

Research on Supplier Evaluation System Based on Lean Accounting

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Abstract. Supplier evaluation is the most crucial step in practically all manufacturing and Lean manufacturing is no exception. Lean accounting, as the main accounting method of lean manufacturing enterprises, is the core of value stream and supports the development of the whole manufacturing industry as the highest goal. For the lean manufacturing enterprises, this paper establishes a this paper established on the basis of the accounting system of the lean supplier evaluation index system, and calculates the different weights of each index through the analytic hierarchy process, and provides some references for the lean manufacturing enterprises how to accurately evaluate and select the suppliers.

1 Introduction

Rapid social and economic development, making more and more enterprises in the strategic development process will focus on the partners, through the overall strategic cooperation to improve the competitiveness of enterprises in the market. As the source of the supply chain, the supplier is responsible for providing the manufacturing resources needed by the enterprise. Its performance directly affects the delivery level, product quality, inventory level and customer satisfaction of the core enterprise, thereby affecting the performance of the entire supply chain [1]. Scientific and reasonable evaluation of suppliers is an objective basis for supplier selection and price determination in the latter part of procurement process. It is also an important tool for suppliers to enhance product quality and service level [2]. The shift in market demand patterns has prompted rapid response capabilities to become the main factor for companies to gain a competitive advantage in the market, and then promotes lean production methods that respond quickly to market demands with the highest quality, and maximum efficiency. The world's manufacturing industry has been continuously developed and promoted.

In the pursuit of lean manufacturing and the implementation of lean methods, many companies find that traditional accounting and financial control systems no longer apply. Under this background, lean accounting with the aim of customer value as the core and value stream as the core to eliminate waste came into being. The supplier assessment is the most critical step in almost all manufacturing operations. The lean accounting-based supplier evaluation system has significant theoretical value and practical significance for companies that implement lean manufacturing. Suppliers play a very important role in the supply of materials for lean manufacturing companies. The article then uses the AHP to guide the supplier evaluation system and selects the best suppliers as long-term partners based on important measurement indicators.

2 Lean Accounting Systems

2.1 Lean Accounting Introduction

Lean accounting to customer value-oriented, value flow as the core, to eliminate waste for the purpose. It is a brand new way of accounting thinking, which is embodied in the combination of the concept of financial accounting and lean management, the value flow cost control of every link in the process of production and operation, the pursuit of the optimization of value flow cost, to enhance the competitiveness of enterprises in the market. Lean accounting has a rich connotation, using a variety of and interrelated, the role of management methods, and gradually formed a complete system

of methods. From an objective point of view, it is difficult for each individual method to grasp the essence of lean accounting. Only when multiple ideas and methods interact and organically combine, the lean accounting system can fully play its role [3].

In contrast to lean manufacturing companies, there are serious shortcomings with traditional performance measures. Therefore, such indicators apply only to non-lean manufacturing. Lean Accounting provides lean performance metrics for lean manufacturing enterprises. These indicators are streamlined, reduce the task of collecting information, save a lot of time collecting relevant data, and timely meet the company's demand for major financial information. They mainly focus on lean production and achieve lean performance. Lean organizations internal performance appraisal is the key to business control and improvement, lean manufacturers need at least the following three different levels of performance measures: production unit performance indicators, the value of flow performance indicators, the company or factory performance indicators.

3 Supplier Evaluation System Based on Lean Accounting

3.1 The Establishment of Indicator System.

An organization transformed from mass production to lean production, and its accounting, control and measurement system will change accordingly. Because traditional accounting systems based on the principle of mass production and run counter to lean thinking, accounting, control and measurement systems must be drastically adjusted so that lean thinking and lean manufacturing persist in the organization. As the lean accounting system most suitable for lean manufacturing enterprises, an important condition to meet is to replace the traditional performance indicators with lean performance indicators, stimulate enterprises to carry out lean operations at all levels and create continuous lean improvement. These lean metrics reflect a company's Lean Strategy and form the basis for business operations and financial controls.

The formation of Lean Unit Performance Metrics derives directly from the company's corporate strategy with the goal of continually improving the value stream. They are streamlined, focusing primarily on lean manufacturing and motivating employees to achieve lean goals. These performance measures are usually published hourly and daily, mainly including hourly reports, product / standard on product ratio, first pass rate and overall equipment efficiency. Value Stream Performance Metrics measure the ability to improve the value stream and effectively create value for customers, with the goal of continually improving the value stream. These indicators are released weekly, mainly including per capita sales, on-time delivery, feed-to-delivery, first pass, average unit cost, and debtor days. Performance metrics for companies or factories often used to oversee the company's strategic goals, with more emphasis on financial results than at other two levels of performance metrics.

Based on the analytic hierarchy process (AHP), lean accounting is used to provide lean measurement indicators for lean manufacturing enterprises, and the corresponding lean measurement indicators are selected at three levels. The Supplier evaluation index system is shown in Figure 1.

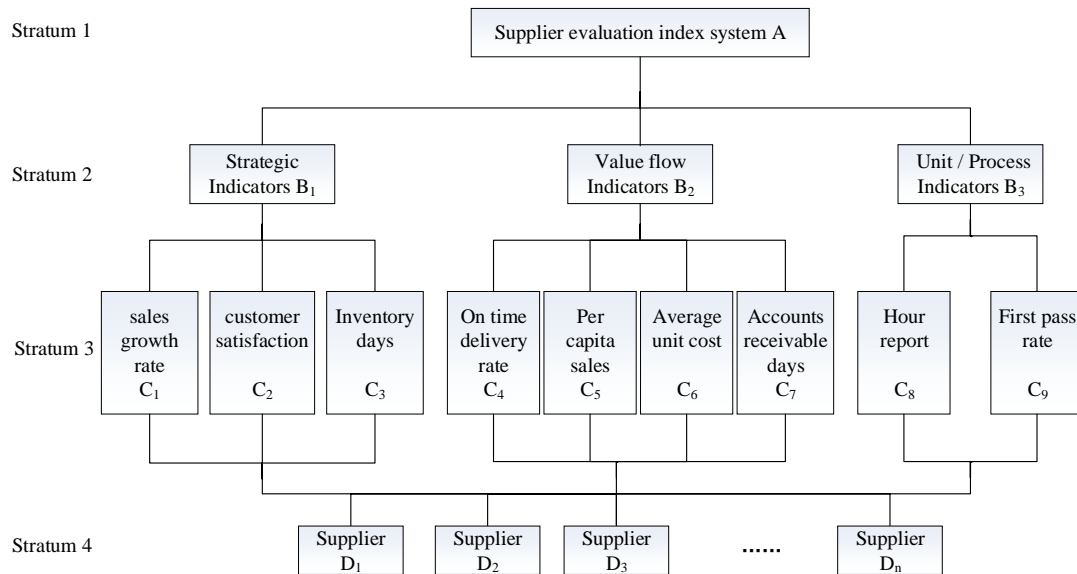


Fig. 1 Supplier evaluation index system

3.2 Analytic Hierarchy Process and Calculation Example

Analytic Hierarchy Process (AHP) is a method for analyzing the last conclusion by decomposing the evaluation target layer and layer, refining the index, then evaluating the relevant index and multiplying the corresponding weight. Although this method needs to confirm the weight value of each index through the expert group initially, because the method sets up the inspection link, the result of the expert judgment is checked by the way of setting up the matrix. If the test fails, the expert is needed Group re-discussion set the weight value until it passed the test. According to the Fig. 1, based on the AHP, we can gain the following.

First, based on the overall target A of the supplier evaluation index system of tier 1, the three evaluation items of the strategic index B1, the value flow index B2 and the unit / process index B3 of the tier 2 are evaluated in pairs. Paired comparison matrix and weight calculation results in Table 1.

Table 1. Pairwise comparisons between items B₁, B₂ and B₃ in Level 2

A	B ₁	B ₂	B ₃	Importance	Consistency check
B ₁	1	1/3	1/3	0.142	C.R.=0
B ₂	3	1	1	0.429	
B ₃	3	1	1	0.429	

The conclusion is that the former two are closer to the purchasing activities of suppliers by lean manufacturing enterprises and are more suitable for evaluating the suppliers. Similarly, pairwise comparisons between sub-items C1, C2 ... C9 under the three rating items B1, B2 and B3 of level 2 are calculated. The paired comparison matrix and weight for the nine sub-projects under the three evaluation items can calculate.

When the weight of each sub-project relative to the project is calculated, the weight of each sub-project relative to the total goal needs to be calculated, that is, the result of calculating the comprehensive weight. Table 2 shows the result of the comprehensive weight calculation.

Table 2. Comprehensive weight of each sub-project

	B ₁ 0.142	B ₂ 0.429	B ₃ 0.429	Comprehensive weight
C ₁ 0.637	0.637			0.090
C ₂ 0.105	0.105			0.015
C ₃ 0.258	0.258			0.037
C ₄ 0.578		0.578		0.248
C ₅ 0.210		0.210		0.052
C ₆ 0.238		0.238		0.102
C ₇ 0.064		0.064		0.027
C ₈ 0.833			0.833	0.357
C ₉ 0.167			0.167	0.072

According to the analytic hierarchy process consistency test, when C.R. <0.1, the correlation matrix is considered to be a satisfactory consistency matrix, indicating that the relationship between elements is logical. It can be seen from the above table that the consistency ratios C.R. of all four matrices are less than 0.1, that is, they can pass the consistency test and the results are consistent.

Conclusion

Lean manufacturing enterprises to implement lean management procurement should pay attention to efficiency, the pursuit of the shortest possible time to purchase the necessary products to ensure that as fast as possible to produce the products or services the market needs. In addition, the quality of the materials purchased from the supplier is directly related to the quality of the result produced by the enterprise during production and operation. If the quality of the procurement can be steadily improved, the procurement cost and the production cost will be reduced. Therefore, the supplier evaluation, control of procurement quality is to ensure the effectiveness of business operations, a key factor.

References

- [1]. Qi L, Shi J, Xu X. Supplier competition and its impact on firm's sourcing strategy ☆[J]. Omega, 2015, 55:91-110.
- [2]. Nagati H, Rebolledo C. Supplier development efforts: The suppliers' point of view[J]. Industrial Marketing Management, 2013, 42(2):180-188.
- [3]. Arbulolópez P R D, Fortunysantos J. An accounting system to support process improvements: Transition to lean accounting [J]. Journal of Industrial Engineering & Management, 2010, 3(3): pages. 576-602.