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Research Article

Comprehensive Budget Execution Performance Evaluation of Companies Incorporating EVA Unsupervised Learning Model

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In order to improve the company's comprehensive budget execution performance and the effect of corporate strategy formulation, this paper integrates the EVA unsupervised learning model to evaluate the company's comprehensive budget execution performance. Moreover, this paper improves the algorithm model by comparing the budgeting process of the company under the traditional budget and the budgeting process of the company under the guidance of EVA. Aiming at the company's massive data, this paper uses combined with the big data audit algorithm to process data and builds a company's comprehensive budget execution performance evaluation system based on the EVA unsupervised learning model. In addition, this paper combines cluster analysis to verify the effect of the system in this paper. The research shows that the company's comprehensive budget execution performance evaluation system based on EVA unsupervised learning model can effectively improve the effect of the corporate financial budget.

1. Introduction

Strategic management refers to a dynamic process in which an enterprise starts from the whole, makes plans and decisions according to the internal and external environment of the enterprise, and puts these plans and decisions into practice in order to achieve the overall business goals of the enterprise. Enterprise strategic management is to implement a series of operation management and control behaviors through various operational activities of the enterprise according to the strategic planning of the enterprise group company and the requirements of future operation and development, so as to achieve various operation and management objectives.

Strategic management must be combined with the long-term planning of the enterprise and the implementation of strategic measures. A good strategic planning can promote the enterprise to maintain the power of sustainable development and the ability to obtain excess profits. The construction of the comprehensive budget management system starts from strategic management, and each business unit carries out various tasks around the strategy by taking strategic management as the operating guideline. By formulating the business strategy of the enterprise, combining the internal and external economic environment of the enterprise and the profile of its competitors, planning the strategic goals, guiding the rational allocation of resources, and realizing the orderly development of various business management activities. The budgets of various business departments and units under the group are coordinated and coordinated with each other and belong to the overall strategic planning of the enterprise group. To sum up, the comprehensive budget management is based on the actual operating conditions of each unit and takes the strategic goals and ideas as the guideline to achieve various business objectives.

Management by objectives is the direction guide for implementing budget management. Comprehensive budget management combines historical business data and future scientific business forecasts to ensure budget goals that are consistent with the company's overall business strategic goals and use the budget goals as a guide for coordinating the company's comprehensive budget management activities. The release of budget objectives, budget standards, organizational preparation, effective implementation, evaluation, and feedback are all carried out around how to achieve business objectives. Under the comprehensive budget management model, budget management activities are oriented to achieve budget objectives [1]. By decomposing the budget target of the business unit into each unit and each department's budget subtarget and then decomposing it to each next-level department and unit, a closed-loop budget management and control system for the whole department, all personnel, and the whole process is formed. All business subactivities of the enterprise must be based on the principle of maximizing the overall interests of the group, personal goals are subject to organizational goals, and the work of each employee can be effectively mobilized to be highly coordinated with the budget goal system [2]. The comprehensive budget management system is divided into layers by target and supplemented by corresponding control measures to be implemented to the responsible personnel and responsible time, and the strict budget execution plan and system have laid a good foundation for the realization of the budget target [3].

This paper integrates the EVA unsupervised learning model to evaluate the company's comprehensive budget execution performance to improve the company's comprehensive budget execution performance evaluation effect. Moreover, this paper combines case analysis to verify the effect of the model proposed in this paper to promote the effect of the company's financial management.

2. Related Work

Research affirms the role of comprehensive budget management: for managers, budget management is an important management tool to help organizations plan, coordinate, implement control, and measure performance. The limited resources of the enterprise need to be preconfigured, planned reasonably, focused on the overall situation, and scientifically predicted according to the usage. The factors that affect a company's target profit will maximize its potential and help the company become profitable. This shows that overall budget management is an important means of enterprise resource integration and utilization strategy. It is also an important means to help enterprises improve modern enterprise system, improve management ability, and enhance competitiveness [4]. The development of budget management should be people-oriented and ensure the participation of all staff in the whole process. Only by applying the concept of budget management to the corporate culture and employees' thinking can an enterprise promote the unity and cooperation between the relevant management departments and various departments of the enterprise, ensure the realization of the budget goal, and promote the long-term strategy of the sustainable development of the enterprise [5]. The company's budget can consider its own situation, see what suits you, and choose according to your needs. The fixed cost method that does not change with the increase or decrease of the business volume can adopt the fixed budget method, such as public travel expenses, vehicle usage fees, and membership fees, which should not be affected by the previous period, and the zero-based budget method is adopted [6]. In order to effectively play the role of budget integration, the organization, process, operation, position, and information system of the enterprise must be incorporated into the budget requirements, the budget must be completed, and enterprise budget management can be carried out so that the budget can really play a role [7].

Comprehensive budget management is based on the company's management methods to achieve its own incentive properties [8]. The accuracy and reliability of budgets affect a company's reputation. The impact of the accuracy and reliability of the budget on the company depends on the proportion of the overall budget management in the company's internal control and internal plans [9]. For the needs of its own development and to protect its own reputation, the company will strengthen various processes of budget management, and problems such as budget slack will be effectively controlled [10]. Budgeting is a technique that relies on people to control costs. The initiative and execution of individuals in businesses and companies enable budgets to be implemented effectively. However, in order to effectively implement the overall budget management, another premise is an effective incentive mechanism suitable for the internal management of enterprises and companies. Otherwise, the budget is just on paper and meaningless in practice [11]. If the target of the budget is not fair, it will directly affect the business performance of the enterprise, resulting in a very negative impact [12].

The study proposes a new starting point for budgeting, which is a comprehensive budget management system based on economic added value. This model takes the incentive mechanism as the core [13]. The preparation of the enterprise's budget should also be combined with the enterprise's strategic goals and take this as the starting point [14]. Budget management and capital management are inseparable, and they need to be organically combined. It is very necessary for group companies to establish a new comprehensive budget model that combines budget management and capital management [15]. As an indispensable part of internal control, the budget can effectively assume the responsibility of optimizing the management structure of the enterprise [16]. A comprehensive budget is not isolated, and its preparation, execution, and other processes need to be combined with other indicators, including key performance indicators and action plan design. If this is used as a preprocess, the budget can be more closely integrated with the strategic goals of the enterprise [17].

A new compensation calculation model is designed, and the compensation calculation model includes the relevant contents of agency theory [18]. Hypotheses are established based on expectation theory, and experimental methods are used to test the mechanism of the interaction between the rigidity of the enhanced budget and the frequency of bonuses affecting performance and satisfaction [19]. Through repeated experiments, the degree of budget slack generated by the agent in the truth-oriented model is obtained. In the case of unclear status and information asymmetry, even in companies using the truth-oriented compensation model, subordinate departments are prone to budget slack [20]. After analyzing the agency theory, it is found that the truth-oriented compensation model can provide effective and accurate information to motivate employees to do their jobs better and achieve company performance goals [21]. The implementation of comprehensive budget management has formulated corresponding goals for the operation and management of the enterprise and also put forward corresponding evaluation standards for the enterprise, which can be used as the basis for evaluating the business performance of the enterprise, which is conducive to the performance evaluation of each department of the enterprise. The comprehensive budget provides a strong basis for the incentive mechanism of enterprises [22].

3. Financial Data Integration Algorithm Integrating EVA Unsupervised Learning

The AdaBoost algorithm is used to theoretically study the case of discrete modeling, and the fitting error of the final model H will not exceed.

$$\prod_t \left[2\sqrt{\epsilon_t (1-\epsilon_t)} \right] = \prod_t \sqrt{1-4\gamma_t^2} \leq \exp\left(-2\sum_t \gamma_t^2 \right). \quad (1)$$

Here, ϵ_t is the fitting error of submodel h_t, and there is $\gamma_t = 1/2 - \epsilon_t$. It can be seen from (1) that as long as the basic algorithm is slightly better than random guessing, the fitting error of the final model H will decrease exponentially with the number of iterations t. A large number of experiments show that AdaBoost will not overfit even after thousands of iterations, and its generalization error will continue to decrease after the fitting error has dropped to zero, as shown in Figure 1(a). In order to explain this phenomenon, the generalization error is analyzed in terms of the margin of the samples. The margin of a sample (z, g) is defined as follows:

$$\begin{aligned} \text{margin}_f(x, y) &= \frac{yf(x)}{\sum_t |\alpha_t|} \\ &= \frac{y\sum_t \alpha_t h_t(x)}{\sum_t |\alpha_t|}. \end{aligned} \quad (2)$$

Its value range is $[-1, 1]$, and its value is positive only when the estimate is correct. Moreover, the size of the margins can be used to measure the reliability of the forecast, with larger margins having higher confidence and smaller margins being lower. After the fitting error drops to zero, AdaBoost will still improve the margin and continue to find a partitioning hyperplane with a larger margin, as shown in Figure 1(b). This results in improved prelancing reliability, which in turn leads to further reductions in generalization error. Furthermore, an upper bound on the generalization error is given.

$$\widehat{Pr}[\text{margin}(x, y) \leq \theta] + \widetilde{O}\left| \sqrt{\frac{d}{m\theta^2}} \right|. \quad (3)$$

From (3), it can be seen that the generalization error upper limit of AdaBoost has nothing to do with the number of training rounds. The second term is actually expected to maximize the minimum margin for each sample when the first term is zero. The estimated value vector of the submodel for the sample (z, g) is denoted as $h(x) = \langle h_1(x), h_2(x), \ldots, h_T(x) \rangle$, and the coefficient vector is $\alpha = \langle \alpha_1, \alpha_2, \ldots, \alpha_T \rangle$. According to the definition of margin in (2), the objective of maximizing the minimum margin can be rewritten as follows:

$$\max_\alpha \min_i \frac{(\alpha \cdot h(x_i)) y_i}{\|\alpha\| \|h(x_i)\|}. \quad (4)$$

Here, the norm in the denominator is defined as follows:

$$\|\alpha\|_1 = \sum_t |\alpha_t|, \|h(x)\|_\infty = \max_t \|h_t(x)\|. \quad (5)$$

When all the values of h are in the range of $\{-1, +1\}$, $\|h(x)\|_\infty$ is equal to 1. In contrast, the goal of SVM is to maximize the minimum margin of the same form as (4). However, the norm in it becomes the norm in Euclidean space.

$$\|\alpha\|_2 = \sqrt{\sum_t \alpha_t^2}, \|h(x)\|_2 = \sqrt{\sum_t h_t(x)^2}. \quad (6)$$

The definitions of bias and variance come from regression analysis. The bias and variance definitions for the prediction function f are given when the variance is used as the loss function. A sample set $S = \{(x_1, y_1), \ldots, (x_N, y_N)\}$ is given. For the prediction of a certain sample (x, y) by the prediction function f obtained from the sample set S, the mean square error is

$$E\left[(y - f(x; S))^2 | x, S \right]. \quad (7)$$

Here, $E[\cdot]$ represents the expectation relative to the probability distribution P. This expectation can be broken down into two parts.

$$\begin{aligned} E\left[(y - f(x; S))^2 | x, S \right] = E\left[(y - E(y|x))^2 | x, S \right] \\ + (f(x; S) - E[y|x])^2. \end{aligned} \quad (8)$$

It can be seen that the first term on the right side of formula (8) has nothing to do with the predictor f and only represents the degree of difference of the data itself. The mean squared error is

$$E_S\left[(f(x; S) - E[y|x])^2 \right]. \quad (9)$$

Among them, E_S represents the expectation relative to the sample set S, that is, the mean over all possible sample sets S (the size N of S is fixed). Formula (9) is decomposed to obtain the following equation:

$$\begin{aligned} E_S\left[(f(x; S) - E[y|x])^2 \right] = (E_S[f(x; S)] - E[y|x])^2 \\ + E_S\left[(f(x; S) - E_S[x; S])^2 \right]. \end{aligned} \quad (10)$$

The first term $(E_S[f(x; S)] - E[y|x])^2$ on the right side of the equation is the bias term. If $f(x; S)$ is different from

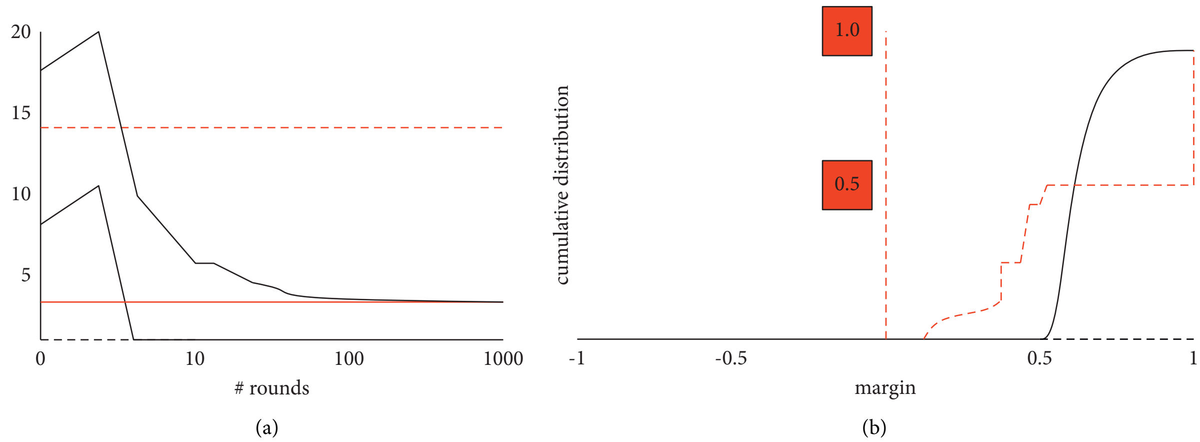

Figure 1: Error curve and marginal distribution plot.

$E[y|x]$ in the average case, f(x; S) is said to be a biased predictor of $E[y|x]$. The second term $E_S[(f(x;S)-E_S[x;S])^2]$ on the right side of the equation represents the variance, which represents how sensitive the predictor f is to the data. An unbiased predictor can still have a high mean squared error because it can have a large variance.

The relationship between generalization error and bias and variance is

$$E(C|f,N,x) = \sum_S P(S|f,N)(h_S(x) - f^*(x)) = (h^*(x) - f^*(x))^2 + \sum_S P(S|f,N)(h_S(x) - h^*(x))^2. \quad (11)$$

In formula (11), the left side is the generalization error, the first term on the right side is the square of the bias, and the second term is the variance. The generalization error of the ensemble method is decomposed into a bias term $B(x,y) = y - \langle f(x)\rangle_S = \sum_t \omega_t [y - \langle f_t(x)\rangle_S]$ and a variance term $V(x) = \left\langle \left(\sum_t \omega_t \Delta f_t(x)\right)^2 \right\rangle_S = \sum_{t,l}\omega_t\omega_l \langle \Delta f_t(x) \Delta f_l(x)\rangle_S$. The upper bound of the variance term is bounded by the mean variance of the individual submodels.

$$V(x) \le \sum_t \omega_t \left\langle [\Delta f_t(x)]^2 \right\rangle_S \quad (12)$$

When the difference between individual submodels is larger, the variance of the ensemble function is further away from the upper limit.

For a multivalued discrete modeling problem $y \in \{1, ..., J\}$, set $e_t = \{x_n; h_t(x_n \neq y_n)\}$ is the error set of h_t, and $i(x,e_t) = I(x \in e_m)$ is set to be the indicator function of e_m. We assume that $i(x,e_t) = I(x \in e_m)$ is a set of non-negative numbers whose sum is 1, and the edge edge $(c) = \sum_t c_t i(x,e_t)$ is a function of x. Breiman points out that edges are similar to margins. Generally, if there is margin(c) $\ge 1 - 2$edge(c), there is $P(\text{margin}(c) < 0) \le P(\text{edge}(c) > (1-\theta)/2)$.

AdaBoost normalizes the negative gradient of the steepest descent direction $P_{\exp}(F)$ relative to the marginal to obtain the distribution $D(x_i) \propto \exp(-y_i F(x_i))$ on the sample and calculates the weight coefficient α_t of the new submodel h through minimization. In fact, AdaBoost is guaranteed to minimize the potential function (13) by choosing α_t and adding anh. Some leveraging methods can also be viewed as performing a constrained gradient descent search on a potential function and further discussions on how to modify the potential function to obtain better boosting-like algorithms.

$$P_{\exp}(F') = \sum_{i=1}^{N} \exp(-y_i(F(x_i) + \alpha_t h_t(x_i))). \quad (13)$$

During the game, the row participant selects a row i, while the column participant selects a column j. Then, the number in the selected cell $M_{i,j}$ represents the loss suffered by the row participant.

We assume that a binary discrete modeling problem is considered, and let $H = \{h_1, \ldots, h_n\}$ be a set of models containing finite submodels. For a given sample set $(x_1,y_1), \ldots, (x_N,y_N)$, the game matrix M has N rows and n columns, among them, there is

$$M_{i,j} = \begin{cases} 1, & \text{if } h_j(x_j) = y_i, \\ 0, & \text{otherwise}. \end{cases} \quad (14)$$

Now, the row participant is the boosting algorithm, and the column participant is the base algorithm. The distribution D on the sample set selected by the boosting algorithm becomes the distribution P of the rows of M, and a submodel selected by the basic algorithm is equivalent to selecting the j-th column of M. The minmax theorem

$$\max_Q \min_P P^T \mathrm{MQ} = \min_P \max_Q P^T \mathrm{MQ}, \quad (15)$$

is equivalent to selecting the j-th column of M. The minmax theorem is applied to the matrix defined above and reinterpreted in the framework of boosting. The following meaning can be obtained: if for any distribution on the samples, there is a basic algorithm with a maximum error of $1/2 \sim \gamma$, a convex merge of submodels exists, and its margin on all samples is at least 2γ. AdaBoost finds an ensemble model with the largest margin on all samples by merging many submodels.

Zero-sum games can be solved by linear programming, which links boosting to linear programming or convex programming. This connection prompts researchers to study boosting from a new perspective and propose new algorithms.

In the case of uncorrelated errors between networks, the probability p_{err} of the ensemble network error is

$$p_{\text{err}} = \sum_{t>T/2}^{T} |Tt| p^t (1-p)^{T-t}. \quad (16)$$

At $p < 1/2$, p_{err} decreases monotonically with increasing T. Therefore, if the prediction accuracy of each neural network is higher than 50%, and the errors between the individual networks are not correlated, the higher the number of neural networks integrated, the higher the accuracy of the integration. In practical applications, since the errors of each independent network cannot be guaranteed to be uncorrelated, there is still a certain gap between the integrated effect and the theoretical value.

It is assumed that T neural networks are used to approximate f: $P^m \longrightarrow P$ by means of weighted integration, and each network is assigned a weight w and satisfies $\omega_t > 0, \sum_t \omega_t = 1$. We assume that the sample set is randomly selected according to the distribution $p(\mathrm{x})$, the output of the network t to the input x is $\widetilde{E}(x) = \sum_t \omega_t V^t(x)$, and the output of the neural network ensemble is $\widetilde{V}(x) = \sum_t \omega_t V^t(x)$. At the same time, the generalization error of the neural network t is $E^t \int \mathrm{d}x p(x) (f(x) - V^t(x))^2$, and the weighted average of the generalization errors of each network is $\widetilde{E}(x) = \sum_t \omega_t E^t$. The uncertainty (degree of difference) of the neural network t is defined as $A^t = \int \mathrm{d}x p(x) (V(x) - \widetilde{V}(x))^2$, and the uncertainty (degree of difference) $\overline{A} = \sum_t \omega_t E^t$ of the neural network ensemble can be obtained, then the generalization error of the neural network ensemble is $E = \int \mathrm{d}x p(x) (f(x) - \widetilde{V}(x))^2$. Among them, A measures the correlation degree of each network in the neural network ensemble. If the submodel has a high degree of bias, the difference of the integration is close to 0, and its generalization error is close to the weighted average of the generalization errors of each network. On the contrary, if the submodels are independent of each other, the difference of the integration will be large, and the generalization error will be much smaller than the weighted average of the generalization errors of each network. Therefore, in order to enhance the generalization error of the neural network ensemble, the errors of each submodel in the ensemble should be as uncorrelated as possible.

4. Comprehensive Budget Execution Performance Evaluation of Companies Incorporating EVA Unsupervised Learning Model

The biggest difference between the EVA-based budget management system and the traditional budget management system is that it considers all capital costs, and it is necessary to adjust the profit-oriented budget table to the EVA budget table on the basis of the traditional budget. The company takes EVA as the starting point for budget preparation and is also an important indicator for performance evaluation and runs the EVA concept throughout the entire process of budget management. Moreover, a comprehensive budget management system based on EVA, which integrates "pre-budget preparation-in-process control-ex-post performance assessment" as a whole, is formed and continuously improved, and an EVA-based company's comprehensive budget system framework is constructed, as shown in Figure 2.

By comparing the budgeting process of the company under the traditional budget and the budgeting process of the company under the guidance of EVA, it can be seen that there are two main improvements. First, it is necessary to integrate the goal of value creation into the budgeting process, decompose the overall goal of EVA from the top down, and prepare the budget from the bottom up. Moreover, each responsibility center determines the EVA target, and each responsibility center is responsible for the EVA target of its own center. Thus, value creation is successfully integrated into the comprehensive budgeting process. Second, from a top-down-based weave to a top-down weave. Moreover, each responsibility center first prepares the business budget for its own center, and then the finance department conducts a comprehensive balance. The responsibility center understands its own situation better than the financial department and is closer to the business, which is conducive to the integration of business and finance and makes budget preparation more scientific and reasonable. The EVA-based company budgeting process is shown in Figure 3.

The company's strategic goal is to maximize corporate value, and quantitative performance is the maximum EVA value. The EVA value is a comprehensive result indicator. It is necessary to know whether each link or part has a creative effect or a destructive effect on the company's value and the degree of effect. It is necessary to decompose the EVA value layer by layer until it affects the lowest index of EVA and analyze the influencing factors of this index. Through the layer-by-layer decomposition of the factors affecting EVA, the path to optimize EVA can be found. The decomposition path of EVA driving factors is shown in Figure 4.

The responsibility center is the basic carrier and the core budget unit for the implementation of the budget management system. The company originally adopted the "company-management layer/functional department" model, dividing the management layer into profit centers or cost centers. When EVA is introduced into the company's budget management and the establishment of the EVA budget responsibility center is refined, the company has changed from a two-level responsibility center to a three-level budget responsibility center of "company headquarters-management layer-grassroots department." At the same time, EVA is connected with the budget preparation, execution, control, and evaluation of responsibility centers at all levels. By refining the budget responsibility center, the responsibility level can continue to be lowered and

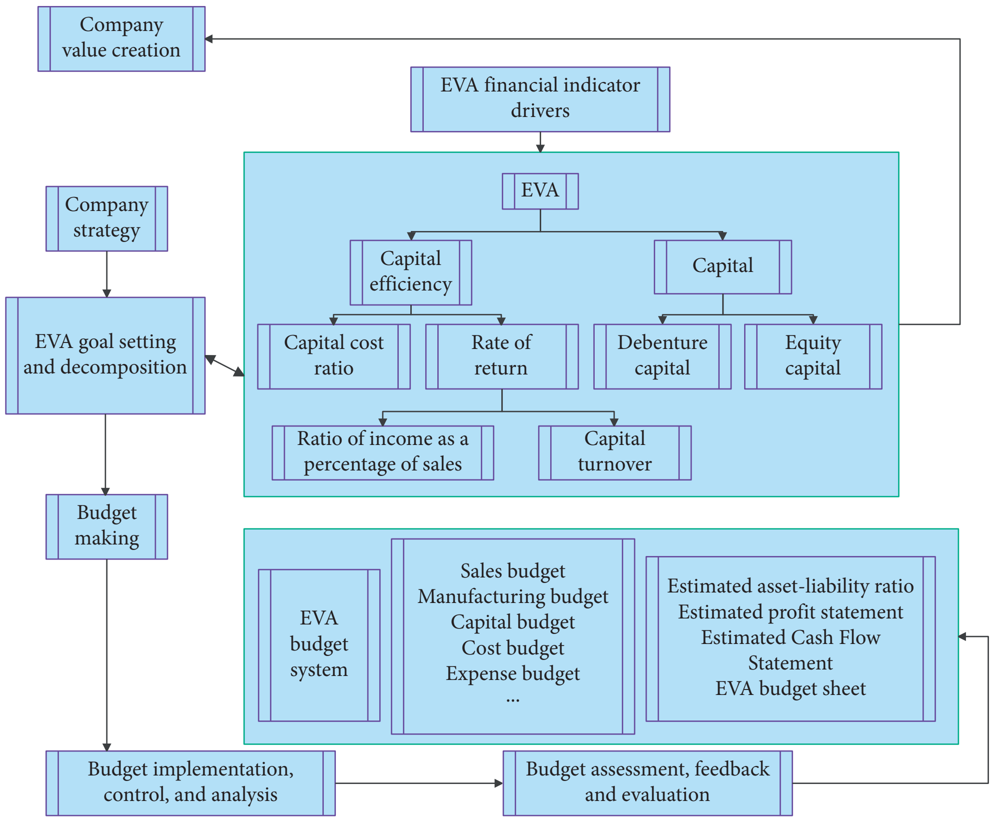

Figure 2: The comprehensive budget management framework of the company based on EVA.

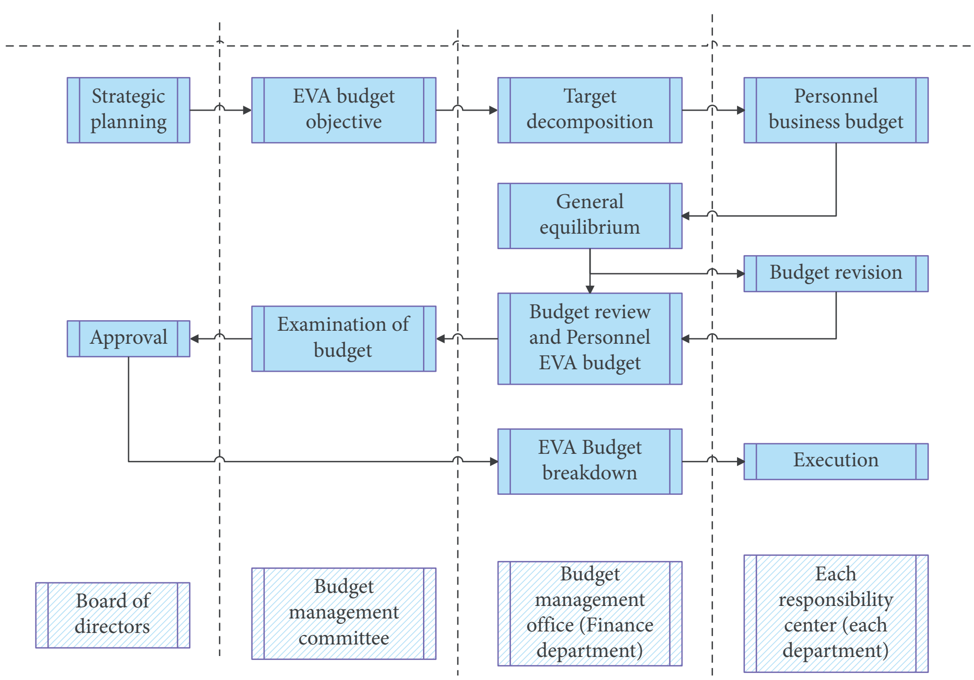

Figure 3: EVA-based company's comprehensive budget preparation process.

implemented, and it will play a fundamental role at the very end of value creation. As a result, the system diagram of the company's EVA budget responsibility center is constructed, as shown in Figure 5.

In view of the company's massive data, this paper uses the previous algorithm combined with the big data audit algorithm to process data. The amount of data stored in the big data audit platform is huge, and the confidentiality of

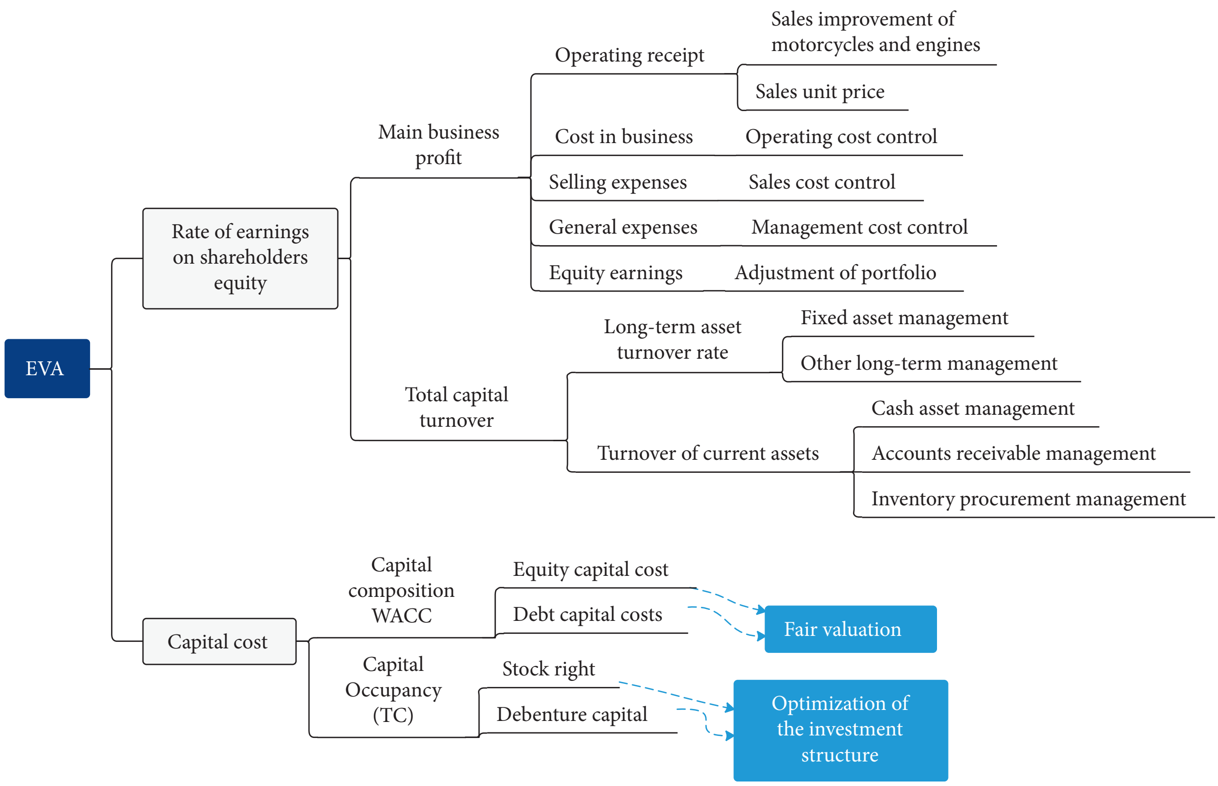

Figure 4: EVA driver analysis and optimization.

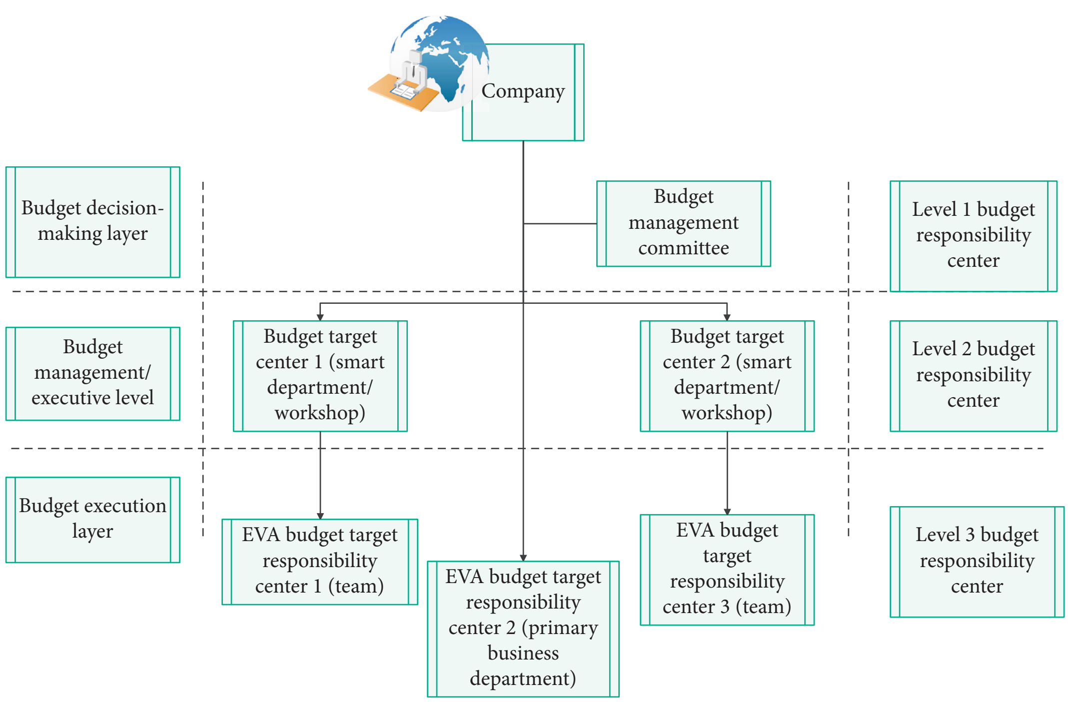

Figure 5: Budget responsibility center system based on EVA.

data information should be highly valued. During data information collection and data mining processing, we should focus on the possible leakage of information, strengthen the protection of network systems and audit platform management, and encrypt the collected data information. At the same time, it is necessary to do a good job of privacy protection to prevent illegal leakage of data and information and to prevent malicious data information from being stolen by those who illegally use the data during the data transmission process, so as to avoid malicious tampering and

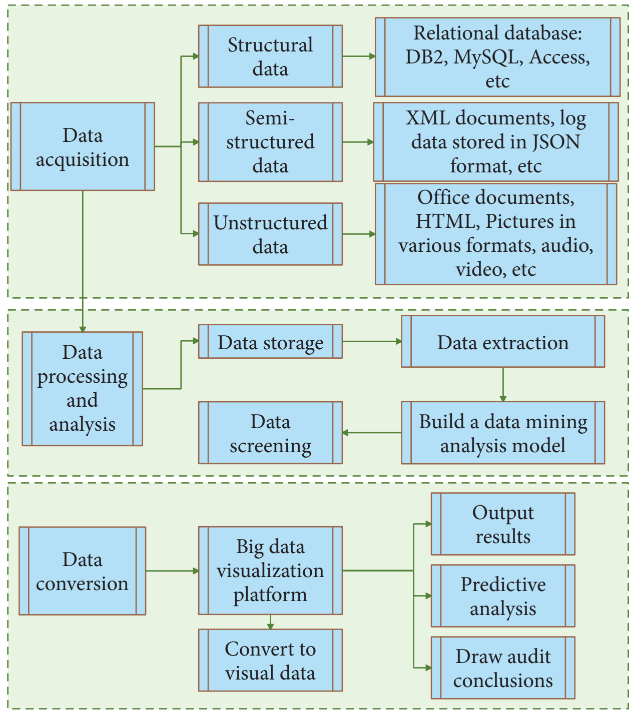

Figure 6: The working framework of the big data audit platform.

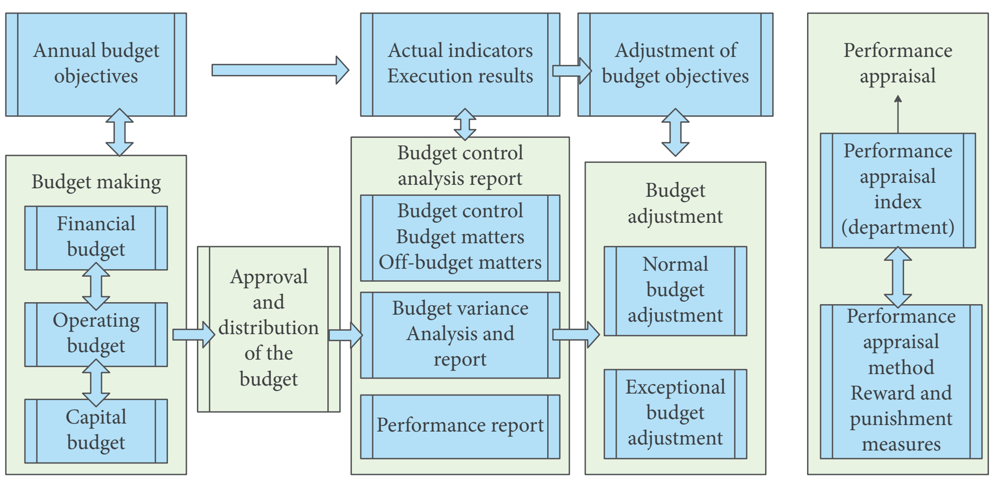

Figure 7: Flow chart of comprehensive budget management.

illegal use of data. In addition, it is necessary to standardize the use behavior of users of the big data audit platform, strengthen the safe use and prevention education of platform users, increase the importance of data information security, and strengthen data security prevention. The working framework of the big data audit platform is shown in Figure 6.

Regarding the comprehensive budget management model, its process is in a cyclical state, and each link interacts and functions.

1. *Budgeting*. In the comprehensive budget management process, this link can lay the foundation for subsequent work, so it is regarded as the initial node of the management process. Regarding the budgeting model, it includes three types: the first is top-down type; the second is top-down combined type; the third is bottom-up type. During budget preparation, various methods are used such as rolling budget, incremental budget, and zero-based budget.

2. *Budget Execution and Control*. The main role of this link is to ensure that the budget is in place. As for the budget execution link, its main task is to allocate budget targets for each department and urge each department to implement the goals. Regarding budget control, it mainly includes the following two points: first, control the budget process; second, control the budget results.

3. *Budget Evaluation*. This link mainly evaluates and evaluates the execution results of the budget execution department and rewards or punishes them in combination

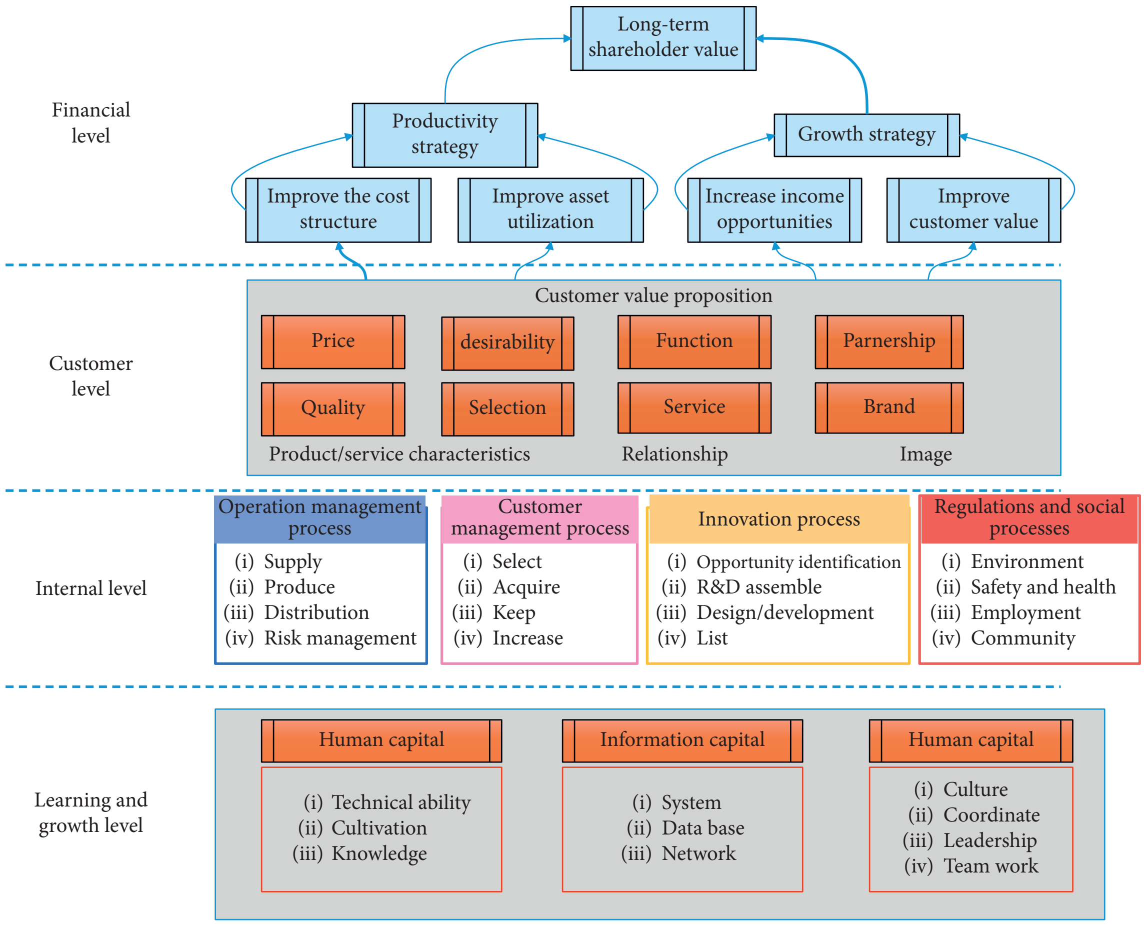

Figure 8: Strategic map framework.

Table 1: Clustering statistics of the evaluation effect of the company's comprehensive budget execution performance evaluation system based on the EVA unsupervised learning model.

Number	Performance evaluation	Number	Performance evaluation	Number	Performance evaluation	Number	Performance evaluation
1	84.64	26	79.58	51	80.67	76	83.41
2	79.56	27	82.34	52	86.50	77	88.23
3	83.39	28	78.21	53	83.05	78	90.47
4	82.58	29	85.57	54	84.80	79	85.96
5	83.76	30	79.81	55	80.31	80	83.43
6	82.90	31	81.32	56	80.40	81	83.35
7	90.64	32	88.54	57	83.83	82	86.23
8	79.08	33	80.44	58	89.80	83	85.10
9	87.12	34	87.07	59	79.82	84	83.53
10	81.44	35	83.95	60	88.43	85	84.87
11	77.67	36	83.03	61	83.64	86	90.47
12	81.08	37	85.23	62	86.59	87	83.28
13	88.50	38	88.38	63	88.89	88	83.89
14	84.23	39	83.51	64	79.28	89	80.70
15	85.47	40	89.87	65	84.05	90	85.96
16	84.99	41	80.62	66	81.21	91	79.55
17	89.07	42	81.09	67	88.06	92	86.27
18	88.49	43	84.18	68	78.96	93	77.48
19	88.93	44	90.80	69	84.31	94	90.09
20	87.91	45	89.84	70	85.32	95	79.11
21	84.02	46	86.23	71	84.49	96	85.34
22	78.44	47	84.95	72	89.78	97	85.64
23	82.13	48	87.37	73	86.09	98	79.60
24	85.01	49	78.65	74	77.43	99	87.15
25	87.77	50	81.52	75	89.66	100	83.70

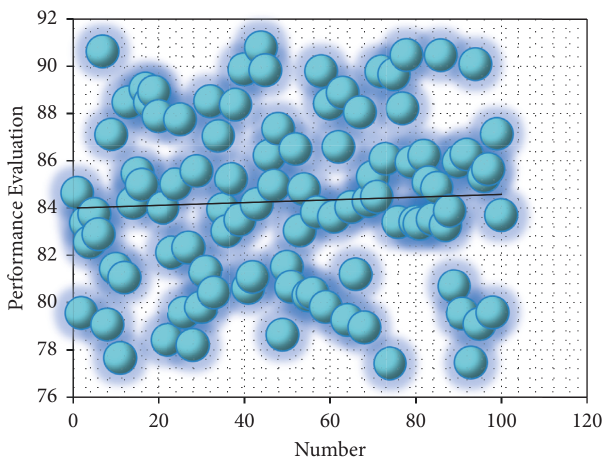

FIGURE 9: Cluster diagram of the company's comprehensive budget execution performance evaluation system based on the EVA unsupervised learning model.

with the reward and punishment system formulated by the enterprise to mobilize the enthusiasm of employees, thereby improving the economic benefits of the enterprise. The specific steps are shown in Figure 7.

Overall, corporate strategy can be divided into four levels. Among them, the customer level is an important part of the enterprise. The main purpose of an enterprise formulating strategic development goals is to obtain more benefits. Enterprise interests come from customers. Only by improving customer satisfaction can enterprises obtain more capital flow. At the same time, optimizing internal processes can improve customer satisfaction. In the learning and growth level, the continuous learning of employees can improve the internal process of the enterprise, thereby promoting the development of the customer level. It can be seen that the relationship between the four levels can be described through the strategy map to promote the implementation of the enterprise's strategic plan. The strategy map shown in Figure 8 illustrates how a business creates value.

After constructing the performance evaluation system of the company's comprehensive budget execution based on the EVA unsupervised learning model, this paper combines the cluster analysis to verify the effect of the system in this paper and counts the performance evaluation effect of the company's comprehensive budget execution based on the EVA unsupervised learning model. The results shown in Table 1 and Figure 9 are obtained.

From the above cluster analysis, it can be seen that the company's comprehensive budget execution performance evaluation system based on the EVA unsupervised learning model can effectively improve the effect of the corporate financial budget.

5. Conclusion

A complete and rigorous budget management system contains the overall strategic goals and related ideas of the enterprise, showing the management's conception and planning of the strategic management guidelines, and it is the means and method for the enterprise to promote management. Secondly, since the budget goal is based on the corporate strategy, in order to promote the realization of the strategic goal, the comprehensive budget management system must be centered on the overall goal of the company. The management achieves the whole-process closed-loop management improvement through the planning, organization, preparation, execution, control, evaluation, and feedback of the budget work. Furthermore, it reflects the systematic, long-term, rigorous, and practical characteristics of strategic management. Strategic planning generally takes 3–5 years, which is the goal of medium and long-term strategic planning. Comprehensive budget management will combine the long-term and short-term interests of the enterprise and propose various effective management and control methods to promote the traction and implementation of strategic goals. This paper integrates the EVA unsupervised learning model to evaluate the company's comprehensive budget execution performance and improves the company's comprehensive budget execution performance evaluation effect. Cluster analysis shows that the company's comprehensive budget execution performance evaluation system based on the EVA unsupervised learning model can effectively improve the effect of corporate financial budgeting.

Data Availability

The labeled datasets used to support the findings of this study are available from the author upon request.

Conflicts of Interest

The author declares that there are conflicts of interest.

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References

[1] B. Abdualgalil and S. Abraham, "Efficient machine learning algorithms for knowledge discovery in big data: A literature review," *Database*, vol. 29, no. 5, pp. 3880–3889, 2020.

[2] B. L. S. Almutairi, "Impact OF COVID19 ON accounting profession from the perspective of a sample of head of accounting departments within Kuwaiti manufacturing sector," *Psychology and Education Journal*, vol. 58, no. 2, pp. 4758–4768, 2021.

[3] S. Balne, “Analysis on research methods in bigdata applications,” *International Journal of Innovative Research in Computer and Communication Engineering*, vol. 8, no. 10, pp. 4059–4063, 2020.
[4] D. Chessell and O. Neguriţă, “Smart industrial value creation, cyber-physical production networks, and real-time big data analytics in sustainable Internet of Things-based manufacturing systems,” *Journal of Self-Governance and Management Economics*, vol. 8, no. 4, pp. 49–58, 2020.
[5] P. B. de Laat, “Big data and algorithmic decision-making,” *ACM SIGCAS - Computers and Society*, vol. 47, no. 3, pp. 39–53, 2017.
[6] P. B. De Laat, “Algorithmic decision-making based on machine learning from Big Data: Can transparency restore accountability?” *Philosophy & technology*, vol. 31, no. 4, pp. 525–541, 2018.
[7] B. L. Handoko, A. N. Mulyawan, A. N. Mulyawan, J. Tanuwijaya, and F. Tanciady, “Big data in auditing for the future of data driven fraud detection,” *International Journal of Innovative Technology and Exploring Engineering*, vol. 9, no. 3, pp. 2902–2907, 2020.
[8] E. Huerta and S. Jensen, “An accounting information systems perspective on data analytics and Big Data,” *Journal of Information Systems*, vol. 31, no. 3, pp. 101–114, 2017.
[9] K. S. Kumar, “Factors affecting the adoption of computerized accounting system (CAS) among smes in Jaffna District,” *SAARJ Journal on Banking & Insurance Research*, vol. 8, no. 6, pp. 11–15, 2019.
[10] T. E. Marshall and S. L. Lambert, “Cloud-based intelligent accounting applications: accounting task automation using IBM watson cognitive computing,” *Journal of Emerging Technologies in Accounting*, vol. 15, no. 1, pp. 199–215, 2018.
[11] E. Nica, C. I. Stan, A. G. Luţan, and R. □. Oa, “Internet of things-based real-time production logistics, sustainable industrial value creation, and artificial intelligence-driven big data analytics in cyber-physical smart manufacturing systems,” *Economics, Management, and Financial Markets*, vol. 16, no. 1, pp. 52–63, 2021.
[12] A. Omitogun and K. Al-Adeem, “Auditors’ perceptions of and competencies in big data and data analytics: an empirical investigation,” *International Journal of Computer Auditing*, vol. 1, no. 1, pp. 92–113, 2019.
[13] Z. Rezaee, A. Dorestani, and S. Aliabadi, “Application of time series analyses in big data: Practical, research, and education implications,” *Journal of Emerging Technologies in Accounting*, vol. 15, no. 1, pp. 183–197, 2018.
[14] O. Throne and G. Lăzăroiu, “Internet of Things-enabled sustainability, industrial big data analytics, and deep learning-assisted smart process planning in cyber-physical manufacturing systems,” *Economics, Management, and Financial Markets*, vol. 15, no. 4, pp. 49–58, 2020.
[15] G. Tucker, “Sustainable product lifecycle management, industrial big data, and internet of things sensing networks in cyber-physical system-based smart factories,” *Journal of Self-Governance and Management Economics*, vol. 9, no. 1, pp. 9–19, 2021.
[16] V. Q. Thong, “Factors defining the effectiveness of integrated accounting information system in ERP environment–Evidence from Vietnam’s enterprises,” *Economics And Business Administration*, vol. 7, no. 2, pp. 96–110, 2017.
[17] J. R. A. Q. Al Natour, “The impact of information technology on the quality of accounting information (SFAC NO 8, 2010),” *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, vol. 12, no. 13, pp. 885–903, 2021.
[18] A. P. Aaron, M. L. Kohlstrand, L. V. Welborn, and S. T. Curvey, “Maintaining medical record confidentiality and client privacy in the era of big data: ethical and legal responsibilities,” *Journal of the American Veterinary Medical Association*, vol. 255, no. 3, pp. 282–288, 2019.
[19] B. J. Ali and M. S. Oudat, “Accounting information system And financial sustainability of commercial and islamic banks: A review OF the literature,” *Journal of Management Information and Decision Sciences*, vol. 24, no. 5, pp. 1–17, 2021.
[20] V. Brock and H. U. Khan, “Big data analytics: does organizational factor matters impact technology acceptance?” *Journal of Big Data*, vol. 4, no. 1, pp. 1–28, 2017.
[21] S. A. Sibi and S. A. L. Merin, “An investigation on accounting information system, Zambia,” *Shanlax International Journal of Management*, vol. 8, no. 2, pp. 13–20, 2020.
[22] L. Loku, B. Fetaji, and A. Krsteski, “Automated medical data analyses of diseases using big data,” *Knowledge International Journal*, vol. 28, no. 5, pp. 1719–1724, 2018.