Whether the Lean Management can Affect The Innovative Performance in the Manufacturing Industry – a Case Study of a Chinese State-Owned Company

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Abstract. With the rapid development of modern Chinese companies, small-and-medium companies play a more and more critical role. At the same time, the competition among Chinese SMEs is also intensifying. This paper proposes the significance of lean management under current enterprise management through the introduction of lean management, how it affects innovation, and the case analysis of a manufacturing SME. The case analysis includes quality process management and improvement, waste elimination, employee participation, good leadership, and supplier relationship. These measures of lean management give a general understanding of how the company inspires innovation and further show that LM has a remarkable effect on SMEs, especially in the manufacturing sector.

1 Introduction

Lean management (LM) and Innovation have been two popular concepts for decades. LM is considered the driving force behind Japan's industrial prosperity. Innovation is viewed as a response to alterations in client demand, rivalry, and technology capacities. LM is a continuous cultural practice that aims to enhance all parts of the organization by cutting waste to become more cost-effective and competitive. Manufacturing cells, JIT, Kanban, cross-functional teams, decentralization, or flattened hierarchies are examples of LM tools used by to increase organizational Innovation. In this paper, a Chinese State-owned Company can be used to do a case analysis to indicate how LM practices improve the company's performance.

2 Literature Review

Lean management constitutes a relatively new area that has emerged from the Toyota Production System (TPS); the TPS inspired the LM philosophy and process methodology, and Lean focuses on waste (Muda), unevenness (Mura), and overburdening (Muri) [1]. Lean requires utilizing abilities, knowledge, and assets with a waste-reduction focus [2]. Overall, Lean Production (LP) method is a comprehensive and long-term-oriented methodical approach that necessitates a change in employee attitudes and awareness to achieve a continuous value stream while avoiding waste [3].

However, China has less desirable LM implementation status among its enterprises these years as many companies see results after long periods. At the same time, achieving LM in the continuing operations of enterprises and some companies even appear to exhibit the "retrograde step," in which many aspects of production and operations revert to the state before the introduction of the lean management model. [4]. On the other, despite the similarities between Lean and innovation management, there needs to be more empirical research on their connection [5]. In addition, numerous studies have concluded that LM can provide additional benefits to a company. However, there still needs to be case studies on companies implementing a strategy [6].

3 Example Company Introduction

The B company's predecessor was an old stat-owned electrical factory, and they owned over 800 employees now, which is a typical small and medium-sized enterprise. In 2003, an Environment Science & Technology Company purchased this factory and became a high-tech company. The main products of the B company are construction machinery, agricultural machinery parts, integrated automatic logistics conveying and sorting equipment systems, electric precipitators and other air pollution assemblies, high and low-voltage switch gear assemblies, etc. They have many suppliers, for example, Caterpillar, Volvo, John Deere, and AGCO. Supporting these products was popular with more and more suppliers is their quality management. The company has been certified by ISO9001 Quality Assurance System, ISO14001 Environment Management System and GB/T28001 Occupational Health and Safety Management System. The B company's top management often organizes quality activities such as internal audits and management reviews every year to evaluate the
quality management system's adequacy, performance, and effectiveness. In addition, The B company also learned from the advanced practices of Caterpillar and Toyota lean management systems to improve production efficiency and achieve cost savings to win an excellent reputation.

4 Practical LM measures that contributed to IP of B company

4.1 Quality process management and improvement

Quality information, like feedback from manufacturing processes that comes at the right time, is expected to boost innovation, and speed up the release of new products [7]. The goal of process improvement (including lean initiatives) is to promote efficiency, standardization, and uniformity, which in turn increases innovative performance [8]. The B company also implemented standard quality process management and improvement. They report different client complaints monthly and help analyze customer quality problems. Under the complaints trend analysis, coating occupied the most significant percentage of all problems. At the same time, B company had specific after-sales people who serviced different customers and made detailed quality maintenance feedback. These graphs, on the one hand, give B company a clear understanding of issues.

4.2 Waste elimination

Lean initiatives prioritize the delivery of products by maximizing value and minimizing waste [9]. The B company always insists on reducing waste, such as inventory improvement projects. The report reflected how the team reduced inventory space, accelerated capital turnover, and project period. B company's annual report showed that the accuracy of sampling raw material had been maintained at 96%. Managing inventory and raw materials increased the cash balance to over 842500 Yuan. Be-sides, inventory reduction is a physical and visible indicator of LM and faster customer responsiveness [10]. By reducing the inventory, the customer responsiveness of company B increased from 75.5% to 86.2% and accelerated capital turnover, which ensured that enterprises got out of difficulties.

4.3 Building strong customer relationship

Among different factors of LM, customer focus is an important variable that needs to be considered. B company paid great attention to customer relationships. According to most experts, customers reacted positively to being involved in product development, were eager to assist, and felt honored to be consulted [11]. As mentioned, B Company had after-sales specialists for their customers and committed to different services. A well-informed consumer can mean receiving much-needed customer feedback and not receiving it [11]. In recent years, the company's sales department regularly conducted a satisfaction survey of different customer groups, and the satisfaction mark is consistently above 90 points.

Moreover, the trend analysis for satisfaction has been rising for three years. The B company actively applied for the ISO90001 quality certification system, ISO14001 environmental management system, and ISO45001 occupational health and safety management system to provide customers with high-quality, satisfactory products and services. With excellent quality and excellent service, their products successfully became the construction machinery parts supplier of Caterpillar, Volvo, John Deere, Kray, JCB, Kohler, and other internationally famous construction machinery manufacturing enterprises.

4.4 Employee participation

The essence of Lean is 'including everyone' in problem identification and resolution [10]. As a typical company of LM, B company focuses on employee participation. Each employee in their company had a form to report their yearly performance indicators. This form included personal suggestions for rationalization, cost saving, number of improvement projects, and personal improvement projects. By setting up different indicators, employee engagement has dramatically increased, contributing to innovative performance.

Concerning suggestions for rationalization, they also kept following up on these suggestions and reporting the actual status. Additionally, since the completed maintenance dates are documented, it is easier to monitor personnel performance [12]. Overall, B company respects every employee, strongly encourages them to make personal and career plans, and guides them to combine their personal development goals. Simultaneously, the employees' talents are given full play, and the personal ideal is combined with the whole company's goal. As evidenced by increased employee appreciation, lean front-end procedures have a favorable impact on business innovativeness [6]. Moreover, [13] discovered that employees who have external contacts contribute more to innovative activities within the firm.

4.5 Good leadership

Good leaders typically emerge from organizations with successful leadership development programs yet having these programs in place does not ensure good leaders [14]. The leadership of B company conducted internal audits, management reviews, and other quality activities every year to evaluate the quality management system's adequacy, suitability, and effectiveness and make continuous improvements. At the process management level, they continue to innovate and improve product quality by utilizing technical improvement, quality improvement, and management improvement. One of the most prominent characteristics was the chief quality officer (CQO). This CQO is the company's senior leader who needs to take responsibility for quality management.
organization and appoints a manager representative to be fully responsible for the company's all-round, whole-process, and full-staff quality management activities.

4.6 Supplier relationship

The suppliers' contributions to the value-adding process have prompted many producers to show more care in interacting with these and implement effective supply methods [15]. TQM is critical in promoting supplier quality management [16]. Thus, B company provided two ways to choose suppliers. First, they strictly screened suppliers and established a standardized procurement operation process and a standardized quality management system to develop, verify, and review suppliers. Then, they implemented process control in all links, such as procurement plan orders, purchased inspection, and warehousing. Finally, they provided reasonable payment credit periods to improve the company's reputation and promote the integrity of cooperation between the two parties. Besides, B company also used competitive bidding to choose the lower price at a certain level. Supply chain sustainability is increasingly recognized as a critical factor in enhancing corporate performance and gaining a competitive edge in today's market [17].

5 Evaluation

5.1 Process efficiency improvement

Technical LM practices can enable employees to apply innovative thinking and activities to continuously improve processes and working methods, resulting in increased innovation [8]. With specialized LM techniques like process control, B company significantly improves production efficiency. Figure 1 shows the logistics of conveying equipment. B company took some LM actions to increase the useful life of conveying equipment. For example, they changed the claw belt wheel to the belt roller at the transition of the conveyor so that it could solve the problem of tearing the conveyor belt caused by the immense force of the original claw belt wheel. At the same time, they also changed the belt roller to the belt roller at the transition of the conveyor so that it could solve the problem of tearing the conveyor belt caused by the immense force of the original claw belt wheel. At the same time, they also added hanging equipment to the drum to eliminate the problem of material adhesion at the drum, which improved the efficiency of conveying equipment to meet the production needs better and improve the process efficiency.

5.2 Updating Management system

On the one hand, as mentioned before, they did regular clearance of raw material surplus and inventory management. Promoting working time quota management increased production and reduced material costs. Simultaneously, implementing three-dimensional warehouse management improves storage operation efficiency and reduces inventory costs. On the other hand, a primary motivation for adopting Lean is the improvement it may bring to happiness, customer loyalty, and employee engagement [11]. By improving B company's customer loyalty and employee engagement, their brand reputation can be dramatically increased. By optimizing re-source usage and improving the brand reputation, the company's management system was updated to improve equipment utilization and production efficiency, the flexible production capacity, and the standardized management level of enterprises.

5.3 Talent management

Internally, the Lean coach empowers employees, guiding them toward self-development, self-regulation, and self-reliance on their path of "learning how to learn" and "constant persuasion of perfection" [7]. B company inspired employees by setting up their own goals and line with company goals. Many researchers considered that employees are allowed to define their roadmap as long as they achieve the agreed-upon timeframes, and the firm's goals are broken down into tangible milestones to be agreed upon by employees through continual communication, negotiation, and consensus-building [7,18]. Only employees with an innovative streak are temporarily separated from their regular duties, formed into teams, and allowed to experiment with new ideas while still being held responsible for the product's eventual release [19]. The employee in B company Continuously researched and developed automated logistics equipment products that meet market demand, such as intelligent three-dimensional warehouses, high-speed cross-belt sorters, high-speed slider sorters, roller conveyor lines, jacking transplanters, balance wheel sorters, and inclined top wheel sorters. By continuously motivating their innovation, B company's research and development costs kept rising, and some employees successfully applied for Chinese national patents certification.
6 Conclusion
Generally, LM was initially from the Toyota production system widely used in different industries and achieved outstanding achievement. This case study also provided enough evidence about B company to indicate the benefit of LM. It conceptualized LM in some measures, such as customer relationships, employee relationships, and others, giving a clear understanding of LM from a practical insight. At the same time, listing some specific results after implementing the LM model that process efficiency can be improved, the management system can be updated, and cultivate more talent for innovation. In general, LM in B company has achieved initial success, and their operational mode can provide an example for other manufacturing and SME companies.

7 Limitations and Future Expectation
First, this case study is based on theoretically based mainly rather than empirical evidence. At the same time, the B company is a small-and-medium size manufacturing company. So, this company needs more reference significance for large companies and other industries, e.g., service. Lastly, this paper did not divide LM into different dimensions like previous research papers, such as soft and hard. However, this thesis also had its advantages. For example, it provides inspiration and guidelines for SME companies, especially the Manufacturing sector in China.

Meanwhile, it also triggers management to think about better managing the company under the LM method. From a research perspective, this paper motivated later generations more firmly to study LM and to provide theoretical and practical support. Besides, this company provided enough case evidence that LM can promote innovation. On the other hand, B company’s LM method did not apply to all the departments. It just applied in some departments related to production and management, like the administrative department. Thus, LM is still a relatively difficult task for B company. The implementation of LM needs to cover every department to promote the sustainable development of the whole company.

Reference

