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Abstract

E-commerce is a business activity that relies on information technology, such as using the Internet, intranet, value added network and other channels to conduct electronic trading activities and related services. It is essentially the same as the traditional commercial activities. However, due to the deep integration with the Internet and the realization of the electronicization, networking and informationization of commercial activities, it has played an important role in promoting the development of traditional commerce and has become a key part of China’s pillar industry of national economic development. In the market economy environment, e-commerce enterprises are faced with increasingly fierce market competition. The cost-effective management can maximize the use of capital investment in the construction and development, which makes the development of e-commerce business an inevitable trend. Among them, the management and control of human resource costs is an important part of the enterprise cost management system, which is the key content of the reform of the enterprise management system. The level of human resource costs is closely related to the distribution of employees’ benefits. By controlling the cost of human resources, the company can effectively reduce the financial costs and increase the utilization rate of funds. In addition, it can effectively coordinate the relationship between enterprises and employees, which is of great significance in motivating staff enthusiasm for the promotion of the development of e-commerce enterprises. Therefore, based on the actual situation of e-commerce enterprises, this paper determines the reasonable input level of enterprise’s human resources cost through the method of enterprise production function, establishes the evaluation system of human resource costs, and provides a reference for promoting the elaborate management of e-commerce enterprises.

Keywords: Big Data Era, E-commerce Business, Human Resource Costs.

1. RESEARCH REVIEW

1.1 Research background

With the rise of electronic data exchange, the earliest e-commerce originated in 1990 when China’s e-commerce has formed a preliminary concept. From 1993 to 1997, the government organizations began the construction of three goals of Golden Card, Golden Gate, and Golden Tax, which has laid a solid foundation for the development of e-commerce. In 1997, China formally established the commodity ordering system as China’s earliest e-commerce platform. Influenced by a variety of subjective or objective factors, the Chinese goods ordering system’s the first order was not completed until one year later, which was a landmark achievement in the development of e-commerce industry in China. Subsequently, in 1999, a number of B2C websites such as 8848 were officially launched and gradually transformed into a B2B model, indicating that China’s e-commerce industry has entered a stage of steady development. With the continuous development of technologies such as SaaS, Web and mobile networks, the number of netizens in China is increasing. Shopping through the Internet has become an indispensable part of the life of most Internet users. By 2017, the scale of e-commerce transactions in China has reached 24 trillion yuan.

1.2 Literature review

Compared with other enterprises, e-commerce enterprises have certain particularities, which are mainly reflected in the following aspects. First, e-commerce industry is the pillar industry in China’s economic development whose level of development is inextricably linked with China’s macroeconomic policies. Second, the economic efficiency of business enterprises has a direct link with market economy environment such as market demand, supply chain construction, logistics level. The market economy changes will have a tremendous impact on e-
commerce business. Third, the e-commerce industry is in a stage of rapid development; due to a large number of vacancies which the enterprises in order to make up, the enterprises will reduce the recruitment standards, which will increase the human resource costs. Finally, e-commerce companies face huge competitive pressure, the employee’s job hopping, employee basic quality and loyalty have an impact on the payroll level (Chen and Wu, 2011). With the vigorous development of e-commerce, the market competition among the major e-commerce enterprises is becoming increasingly fierce. The vast majority of enterprises are expanding the scale of employees in the enterprise’s human resources, with an increase of up to 10%; while the average wage of employees increased by 8.5% with the annual bonus of about 3 times to 4 times of the monthly salary, which reflects that e-commerce enterprises attach great importance to the human resource costs and to promoting the development of e-commerce enterprises in terms of the human resources cost management (Zhao et al., 2011). The evaluation of the human resource costs of the enterprises are the ratio method and the pushback method. The ratio method means that by analyzing the historical data stored in the enterprises, the ratio of its costs of human resources to the related indicators are obtained. In general, the reference indicators are mainly personnel cost indicators. For the stable development of enterprises, the overall rate of personnel cost indicators should show a downward trend. The pushback method refers to the level of the costs of human resources are acquired according to the predicted profit and sales revenue to back induct the ratios of each cost, while ensuring that the enterprises are at the normal level in the same industry (Du et al., 2011).

2. E-COMMERCE BUSINESS HUMAN RESOURCE COST EVALUATION MODEL

In a certain period of time, the production cost of e-commerce enterprises is mainly composed of research and development costs, procurement costs, manufacturing costs and marketing costs, while human resource costs permeate each of them, mainly including input costs and material resources (Sun, 2011). According to the production function model, the total cost input composition formula is as follows:

\[ g(C_h, C_k, C) = 0 \] (1)

The above formula mainly reflects the relationship between the quantity of production factors consumed in the production of products and the maximum output under the premise that the technological level of an enterprise does not change. The relationship between production functions runs through all the production activities of e-commerce enterprises, and effectively reflects the dependence between input and output of e-commerce enterprises on. The functional relationship is as follows:

\[ f(C_h, C_k) = 0 \] (2)

Where, Q represents the Earnings before Interest and Tax (EBIT) data of e-commerce enterprises, mainly including the current interest expense and income tax profit, which is the interest costs of e-commerce enterprises in carrying out commercial activities (Zhang and Li, 2011). EBIT does not divide the funds allocated to the debtor and the shareholders or hand in the benefits to the nation. Research of EBIT can more accurately reflect the income level of e-commerce enterprises. \( C_h \) represents the human resource costs of the e-commerce enterprise, which is generally not reflected in the accounting bill of the enterprise. The ratio method and the pushback method can work out the human resource cost level of the e-commerce enterprise. Figure 1 shows the cost summary:

![Figure 1. A Summary of the Cost of Human Resources](image-url)
represents the current investment of the material resources of e-commerce business, such as the production of plant construction, production equipment acquisition, procurement of raw materials, operating funds and the like. Among them, plant and equipment belong to fixed assets. The costs should be calculated by depreciation of fixed assets (Ge, 2014). For the calculation of input costs of intangible assets, the actual discount amount and amortization can be adopted. In addition, other costs and expenses are generally calculated through accrual basis. According to Cobb Douglas production function, combined with the actual needs of e-commerce business, the elements L is represented by \( C_h \) and K is represented by \( C_k \) respectively; the human resource input costs and material resources input function are obtained as follows:

\[
Q = AC_h^{\alpha}C_k^{\beta} \mu
\]

(3)

Where, A, \( \alpha \), \( \beta \), \( \mu \) are constants. A represents the comprehensive technical level of e-commerce enterprises, \( \alpha \) represents the elasticity coefficient of human resources cost input in e-commerce enterprises, \( \beta \) represents the elasticity coefficient of enterprise material resources cost inputs, and \( \mu \) represents the random disturbance. Fine-tune of the above public notations marked as \( \zeta = \ln \mu \), and the linear relationship can be obtained as follows:

\[
\ln Q = \ln A + \alpha \ln LC_h + \beta \ln C_k + \zeta
\]

(4)

Where, \( Q, C_h \) and \( C_k \) adopt the historical data in the above calculation formula. After the data of each parameter are sorted out, the production function of the e-commerce enterprise can be obtained through regression calculation and analysis (Lin and Zhao, 2013). It is shown as follows:

\[
Q = A_iC_h^{\alpha_i}C_k^{\beta_i} \mu_i
\]

(5)

Each of these data is the specific values obtained after regression analysis of the above formula. If, for an e-commerce business, the total cost of investment for business development in the future is \( C \), and the total output is replaced by EBIT as \( Q \), the enterprise’s maximum output value can be calculated (Rao et al., 2013). According to Lagrange’s theorem, the following formula can be obtained:

\[
G(x, y, \alpha) = A_iC_h^{\alpha_i}C_k^{\beta_i} \mu_i + \alpha g(C_h, C_k, C)
\]

(6)

Based on the above formula, the partial derivative of the building equation can be obtained as follows:

\[
\begin{align*}
\frac{\partial G}{\partial C_h} &= \frac{\partial g}{\partial C_h} + \frac{\partial f}{\partial C_h} = 0 \\
\frac{\partial G}{\partial C_k} &= \frac{\partial g}{\partial C_k} + \frac{\partial f}{\partial C_k} = 0 \\
\frac{\partial G}{\partial \alpha} &= g(C_h, C_k, C) = 0
\end{align*}
\]

(7)

The solution \((C_h, C_k, \alpha)\) obtained in the above equation, \((C_h, C_k)\) is the possible extremum point at which the production function \(Q = A_iC_h^{\alpha_i}C_k^{\beta_i} \mu_i\) when \(g(C_h, C_k, \alpha) = 0\). In this respect, the maximum of the solution of the production function can be obtained, in which case \((C_h, C_k)\) can take values of \((C_h, C_k)\), which help obtain the cost of human resources invested by e-commerce enterprises. The proportion of cost of human resources in total resources input costs is that, in the total cost of the enterprise, the total cost of human resources is written as \(\frac{C_h}{C}\), and the total cost of material resources is written as \(\frac{C_k}{C}\), of which the production function of the e-commerce business can obtain the maximum value, and the input of human resource cost can help the enterprise obtain the maximum economic benefits. Therefore, under such circumstances, the costs of human resources in e-commerce enterprises prove to be relatively reasonable.

3. E-COMMERCE BUSINESS COSTS OF HUMAN RESOURCES

3.1 Research and development costs in composition of human resource costs

E-commerce companies cover a wide range of industries, such as suppliers specializing in providing low added-value products such as agricultural products and manufacturing materials, and many suppliers of high-value-added
electronic devices such as mobile phones and computers. Among them, the high value-added e-commerce enterprises tend to rely more on the technological level. How to improve their own technological level and how to improve the competitiveness of e-commerce companies have become the key to survive and flourish in the market for the e-commerce enterprises. Especially in recent years, the high-tech industries in China have witnessed rapid development. The self-developed electronic products have risen by leaps and bounds in quality which poses great challenges to major foreign electronic equipment brands. Especially of the 12th Five-Year Plan, the new energy vehicles, energy saving and other aspects demand more and more professionals, which have formed a number of high-tech talents with high-income. Therefore, for e-commerce enterprises, the talent competition has become a key issue in market competition.

3.2 Procurement costs in composition of human resource costs

Procurement is an inevitable part of the e-commerce business, and good personnel investment can bring better raw materials and long-term cooperation of suppliers for e-commerce enterprises, which can effectively control the production costs of enterprises and enhance their business. The utilization rate of funds is of great significance to enhancing the economic benefits of enterprises. Therefore, the procurement of high-end talent in e-commerce enterprises is the key competition and high-end personnel demand high payrolls, generally up to 100, 000 or even more than 200, 000. With the continuous development of e-commerce enterprises, the amount of raw materials, the high-end personnel investment, the professional ability requirements will continue to rise for the e-commerce enterprises. It is predicted that in the next few years, China’s demand for high-end personnel with excellent vocational skills will be in line with the international top level.

3.3 Human resource costs of production costs

In the production process, the cost of human resources is mainly reflected in the wages of production workers. With the continuous development of high-tech industries, the workers needed by e-commerce enterprises are no longer traditional simple manual one. It is necessary for them to possess a certain professional basis and to operate various kinds of equipment to complete product processing. Therefore, there is certain demand for the professional competence of workers, which cause the salary level rise. For now, the average annual salary of front-line workers in China’s e-commerce enterprises is about 70, 000 yuan, which is in the middle reaches of the wage structure in China. With the continuous development of price and e-commerce enterprises along with better proficient working abilities of workers, the salary level is in a steady upward trend.

3.4 Human resource costs of marketing and service costs

Marketing and service has played a role in expanding sales, improving consumer satisfaction, building a good brand image for e-commerce enterprises. To some extent, marketing and services cannot bring direct economic income for e-commerce business. The level of their economic income depends on the quality of e-commerce products. In fact, the assets of enterprises are divided into tangible assets and intangible assets. Modern enterprises often have huge intangible assets, and even many large enterprises do not have good physical assets but based on intangible assets. Marketing and services is an important motivation for enhancing the intangible assets of enterprises. However, at present, the importance of marketing and service in e-commerce enterprises is low. There are some flaws in human resources service, which are mainly reflected in the following aspects.

First, some e-commerce enterprises place undue emphasis on product research and development, procurement and production without paying sufficient attention to marketing and services, lacking the necessary control over the costs of human resources. In fact, the reasonable control over human resources is as important as marketing and service, which requires e-commerce enterprise to pay more attention to the control of the costs of human resources engaged in marketing services, thereby enhancing the level of cost control.

Second, many e-commerce enterprises lack the emphasis on talent without including the development of talents into the long-term strategic planning of enterprises, which also makes it difficult for enterprises to obtain the important impetus to promote their own sustainable development. At the same time, the problem of mobility has greatly boosted the costs of human resources in enterprises. In addition, due to the lack of necessary human resources management system development plan which can play a catalytic role for the future development of enterprises, the enterprise human resource structure cannot make the appropriate adjustments based on changes in market, which will have profound impact on business economic benefits. Therefore, modern e-commerce enterprises must pay enough attention to human resources management, strengthen the management and control
over the costs of human resources management, and promote the continuous improvement of the economic benefits of e-commerce enterprises.

Third, the e-commerce enterprises generally lack a scientific and effective accounting detection algorithm of human resource costs, which makes it difficult for the accounting department and human resource management department of the enterprise to analyze the cost management level of human resource. Analysis of resource costs can help adjust human resources management system. Many enterprises do not form a consensus on human resource costing, which result in different standards for the cost of human resources for different e-commerce businesses. All of these problems lead to the difficulties of human resources cost management and control in e-commerce enterprises, which has become one of the most important obstacles to the development of e-commerce enterprises. Therefore, e-commerce enterprises need to strengthen the level of human resource costs with the selection of a reasonable accounting detection algorithm, so as to enhance human resource cost management capabilities.

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