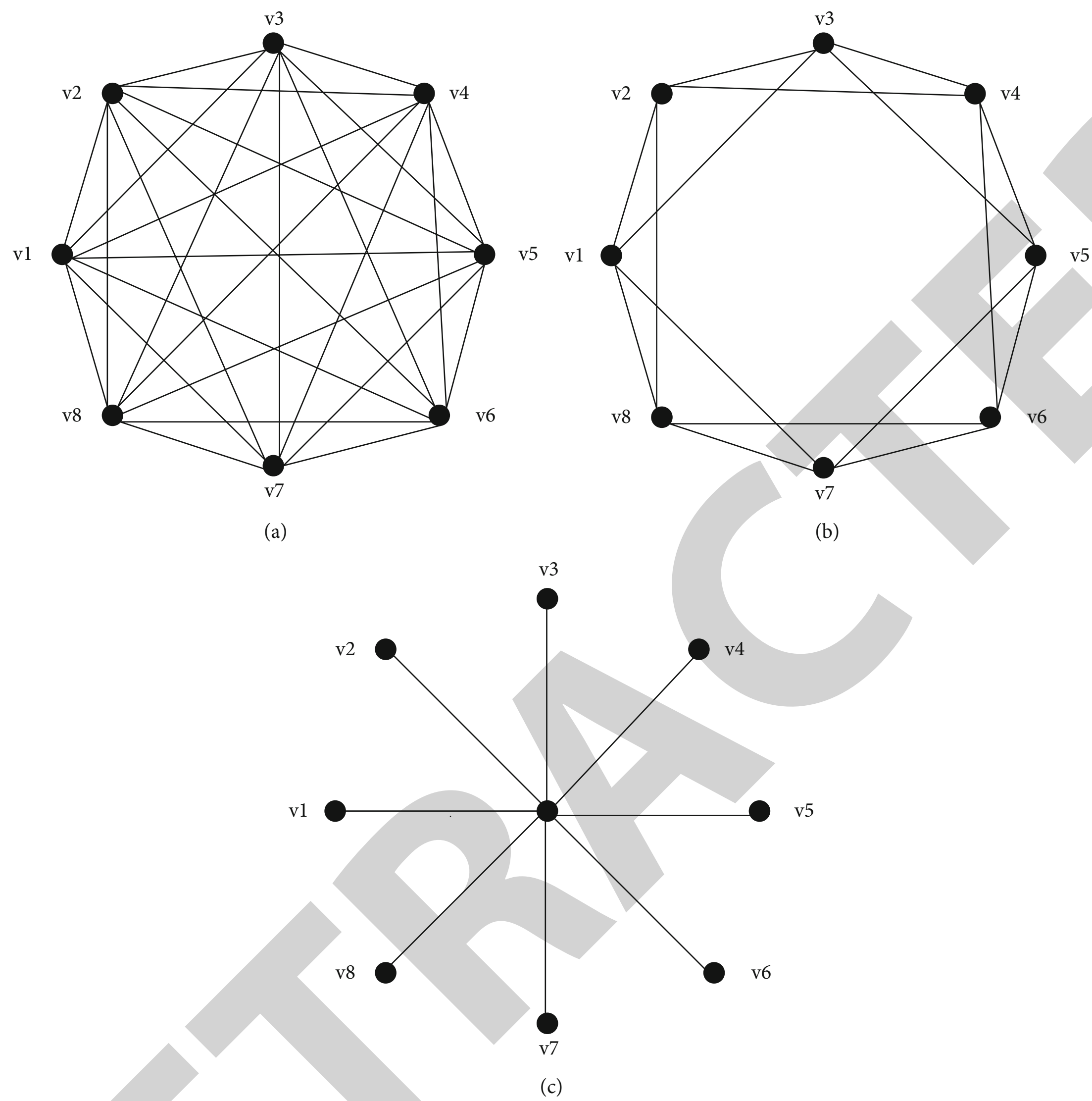

Figure 2: Regular network model.

Table 1: Characteristics of complex network model.

Model name	Average path length L		Clustering coefficient ($0 \le C \le 1$)		Distribution law
	Qualitative	Quantitative	Qualitative	Quantitative	
Globally coupled network	Larger	L = 1	Larger	C = 1	Function distribution
Nearest neighbor coupling network	Larger	$L \longrightarrow \infty$	Larger	$C \approx 3/4$	Function distribution
Star coupling network	Larger	$L \longrightarrow 2$	Larger	$C \longrightarrow 1$	Function distribution
Small-world network	Larger	$L(p) < < L(0)$	Smaller	$C(p) \propto C(0)$	Poisson distribution
BA scale-free network	Smaller	$L \propto \log N / \log \log N$	Smaller	$C = \left(n^2 (n+1)^2 / 4(n-1)\right) [\ln (m + 1/m) - 1/m + 1] \left([\ln (t)]^2 / t\right)$	Power law distribution

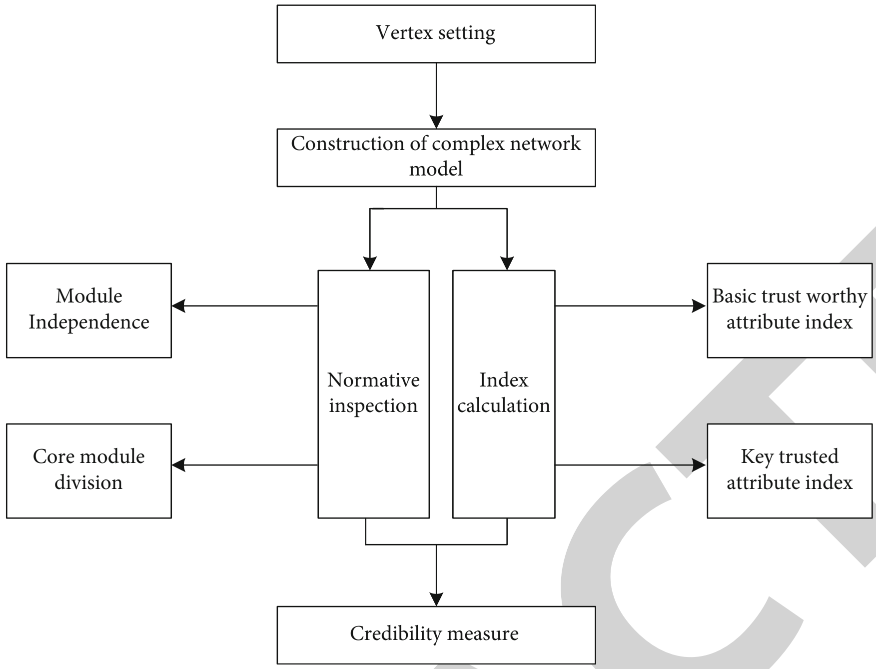

Figure 3: Schematic diagram of accounting cloud service credibility measurement system.

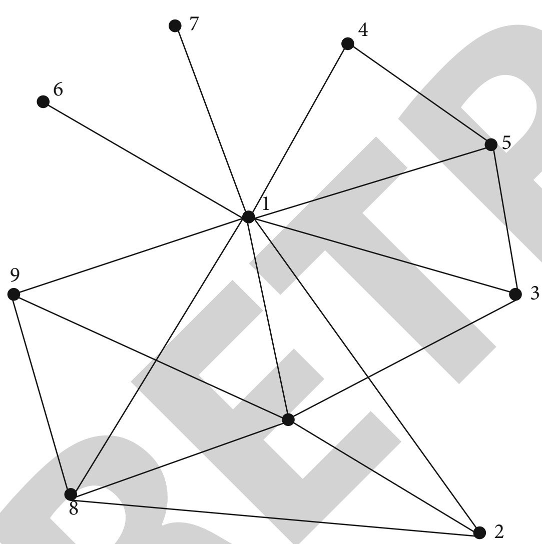

Figure 4: Complex network of contracted accounting cloud services.

that play a practical role in this paper, the following principles should be followed [9].

(1) Principle of relevance

(2) The principle of comprehensiveness

(3) Principle of comparability

(4) Principle of quantification

3.1.2. Selection of Specific Credible Indicators. This paper chooses the reliability index of accounting cloud service based on complex network theory. At the same time, because third-party organizations such as accounting and auditing have no influence on the reliability of accounting cloud services, the selection of indicators does not consider strengthening the content related to reliability attributes and discusses them from two aspects: basic reliability attributes and key reliability attributes [10].

(1) Basic Reliable Attribute Measurement Index. The basic reliability attributes must meet the reliability level of all accounting cloud service systems. It means that the information exchange between cloud accounting modules is correct and timely. Based on this requirement, this paper chooses network density, centrality, and centrality in complex network theory and measures the integration of accounting cloud services.

(2) Key Trustworthy Attribute Measurement Indicators. Key reliability attributes can be divided into different levels. Based on complex network theory, this paper mainly focuses on the measurement of maturity, stability, and hierarchy and chooses the following reliability indicators.

(1) Spot degree and spot degree distribution

(2) Average shortest path

(3) k-nucleus

3.2. Normative Inspection and Calculation of Credible Indicators

3.2.1. Conformity of Normative Inspection. To analyze the reliability of accounting cloud services, we must first confirm whether they are normative.

Table 2: Vertex approach centrality.

Serial number	Approximate centrality	Vertex number	Serial number	Approximate centrality	Vertex number
1	0.342808438	6	11	0.2631854	116
2	0.2983375	179	12	0.26092996	163
3	0.29429692	166	13	0.26092896	165
4	0.291159	46	14	0.259863947	7
5	0.28896613	146	15	0.25951097	164
6	0.28212703	100	16	0.25880769	122
7	0.27965861	183	17	0.25810821	128
8	0.27482514	65	18	0.257759794	4
9	0.267527	52	19	0.25706596	99
10	0.26491085	145	20	0.25637582	120

Table 3: Vertex intermediary center degree.

Serial number	In the intermediary center	Vertex number	Serial number	In the intermediary center	Vertex number
1	0.63674192	6	1	0.12056193	146
2	0.34341395	179	2	0.07357198	52
3	0.27608892	166	3	0.07208597	91
4	0.24249014	46	4	0.07098372	17
5	0.21576191	146	5	0.06354360	116
6	0.16063104	100	6	0.06144943	129
7	0.15761182	183	7	0.05794528	12
8	0.15404517	65	8	0.05259543	147
9	0.14969503	52	9	0.05174976	56
10	0.126338751	145	10	0.0486913	61

(1) Module Independence. Cloud accounting system is customized by enterprises in terms of modules, and each module should be relatively independent. According to the process of accounting business, accounting treatment belonging to each module should also be able to be carried out independently. Therefore, if the complex network of cloud accounting is reduced to the network with secondary modules as its vertex, it meets the basic requirements of accounting business and can be said to be normative.

Figure 4 is a diagram using complex network analysis software. In addition, the old connectors of each vertex before shrinking will be replaced by new connectors attached to the new vertex. For example, all information transfer relationships between the purchase module and the general ledger module are replaced by connectors connecting the purchase module and the general ledger module. Therefore, cloud accounting has the independence of modules, and each module works independently, which is normative and can meet the requirements of basic reliability attributes.

(2) Core Module Partition. Using complex network theory, the modules in cloud accounting are divided into "core module," "semiedge module," and "edge module," and the three core modules will participate in accounting business more than edge module.

Table 4: Degree frequency distribution table.

Cluster	Freq	Freq%	CumFreq	CumFreq%	Representative
1	105	54.6874	142	54.6875	vl
2	37	19.2709	105	73.9584	v8
3	12	6.2500	154	80.2082	v7
4	9	4.6874	163	84.8958	V4
5	8	4.1668	171	89.0623	v12
6	5	2.6042	176	91.6667	v46
7	5	2.6042	181	94.2706	v57
8	5	2.6042	186	96.8750	6s
9	1	0.5208	187	97.3954	v145
10	1	0.5208	188	97.9167	v183
12	1	0.5208	189	98.4373	v77
17	1	0.5208	190	98.9583	v166
19	1	0.5208	191	99.4792	v15
23	1	0.5208	192	100.0000	v6
Sum	192	100.0000	—	—	—

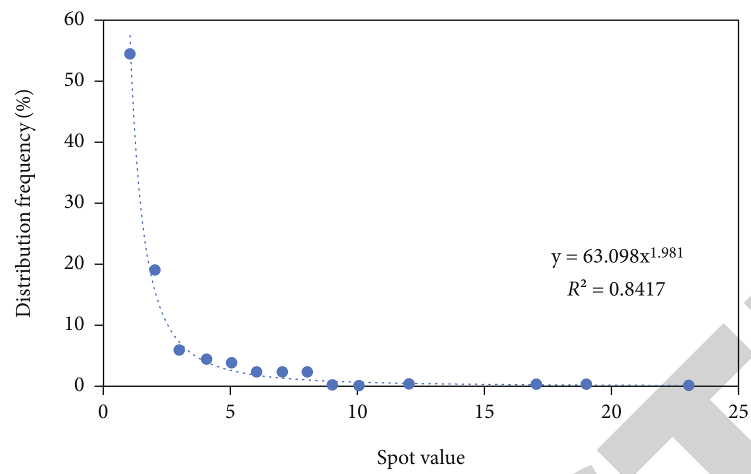

Figure 5: Distribution of accounting cloud service degree.

Table 5: Distribution table of entry frequency.

Cluster	Freq	Freq%	CumFreq	CumFreq%	Representative
0	51	26.5624	51	26.5622	v1
l	108	56.2501	159	82.8127	v5
2	13	6.7708	172	89.5833	v8
3	5	2.6042	177	92.1875	v4
4	5	2.6042	182	94.7917	v52
5	3	1.5625	185	96.3541	v91
6	4	2.0832	189	98.4373	v57
7	2	1.0418	191	99.4792	v77
22	1	0.5208	192	100.0000	v6
Sum	192	100.0000	—	—	—

Table 6: Output frequency distribution table.

Cluster	Freq	Freq%	CumFreq	CumFreq%	Representative
0	67	34.8958	67	34.8958	v5
1	85	44.2708	152	79.1667	vl
2	18	9.3750	170	88.5417	v6
3	3	1.5625	173	90.1042	v12
4	9	4.6875	182	94.7917	v71
5	3	1.5625	185	96.3542	v77
6	3	1.5625	188	97.9167	v100
7	1	0.5208	189	98.4275	v65
9	1	0.5208	190	98.9583	v183
12	1	0.5208	191	99.4792	v166
17	1	0.5208	192	100.0000	vl5
Sum	192	100.0000	—	—	—

Table 7: Distance between two random vertices.

Distance	1	2	3	4	5	6
Even number of points	484	2110	4560	7780	8324	6642
Distance	7	8	9	10	11	—
Even number of points	4064	1808	660	176	36	—

3.2.2. *Calculation of Trustworthy Indicators*

(1) Calculation of Basic Trustworthy Attribute Index. (1)1. Network Density. Calculated by complex network software, the network density of accounting cloud services selected in this chapter is 0.01325252, which indicates that only 1.35252% of all possible arcs actually appear on the network. In real networks of similar scale, it is not uncommon for the density value to be so low. The network density index is meaningful when comparing, so when selecting cloud accounting products, we can apply each index to measure the integration of optional products, judge the reliability, and give priority to purchase. At the same time, the aggregation degree between the total calculation module and other modules in the accounting cloud service system is high, and the association between some relatively independent asset modules and other modules is relatively loose.

Network density can be used to describe the density of interconnected edges between nodes in a network. Online social networks are often used to measure the intensity and evolution trend of social relationships.

Accounting cooperation between different enterprises in accounting service enterprises can be described by complex network, through which different enterprises' economic business and services can be analyzed.

(1)2. Proximity to Centrality and Proximity to Centrality Potential. The acquisition range of the proximity of each module is obtained by calculation, and Table 2 is summarized. Due to the limited space, this chapter lists the top 20 vertices close to centrality. As can be seen from Table 2, the proximity centrality of Module 6 is the largest, with a value of 0.3249. Therefore, the general ledger module is located in the middle of the network but is not the highest value that might appear in a network of the same size. At the same time, the difference of all vertices close to centrality of the network is not big; for example, the values of 163 and 165 are 0.2609, and the variation of vertex proximity of the network is small, the degree of centralization is low, and

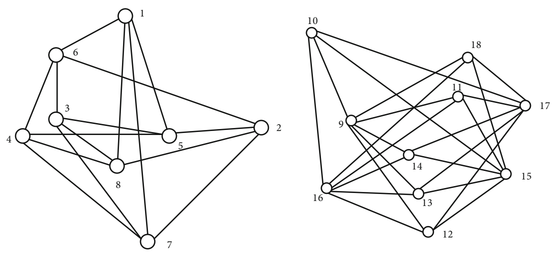

Figure 6: Accounting cloud service 4-core network.

Table 8: Cloud accounting credibility index value.

Indicator symbol	Indicator name	Index value
x_1	Network density	0.0132
x_2	Near-center potential	0.2729
x_3	Intermediary center potential	0.6187
x_4	Average point value	2.5314
x_5	Average shortest path	4.9643
x_6	K-nucleus	4

Table 9: Credibility index scoring table.

	x_1	x_2	x_3	x_4	x_5	x_6
x_1	0.5	1	0	0	0	1
x_2	0	0.5	0	0	0	1
x_3	1	1	0.5	0	0	1
x_4	1	1	1	0.5	1	1
x_5	1	1	1	0	0.5	1
x_6	0	0	0	0	0	0.5

Table 10: Reliability index score.

u_1	u_2	u_3	u_4	u_5	u_6
2.5	1.5	3.5	5.5	4.5	0.5

Table 11: Normalized weight of credibility index.

a_1	a_2	a_3	a_4	a_5	a_6
13.88%	8.34%	19.46%	30.56%	25.00%	2.76%

the integration is not high, so it can be seen that the performance of reliability close to centrality is better.

This distance is described by approaching the central potential from the perspective of the whole network. By calculation, the near center potential value of accounting cloud service is 0.27278020, which plays an important role in quantifying reliability and comparing with other networks.

(1)3. Intermediary Centrality and Intermediary Centrality Potential. The calculated mediation centrality is arranged in descending order, and the first 20 nodes are shown in Table 3. It can be seen from the table that the mediation degree of the accounting cloud service ranges from 0.00 to 0.6367, with a large degree of variation, so the reliability of the mediation center degree performs well. In addition, the intermediary center potential of this accounting cloud service is 0.6188, which is higher than the close center degree. It is shown in Table 3.

(2) Calculation of Key Trustworthy Attribute Index. (2)1. Degree and Degree Distribution. This paper uses point and point distribution to evaluate the maturity of cloud accounting. Accounting cloud services are network-oriented, but there are no heavy edges and rings, and the sum of degrees and degrees, so the arcs are symmetrical first. That is to say, it is discussed to change arcs in one direction or both directions into directionless edges.

From Table 4, we can know that the three nodes with the highest point value are voucher processing module, final settlement module, and inventory outbound module. This means that it is in the most active state in cloud accounting. The calculation shows that the average point value of symmetric network is 2.525. Cloud accounting shows better maturity and high reliability in point value.

The relationship between accounting cloud service distribution and distribution frequency can be fitted as

$$y = ax^b. \quad (13)$$

According to Table 4, the degree distribution diagram of the complex network of cloud accounting is shown in Figure 5.

In fact, the complex network of accounting cloud services is a simple directional graph, that is, an arc connected to the vertices of the network. Therefore, as described in Tables 5 and 6, it is necessary to calculate the in-value and out-value, respectively. The highest value is the voucher processing module, and the highest value is the sales invoice module, which meets the actual accounting requirements and has high consistency.

(2)2. Average Shortest Path. As can be seen from Table 7, the number of points with distances of 4 and 5 is the most even, and the distance between the two modules in cloud accounting is about 4 to 5. Therefore, the accounting cloud service system has relatively tight structure, high stability, low probability of errors, and high reliability.

(2)3. k-Nuclei. Because k-cores are nested, the hierarchy of accounting cloud services is represented by deleting k-cores in order lower than the highest value. By calculation, in the case of four cores ($k = 4$), the network crashes into a relatively dense system, and the visual image is shown in Figure 6.

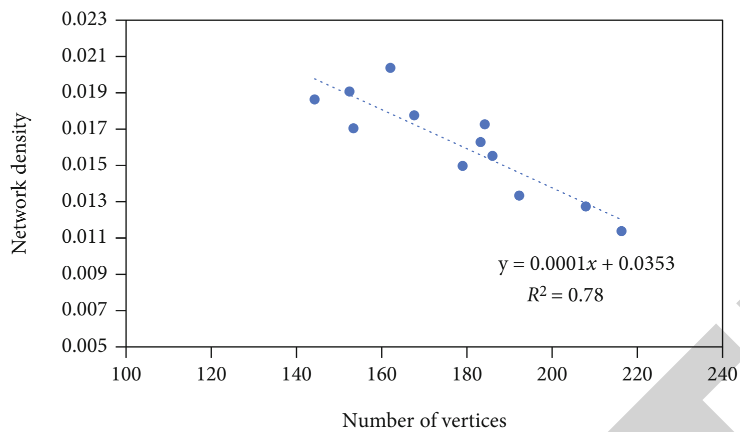

Figure 7: Relationship between network size and network density.

Table 12: Comparison of cloud accounting credibility.

Product name	1	2	3	4
Reliability (R)	2.2705	2.2463	2.3231	2.2312
Product name	5	6	7	8
Reliability (R)	2.2396	2.2391	2.2814	2.1998
Product name	9	10	11	12
Reliability (R)	2.1961	2.2502	2.1887	2.2082

This shows that accounting cloud services have a better level, and different accounting information users can obtain necessary information at different levels. Therefore, there is better reliability.

4. Experiment

4.1. Trustworthiness Measures. In order to improve the reliability of accounting cloud services more intuitively, this paper uses fuzzy comprehensive evaluation method to analyze the complex network reliability of accounting cloud services, measure its reliability correctly, and provide the basis for comparison and optimization.

In this paper, six indexes about the reliability of the whole complex network are selected. Set $X = \{x_1, x_2, x_3, x_4, x_5, x_6\}$ is used as the index value of cloud accounting, and its index value can be summarized as shown in Table 8.

4.2. Determining Weights. Because each index has different influence degree on reliability, it is necessary to evaluate the influence degree of each index. In this paper, the pecking order diagram method is used to determine the weights of the above six reliability indexes, respectively.

4.2.1. Importance Evaluation. Based on the influence of structural indexes on reliability in complex network theory, this paper evaluates the above indexes as shown in Table 9.

The reliability index scores are $U = \{u_1, u_2 \cdots u_6\}$, and the reliability index is added with the scores, and the scores of each index are shown in Table 10.

4.2.2. Weight Calculation. $A = \{a_1, a_2, a_3, a_4, a_5, a_6\}$ is the weight of reliability indicators. According to the above reliability index scores, formula (14) is used for unification, and the weight values of each index are calculated as shown in Table 11.

$$a_i = \frac{u_i}{\sum u_k}. \tag{14}$$

Set the final credibility of accounting cloud services to R. Formula (15) is used here to measure the reliability of accounting cloud service products.

$$R = \sum a_i x_i. \tag{15}$$

When the data is brought in, $R = 2.2706$; that is, the credibility of the accounting cloud service is 2.2706.

To sum up, the credibility evaluation method of accounting cloud services based on complex network proposed in this paper is highly practical.

4.3. Comparative Study on Credibility of Accounting Cloud Service Products. In this chapter, according to the 12 selected accounting cloud service products, complex network models are constructed, respectively. According to the reliability analysis method of accounting cloud service proposed above, the reliability index of each product is calculated and comparable reliability index data is obtained, and a detailed analysis is carried out.

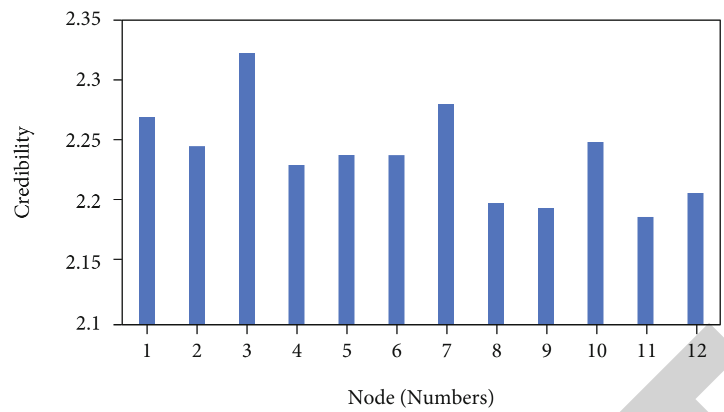

Figure 8: Comparison of credibility of accounting cloud services.

As shown in Figure 7, the relationship between network size and network density is represented by a visualization diagram and a fitting function.

As shown in Figure 7, there is a negative relationship between network density and network size. That is to say, with the increase of network scale, the network density will become smaller and smaller. In addition, the linear function fitting is $y = -0.0001x + 0.0349$, and R^2 is 0.78. Therefore, for enterprises, if many cloud accounting modules are selected, the network scale will expand rapidly and the network density will decrease, which will affect the integration of cloud accounting.

Use Equation (15) to calculate the reliability of the sample cloud accounting products, and the results are shown in Table 12.

As shown in Figure 8, a bar chart of the availability of accounting cloud services can be drawn according to Table 12.

It can be clearly seen from the figure that the reliability of No. 3 product is the highest. 11 products have the lowest reliability. Therefore, the reliability evaluation method of accounting cloud services based on complex network can clearly evaluate and compare the reliability of accounting cloud services and can provide the basis for product selection and optimization.

5. Conclusion

From the research results of this paper, the current mainstream accounting cloud service network density is very low. In many practical complex networks, such low network density is not uncommon, but the low network density has a great impact on the integration of accounting cloud services. At the same time, this paper also finds that the core potential of accounting cloud services is quite different, and their comprehensiveness is different. Integration is also the basic reliability attribute of accounting cloud services, and the overall reliability is very important. Therefore, this paper suggests that accounting cloud service providers develop more integrated new accounting cloud services. Moreover, on the premise of ensuring its basic and important reliability attributes, the reliability is improved. Moreover, for the existing accounting cloud services, providers should make every effort to optimize the network density, make it have greater density and shorter path length, and improve integration and reliability. Only when suppliers continuously optimize the reliability of accounting cloud services can they export more and better accounting cloud services to the market.

Data Availability

The experimental data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declared that they have no conflicts of interest regarding this work.

References

[1] S. Liu, "Human resource management of internet enterprises based on big data mobile information system," *Mobile Information Systems*, vol. 2021, no. 5, p. 9, 2021.

[2] H. Yue and X. Zheng, "WITHDRAWN: research on encrypting accounting data using des algorithm under the background of microprocessor system," *Microprocessors and Microsystems*, vol. 25, no. 1, 2021.

[3] S. Song, Y. Zhang, and B. Yu, "Interventions to support consumer evaluation of online health information credibility: a scoping review," *International Journal of Medical Informatics*, vol. 145, p. 104321, 2021.

[4] J. Wang, X. Yu, and L. Qiang, "Research on key technologies of intelligent transportation based on image recognition and anti-fatigue driving," *EURASIP Journal on Image and Video Processing*, vol. 2019, no. 1, p. 210, 2019.

[5] L. M. Frescura, B. Menezes, and R. Duarte, "Application of multivariate analysis on naphthalene adsorption in aqueous solutions," *Environmental Science and Pollution Research*, vol. 27, no. 3, pp. 3329–3337, 2020.

[6] M. He, J. Li, Y. Zhang, and W. Li, "Research on crack visualization method for dynamic detection of eddy current thermography," *NDT & E International*, vol. 116, p. 102361, 2020.

[7] H. Jiang, Z. Liu, C. Liu, Y. Su, and X. Zhang, "Community detection in complex networks with an ambiguous structure

using central node based link prediction," *Knowledge-Based Systems*, vol. 195, no. 12, p. 105626, 2020.

[8] B. Holtmann, J. Buskas, M. Steele, K. Sokolovskis, and J. B. W. Wolf, "Dominance relationships and coalitionary aggression against conspecifics in female carrion crows," *Scientific Reports*, vol. 9, no. 1, p. 15922, 2019.

[9] A. Hk, "Evaluating mutual requirements evolution of several information systems," *Procedia Computer Science*, vol. 176, pp. 1251–1260, 2020.

[10] A. Asatiani, U. Apte, and E. Penttinen, "Impact of accounting process characteristics on accounting outsourcing - comparison of users and non-users of cloud-based accounting information systems," *International Journal of Accounting Information Systems*, vol. 34, p. 100419, 2019.