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ENTERPRISE AUDIT RISK ASSESSMENT AND PREVENTION BASED ON AHP ANALYSIS

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Abstract. If there are no auditing standards or auditing processes of big data, the audit risks of enterprises are increased. This paper first introduces the topic through the research background and literature review in order to ensure the integrity and accuracy of audit evidence to the maximum extent, and then analyses the causes of enterprise audit risk. When analysing the risk level of material misstatement, it is mainly the audit risk generated by the enterprise's unique business model, information system and financial management. Audit risk is mainly caused by the ability of auditors and audit process management. After quantitative analysis of the correctness of enterprise audit risk assessment indicators, this paper builds a multi-level comprehensive assessment model of enterprise audit risk on the basis of AHP analysis. At the same time, this paper puts forward specific measures to improve audit methods and audit processes and prevent audit risks in view of the actual problems encountered in the current audit risk of enterprises, so as to provide certain references for enterprise risk management and control.

Key words: AHP analytical method; risk audit; risk prevention

1. Introduction. Audit risk management is the core of risk-oriented audit, and audit risk assessment is an important part of enterprise risk management. On the basis of the qualitative identification of audit risk factors, these kinds of research make quantitative research and related evaluation of risk factors [1], which are the premise of enterprise audit risk disposal. With the deepening of the study of audit risk by scholars at home and abroad, most researchers currently have two mainstream understandings of the connotation of audit risk assessment for enterprises. One is that audit risk is a strategic risk for enterprises based on the overall, comprehensive and strategic characteristics of enterprise risk management, which will affect the development direction, process and even survival of enterprises [2]. Another view is that audit risk is an effective measure to avoid risks in the course of business activities, and audit risk comes from the strategic management of enterprises. This paper holds that the broad audit risk is the result of the joint action of audit market competition risk from the perspective of audit process, audit project risk and audit expectation gap risk [3]. The essence of audit risk is the risk of the relationship between accounting firms and audit clients, and the risk that accounting firms cannot continue to audit the original clients. Audit project risk includes audit project material misstatement risk and inspection risk. Audit expectation difference is the objective fact that the public and the audit circle have different understanding of audit content and function, and the risk of audit expectation difference is the possibility that this objective fact will cause loss to the audit supplier [4]. The broad definition of audit risk is as follows: audit risk = audit market competition risk × audit project risk × audit expectation difference risk. The narrow sense of audit risk refers to the audit project risk. Considering the general applicability of audit standards, this paper mainly starts from the perspective of narrow audit risk when analyzing enterprise audit risk and its characteristics [5].

2. Theoretical.

2.1. Research needs. In the case of non-standardization of big data auditing standards, new business models have led to changes in the carriers of financial information and business information recorded by enterprises. In addition, many business models have certain uncertainties, which leads to risks in the business activities of enterprises, and then increases the audit difficulty and audit risks. The traditional audit model

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is not suitable for modern enterprise risk management [6]. This paper establishes the index system of the enterprise audit risk assessment.

2.2. Objectives of the Study. After analyzing the causes of enterprise audit risk, this paper studies the enterprise audit risk evaluation index system quantitatively. The purpose of this study is to remind auditors to pay attention to audit risks different from the traditional audit model, and enterprises need to improve audit methods and audit processes to prevent audit risks. The research results of this paper can provide some reference for improving the audit quality of intelligent information.

2.3. Risk of material misstatement (B1). The risk of material misstatement refers to the possibility of material misstatement of financial statements prior to audit. The risk of material misstatement is a risk that auditors can detect, evaluate but cannot control [7]. It includes :(1) the degree of soundness of relevant laws, regulations, systems and standards (B11). (2) Economic environment (B12). The macroeconomic situation is the most important external environment for the production and operation of enterprises, and the risks faced by enterprises in different economic cycles are different. (3) Policy orientation (B13). The intervention of government policies and the stability of society will affect the normal operation of enterprises, which may lead to the risk of major misstatement. (4) Partner (B14). The enterprise is a number of relevant fit relationships, the selection of partners will determine the operation of the entire enterprise and the final profit. (5) Management level (B15). The partner enterprises in the enterprise usually face different corporate culture and management mode, different technical standards and hardware environment, which greatly increases the risk of management operation, and may directly lead to management loss of control. (6) Information Security (B16) In the highly competitive economic society, the magic weapon is to have the core technology for an enterprise to survive and succeed in competition that other enterprises do not have, and the leakage of the core technology is a fatal blow to the survival and development of enterprises. (7) Core technology (B17). Although enterprises emphasize mutual trust among partners, and the rapid development of information technology makes information sharing a trend, information asymmetry is still a key attribute in the reality of enterprises, and directly leads to the emergence of various unethical behaviors such as false information and cheating in enterprises. (8) Business ethics (B18). Business ethics is the sum of behavioral norms used to regulate the relationship between enterprises and society, enterprises and enterprises, enterprises and workers. It is not only an important part of the social moral system, but also it is the social moral principles and norms of business behavior.

2.4. Check Risks (B2). The risk of inspection is the possibility that a determination has a misstatement that, alone or in conjunction with other misstatements, which would be material but that the CPA has failed to detect such a misstatement. Inspection risk is the risk that auditors can control [8]. It includes:

1. Audit services (B21). The auditor's understanding of virtual enterprise, the network audit, the audit technology of E-commerce, and related audit software will affect the size of the inspection risk.
2. Audit process (B22). An enterprise is a complex system, the design of its audit program is a complex project, and it is also an important concern of auditors when designing audit program.
3. Audit Principles (B23). This also directly increases the risk of inspection.

2.5. Evaluation index system. Analytic Hierarchy Process (AHP) decomposes the decision problem into different hierarchical structures according to the order of the overall goal, sub-goals of each level, evaluation criteria and specific backup plan. Then, by solving the eigenvector of the judgment matrix, the priority weight of each element at each level on an element at the upper level is obtained. Finally, the final weight of each alternative plan on the overall goal is recurred by the method of weighting sum. The one with the greatest final weight is the optimal scheme. AHP can optimize the connection relationship of each layer and its sub-evaluation indicators, and reduce the uncertain factors in the evaluation process to a great extent. This paper establishes an enterprise audit risk assessment index system based on AHP, as shown in Table 2.1.

The identified risk variables still have some subjectivity. Therefore, the obtained risk factors can be further verified by questionnaire survey. This paper collects a large amount of data about audit risk assessment indicators with means of consulting experts and investigation. In this paper, SPSS software is used to analyze the risk factors. Reliability analysis is a common testing method to verify whether the scale questionnaire is scientific and reasonable. Reliability analysis was carried out by SPSS mainly to see the value of Cronbach's alpha reliability coefficient after analysis. In general, most researchers believe that Cronbach's alpha reliability

Table 2.1: Evaluation index system of enterprise audit

Target layer B	Criterion layer Bn	Index layer Bnm
Risk assessment of enterprise audit	Risk of material misstatement of index system B1	Soundness of institutional guidelines B11
		Economic environment B12
		Policy orientation B13
		Partner B14
		Management level B15
		Information Security B16
		Core technology B17
		Business ethics B18
	Check the risk B2	Audit Service B21
		Audit process B22
		Audit Principle B23

Table 2.2: Reliability test of the risk factors

Indexes	Risk factors	Cronbach's Alpha if Item Deleted	Cronbach's AlPha
B1			0.75
	B11	0.80	
	B12	0.82	
	B13	0.71	
	B14	0.82	
	B15	0.88	
	B16	0.70	
	B17	0.86	
	B18	0.61	
B2			0.83
	B21	0.82	
	B22	0.80	
	B23	0.84	

coefficient is greater than 0.6, and indicating that the data is reliable to a certain extent. The reliability coefficient of the questionnaire survey calculated by SPSS is shown in Table 2.2.

As can be seen from the table, the reliability coefficient of the overall data is greater than 0.6. This indicates that the evaluation indicators selected are of high credibility in this paper. The Analytic Hierarchy Process (AHP) is the research basis of comprehensive evaluation. The basic steps of using this analysis method:

The first step is to determine the index system of hierarchical analysis based on comprehensive analysis, and determine the evaluation factors of the target layer (B), criterion layer (Bn) and index layer (Bnm).

The second step, the indicators at the same level are compared in pairwise in the index system. Generally, the importance degree is scored and assigned by one's own experience or organized experts, and a judgment matrix is constructed: B=Bnm, whose elements are as follows:

$$B_{ij} > 0, B_{ij} = \frac{1}{B_{ij}}, \sum_{i=1}^{n} \sum_{j=1}^{m} B_{ij} = 1, \quad (i = 1, 2, \ldots, n;\ j = 1, 2, \ldots, m) \tag{2.1}$$

where, the ratio of importance of element i to element j is B_{ij}. The third step is to calculate the weights. For each line of elements of the judgment matrix, the product Ai of each line of elements is calculated with the

behavior vector, and the calculation formula is shown as follows:

$$A_i = \prod_{i=1}^{n} Y_i, \quad (i = 1, 2, \ldots, n) \tag{2.2}$$

For the n-order judgment matrix, the result of m is calculated according to the above formula, and the normalized eigenvector value of each row is calculated to the judgment matrix with the eigenvector $W = (w_1, w_2, ...w_n)T$. The calculation formula is as follows:

$$w_i = \frac{\sqrt[n]{A_i}}{\sum_{i=1}^{n} \sqrt[n]{A_i}} \tag{2.3}$$

The maximum characteristic root max is calculated to the judgment matrix C according to the n-order judgment matrix C and the corresponding eigenvector W.

$$\lambda_{\max} = \sum_{i=1}^{n} \frac{Cw_i}{nw_i} \tag{2.4}$$

The fourth step is hierarchical total sorting and consistency checking. Because of the complexity of objective things and the fuzziness and diversity of people's understanding of things, the judgment matrix given may not be completely consistent. So that it is necessary to carry out consistency test. When the order of the judgment matrix is less than or equal to 2 orders, there is no possibility of the above inconsistency. Then it can be directly judged that it meets the condition of complete consistency. When the order is greater than 2, consistency judgment is required. The consistency index CI value of the judgment matrix at each layer can be expressed as:

$$CI = \frac{\lambda_{\max} - n}{n - 1} \tag{2.5}$$

After calculating the relative importance of factors at all levels, the overall weight of factors can be calculated at each level on the whole evaluation target according to the principle from high level to low level. So that it is necessary to carry out the overall hierarchical ranking. Then the random consistency ratio of the next layer is:

$$CB = \frac{CI \sum_{j=1}^{m} C_j}{GC_j} \tag{2.6}$$

where G is the randomness index.

3. Research method (Multi-level comprehensive evaluation method). The multilevel comprehensive evaluation method is is used to effectively solve the large errors caused by subjective factors and the comprehensive evaluation method based on the AHP, which has greater reliability and practicability. When the problem has uncertainty and fuzziness, the comprehensive evaluation model can be used to deal with it. After comprehensive consideration of various influencing factors, this paper chooses the multi-level comprehensive evaluation method, constantly optimizes the evaluation index system, and makes clear the weight of each evaluation index.

1. Subjection matrix. With the problem evaluation index determined by the above analytic hierarchy process, two finite sets are assumed according to the comprehensive evaluation method: D=d1,d2,... ,dn, set B=B1,B2,... Bn. D represents the set of evaluation factors. The best evaluation result is obtained from alternative concentration after considering various influencing factors. These evaluation index factors are fuzzy and uncertain to a certain extent, and some can be considered as definite values. The establishment of the membership function must consider the variation law of each single index. When there are a large number of indicators, it is necessary to classify the indicators and calculate

the membership degree B for each evaluation level according to the actual value of each evaluation indicator. The form can be expressed as:

$$B = \begin{bmatrix} B_{11} & \cdots & B_{1n} \\ \vdots & \ddots & \vdots \\ B_{m1} & \cdots & B_{mn} \end{bmatrix} \tag{3.1}$$

In the formula, Bij represents the membership degree of d_i evaluation to grade, and $\sum B_{ij} = 1$ after normalization treatment. According to the value domain Vi divided by evaluation grade, the calculation of positive effect index Bi can be expressed as:

$$B_i = \begin{cases} 0 & \text{if } d_i \in (0, x_i) \\ \left(\frac{B_i - x_i}{x_{i+1} - x_i}\right)^{0.5} & \text{if } d_i \in [x_i, x_{i+1}) \\ 1 & \text{if } d_i \in [x_{i+1}, x_{i+2}) \\ 1 - \left(\frac{d_i - x_{i+2}}{x_{i+3} - x_{i+2}}\right)^{0.5} & \text{if } d_i \in [x_{i+2}, x_{i+3}) \\ 0 & \text{if } d_i \in [x_{i+3}, +\infty) \end{cases} \tag{3.2}$$

According to the value domain xi divided by comparison relationship and evaluation grade, the calculation formula of negative effect index Bi can be expressed as follows as long as the conditional interval of the above equation is reversed:

$$B_i = \begin{cases} 0 & \text{if } d_i \in (x_i, +\infty) \\ \left(\frac{d_i - x_i}{x_{i+1} - x_i}\right)^{0.5} & \text{if } d_i \in (x_{i+1}, x_i] \\ 1 & \text{if } d_i \in (x_{i+2}, x_{i+1}] \\ 1 - \left(\frac{d_i - x_{i+2}}{x_{i+3} - x_{i+2}}\right)^{0.5} & \text{if } d_i \in (x_{i+3}, x_{i+2}] \\ 0 & \text{if } d_i \in (-\infty, x_{i+3}] \end{cases} \tag{3.3}$$

2. Comprehensive evaluation result model. With the weight matrix and membership matrix obtained above, this paper establishes the measurement model of the comprehensive evaluation result Y:

$$Y = CB = \begin{bmatrix} B_1 & B_2 & \ldots & B_m \end{bmatrix} \begin{bmatrix} B_{11} & \cdots & B_{1n} \\ \vdots & \ddots & \vdots \\ B_{m1} & \cdots & B_{mn} \end{bmatrix} \tag{3.4}$$

Above the formula, Yij represents the comprehensive subordination degree of the evaluation index to the evaluation level. The calculation model of Yij in this paper is selected as follows:

$$Y_{ij} = \min\{1, \sum_{i=1}^{n} \sum_{j=1}^{m} \min(B_{ij}, B_{ij})\}, \quad i = 1, 2, \ldots, n; \quad j = 1, 2, \ldots, m \tag{3.5}$$

For the evaluation and analysis of the comprehensive evaluation result Y, the maximum subjection degree method and the comprehensive score value method are usually used. The maximum subjection degree method is to select the one with the greatest subjection degree from each evaluation result vector in Y. And it is believed that the evaluation index belongs to this evaluation level. The critical value of each evaluation grade can be calculated by using the comprehensive score value method. Then the corresponding vector in $Y$is used to calculate the comprehensive score value V.

$$V = \frac{\sum_{i=1}^{n} \sum_{j=1}^{m} (Y_{ij}^{e} \times B_{ij})}{\sum_{i=1}^{n} \sum_{j=1}^{m} Y_{ij}^{e}} \tag{3.6}$$

Where e is the reduction coefficient, the purpose is to weaken the weight position of larger Y_i. When e tends to infinity, the comprehensive score value method is essentially the maximum subjection method.

According to the comprehensive score value, this paper can evaluate the audit risk of enterprises. In general, the higher the comprehensive score, the higher the audit risk. On the contrary, it indicates that the audit risk of enterprises is lower.

In this paper, according to the nature of the problem and the overall goal to be achieved, the problem is decomposed into different components, and the factors are aggregated and combined according to different levels according to the interrelated influence and membership relationship among the factors, forming a multi-level analysis structure model, so that the problem is finally reduced to the lowest level relative to the highest level of the relative merits and demerits of the arrangement. With the evaluation process of each factor of objective layer (B), criterion layer (Bn) and index layer (Bnm), this paper establishes a comprehensive evaluation model to achieve the purpose of audit risk assessment of enterprises.

4. Results and discussion.

4.1. Conduct full sample audit. An enterprise may have diversified sources of revenue, more complex types of business, and more preferential policies, and auditors must understand and evaluate whether the accounting policies and accounting estimates are consistent with the new revenue standards. Enterprises have a large number of small amount but high volume of transactions, and small amount of online transactions are easy to be faked and not easy to be discovered [10]. When auditors plan to implement audit procedures, they should appropriately tilt audit resources to income based on the principle of cost-effectiveness, expand the scope of audit objects, and take full sample audit to examine all transactions and transaction volumes of enterprises in detail [11].

4.2. Focus on business model audits. During auditing, auditors should first analyze the business model of the enterprise, focusing on whether it conforms to the development of the market, and whether it conforms to the scale of the enterprise, and whether it corresponds to the characteristics of the enterprise [9]. The business model of online transaction, offline experience and platform logistics delivery of enterprises makes them more complex than the related party transactions of traditional enterprises [12]. Auditors can conduct data analysis through audit software and pay more attention to whether there is collusion and fraud in related party transactions and management. This can avoid the risk of material misstatement associated with continuing operations [13].

4.3. Focus on audits of information systems. First of all, by establishing a set of audit risk identification and assessment information system, the information system of the audited entity is to identify risks, and review whether it can reflect the complex business process of the enterprise, effective internal control, and whether it can ensure the truth and integrity of the data. Secondly, the risk assessment of the information system is carried out to assess whether the stored data will be lost or damaged and to what extent when the information system is attacked by the outside world. In addition, auditors must use the knowledge, experience and technology of professionals to use computer technology to audit information systems, ensure the security and stability of information systems, and ensure the authenticity of financial data [14].

4.4. Improve relevant audit laws and regulations. The construction of audit regulations that adapt to the era of big data can not only provide legal support for audit work, but also it can provide a legal basis for audit work, and safeguard the legitimate rights and interests of audited institutions [15]. In the form of laws and regulations, it shall be stipulated with the scope, authority and implementation methods of data acquisition. In terms of data acquisition, the first thing is to ensure that the audited entity shall provide the business system and electronic data related to audit evidence as required by the audit entity [16]. The second is to establish an electronic data collection and submission system to standardize the types of data acquisition and guarantee the authenticity and accuracy of data. In terms of data storage and use, the audit unit is required to ensure the security and confidentiality of data, which is conducive to protecting the security of electronic data and auditors, and creating a good data environment [17].

4.5. Standardize the audit process. It is necessary to create a new technical method to audit enterprises from the perspective of big data audit. The audit object has been expanded from basic financial data to semi-

structured and unstructured financial data and non-financial data [18]. The audit environment has been expanded from offline audit to off-site audit including online audit, and the audit method has been changed from sampling audit to full-sample data processing and analysis, and data analysis has been added in the audit process from beginning to end. The changes of many factors lead to the increase of audit risk, and it is urgent to improve and enrich the audit theory to standardize and guide the audit process and reduce the audit risk caused by the non-standard audit process [19].

4.6. Use big data and other technologies to obtain audit evidence. When auditing enterprises, auditors can make use of the advantages of big data auditing to analyze financial data and non-financial data such as images, audio and video through audit software. The development of network technology provides a new way for the acquisition of information. Auditors can obtain the original data through Internet technology, that is, extract useful information from a large number of network information and save it. At the same time, the Internet also provides many third-party data acquisition platforms, and auditors can use some reliable and authoritative third-party platforms to obtain data during auditing [20].

4.7. Cultivate high-end composite audit talents. Firstly, the entry threshold of auditors should be raised to ensure the quality of auditors in terms of professional competence. Secondly, strengthen the training of auditors, minimize audit risks caused by auditors' professionalism, ability, professional ethics and other problems in the audit process [21, 22, 23, 24]. And vigorously cultivate audit talents of computer type and audit computer talents. Because of adding computer talents to the audit team, it can improve the quality of auditors, and cultivate team coordination and efficient cooperation.

5. Scope for future research. The future research direction mainly analyzes the need to develop matching financial software for audit work, broaden the channels for collecting audit evidence from third-party platforms or using blockchain technology, establish audit analysis models to promote audit work, and ensure the integrity and accuracy of audit evidence to the maximum extent.

6. Limitations of the Study. Because of the limited data collection channels and the need to continuously improve study level, this paper has conducted a preliminary study on enterprise audit risk. The arguments and suggestions are still at a very superficial stage, and whether they are operable needs to be further tested. In addition, the enterprise application field is very wide, and there are still some differences between individual cases and the overall situation. In the future, the causes of audit risk and how to deal with audit risk factors are worth further exploration and research, so as to improve audit efficiency and audit quality.

7. Conclusion. In the study of enterprise audit risk assessment and preventive measures, this paper first analyzes the influencing factors of enterprise audit risk assessment, so as to clarify the evaluation indicators. Based on the AHP evaluation method, this paper establishes an enterprise audit risk assessment system, and collects a large number of enterprise audit risk assessment index data by consulting experts and investigation methods. After analyzing the risk factors with SPSS software, this paper verifies the reliability of the evaluation indicators. In order to effectively solve the large errors caused by subjective factors, this paper puts forward the comprehensive multi-level evaluation method, which further improves the reliability and practicability of enterprise audit risk assessment system. After putting forward the enterprise audit risk assessment method, this paper puts forward the concrete preventive measures according to the actual behavior and problems encountered by the enterprise audit risk. Through this research, its purpose is to help more enterprises can continue to forge ahead and avoid risks.

REFERENCES

[1] Lili, T. & Wansheng, W. Research on risk prevention of Internal Audit in Small and medium-sized enterprises [J]. *Journal Of Enterprise Accounting*. **2023**, 6-10 (0)

[2] Anjian, W. Risks and Control Strategies faced by Internal Audit of Small and Medium-sized Enterprises [J]. *Finance And Economics*. **2023**, 18-22 (0)

[3] Yanlin, C. Strengthening Internal Audit of Small and medium-sized Enterprises to improve anti-risk ability []. *China Commerce And Trade*. **2023**, 99-102 (0)

[4] Wei.Analysis, S. of Marketing Innovation Under the New Retail Mode-Taking'Luckin coffee' as an Example[J]. *E*. **2021**, 88-92 (0)

[5] Yoon, K. & Hoogduin, L. Big Data as Compilementary Audit Evidence[J]. *Accounting Horizons*. **29**, 66-73 (2015)
[6] Fang, H. Discussion on financial risk management and internal audit of small and medium-sized enterprises [J]. *China Economic And Trade*. **2023**, 66-70 (0)
[7] Dehua, J. Analysis of problems and countermeasures in internal audit of Chinese small and medium-sized enterprises []. *Reform And Management*. **2023**, 45-50 (0)
[8] Dimitris, B. The Impact of Big Data on Accounting and Auditing[J]. *International Journal Of Corporate Finance And Accounting (IJCFA)*. **8**, 185-190 (2021)
[9] Jianxin, C. & Xiaoke, Z. Reconstruction of Retail business Model in the context of Big Data: a factor Perspective[J]. *Business Economics Research*. **2021**, 16-19 (0)
[10] Chen, W. & Ju., J. Research on Feature mining methods of Audit Clues based on Big Data Visualization Technology[J]. *Audit Research*. **2018**, 78-83 (0)
[11] Wei, C. Research on Network Audit Risk Control under Big Data Environment[J]. *Chinese Certified Public Accountants*. **2018**, 111-113 (0)
[12] Zuping, D. Audit Risks and Countermeasures in the environment of Big Data Audit[J]. *Chinese And Foreign Entrepreneurs*. **2020**, 41-43 (0)
[13] Zeng, F. Research on Audit Risk Prevention of Enterprises under the New Retail Model[J]. *Guangzhou Quality Supervision Herald*. **2020**, 9-13 (0)
[14] Qiufei, W., Shuang, Q. & Dan, S. Research on Audit risk Identification and Control based on Big Data[J]. *Friends Of Accounting*. **2018**, 91-96 (0)
[15] Wei, W. Reconstruction and Trend Outlook of Traditional Auditing Methods in the Era of Big Data[J]. *The Economist*. **2017**, 161-166 (0)
[16] Liqin, X. Analysis of some Problems in Policy Tracking Audit[J]. *Modern Economic Information*. **2019**, 106-109 (0)
[17] Hongfei, X. A Study on the impact of Business Audit Risk[D]. (Shandong University,2021)
[18] Helmy, A., Jaseemuddin, M. & Multicast-ility, B. a novel architecture for efficient micro mobility[J]. *Selected Areas In Communications*. **22**, 2020 (0)
[19] Weiler, R. How to sharpen virtual business[J]. *Information Week*. **2021**, 132-135 (0)
[20] Markus, L., Manville, B. & Agres, C. What makes a virtual organization work[J]. *Sloan Management Review*. **2021**, 13-26 (0)
[21] Innovation, C. when is virtual virtuous[J]. *Harvard Business Review*. **2022**, 127-134 (0)
[22] Kumar, M., Vimal, S., Jhanjhi, N., Dhanabalan, S. & Alhumyani, H. Blockchain based peer to peer communication in autonomous drone operation. *Energy Reports*. **7** pp. 7925-7939 (2021)
[23] Azeem, M., Ullah, A., Ashraf, H., Jhanjhi, N., Humayun, M., Aljahdali, S. & Tabbakh, T. Fog-oriented secure and lightweight data aggregation in iomt. *IEEE Access*. **9** pp. 111072-111082 (2021)
[24] Lee, S., Abdullah, A. & Jhanjhi, N. A review on honeypot-based botnet detection models for smart factory. *International Journal Of Advanced Computer Science And Applications*. **11** (2020)

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