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Discussion on the Shortcomings and Countermeasures of Lean Management in Manufacturing Industry in the Industry 4.0 Era

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Abstract

Industry 4.0 and economic globalization have transformed the vast Earth into a "global village." At the same time, the world is experiencing major changes unseen in a century, presenting both risks and opportunities for China's manufacturing industry. The coexistence of lean, digital, interconnected, and intelligent practices is a necessary means to propel the upgrading and transformation of the manufacturing industry, reducing costs, and enhancing efficiency. Currently, most of China's manufacturing enterprises are at the Industrial 1.0, 2.0, or 3.0 stages, exhibiting a high degree of technological prowess but light management thinking, with inadequate crisis awareness. How can we utilize the tide of the "Made in China 2025" strategy and the 14th Five-Year Plan for intelligent manufacturing to navigate China's economy towards a high-quality development trajectory? Only by developing and nurturing the "lean" soft power of enterprises, establishing lean management with Chinese characteristics tailored to their needs, eliminating all waste, continuously improving, and achieving everyone's lean. Simultaneously, we must enhance the hard power, adhering to "internal and external refinement", in order to achieve a strategic leapfrogging in the global manufacturing game. This paper starts with an analysis of the crucial significance of lean management in Chinese manufacturing enterprises, introduces the history of lean management's development, deeply analyzes the current state and shortcomings of lean management in Chinese manufacturing enterprises, the difficulties and challenges faced by enterprises, and proposes targeted countermeasures and methods to address the problems of enterprise management, aiming to provide relevant references for the takeoff of Chinese manufacturing enterprises.

Keywords

Industry 4.0; Lean Management; Toyota Production System; Lean Culture.

1. Introduction

With the rapid advent of the global Industry 4.0 technological revolution and economic globalization, continuous breakthroughs in new technologies provide fresh historical opportunities for the high-end, intelligent, and green development of the manufacturing industry. At the same time, the world is undergoing unprecedented transformations, marked by intensifying global technological and economic competition. The strategic rivalry between major powers is centered on the manufacturing industry. Strategies such as the United States' "Advanced Manufacturing National Strategic Plan" and "Advanced Manufacturing Partnership (AMP) Plan," Germany's "National Industrial Strategy 2030," Japan's "Society 5.0" strategy, and South Korea's "Manufacturing Innovation 3.0" strategy, all geared towards revitalizing the manufacturing industry, aim to capture the commanding heights of a new round of global manufacturing competition.

China closely tracks global manufacturing trends and has introduced the "Made in China 2025" strategy and the "14th Five-Year Plan for the Development of Intelligent Manufacturing," in

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order to transform Chinese manufacturing from "big but not strong" to "big and strong." These strategies focus on advancing the upgrading and transformation of the manufacturing industry, while aiming to reduce costs and enhance efficiency. Digitization, networking, greening, and intelligence are concurrently promoted as the pivotal development directions for the future manufacturing industry. Chinese manufacturing enterprises are actively engaged in the process of upgrading, transforming, reducing costs and increasing efficiency. However, despite significant investments in reshaping development models, optimizing economic structures and shifting growth engines, some enterprises have witnessed minimal results, even experiencing short-term inefficiencies and operational disruptions. The underlying issue stems from the lack of solid internal skills, specifically the failure to establish a robust foundation through lean production management. China's manufacturing industry is characterized by a blend of Industry 1.0, 2.0, and 3.0 now. Some enterprises are still in the exploratory and assimilation phase of management awareness, while others prioritize business model innovation but adhere to traditional management practices, The disadvantages of overvaluing technology rather than management are widespread in most enterprises of our country. To expedite the upgrading and transformation of China's manufacturing industry and foster digital and intelligent manufacturing, effectively improving the level of enterprise management is an urgent imperative.

In the early 20th century, the United States achieved world dominance in manufacturing through technological innovation and management innovation. Post-World War II, Japan and Germany capitalized on American experiences, blending them with their unique local contexts to devise management theories and models tailored to their national needs. They leveraged technological innovation and managerial innovation to attain world-class manufacturing status too [1]. In Germany, lean management is defined as the first of the four modules of the future smart factory now. Professor Henke of the Fraunhofer Institute underscores this, stating, "To achieve Industry 4.0, we must first achieve Management 4.0." Industry 4.0 should not be viewed solely as an industrial revolution or technological revolution; it is also a revolution in enterprise management. The Ministry of Industry and Information Technology's 14th Five-Year Plan for Intelligent Manufacturing Development repeatedly emphasizes the importance of management innovation, optimization, decision-making, total factor management and intelligence in 2021. Similarly, the CPC Central Committee's decision, issued on July 18, 2024, mandates the cultivation and expansion of advanced manufacturing clusters, fostering the high-end, intelligent, and green development of manufacturing. For Chinese enterprises, to achieve Industry 4.0 and overtake competitors, both technology and management are essential. and the most important thing is to concentrate on consolidating lean management.

2. Overview of Lean Management Concept

Henry Ford I, the founder of Ford Motor Company and a great entrepreneur who has dominated Forbes' list of the 20 most influential entrepreneurs since 2005, once said, "We never include useless things in our company. When we remove the useless parts and simplify the necessary parts, we also reduce manufacturing costs." This is the best interpretation of "lean" by the Fords.

Toyota is the pioneer of the lean management philosophy and an indelible figure in the history of lean management model development. In 1935, Toyota President Kiichiro Toyoda proposed the "JIT concept," which stands for "Just In Time" and refers to completing the necessary quantity of necessary products at the lowest cost within the necessary time. "Toyota's JIT production system may be the most important management innovation to improve productivity since Taylor's scientific management in the 20th century," said Schoenberg, author of the book "World Class Manufacturing." In 1953, Toyota's Vice President, Taiichi Ohno, founded the unique Toyota Production System (TPS), characterized by multiple varieties, small

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batches, high quality, and low consumption. The birth of this system marked the formal establishment of the lean production model and ultimately shaped the Toyota lean management philosophy that has amazed the world. The core idea is to eliminate all ineffective labor and waste, and to pursue perfection relentlessly in market competition [2]. He mentioned in his book "The Toyota Production System": "The Toyota Production System is the Toyota style of IE, which is the IE that creates profits."

Subsequently, Japan promoted the Toyota production model fully, and its global competitiveness in manufacturing gradually surpassed that of the United States. American scholars began to pay attention to and study the successful experience of Japan's manufacturing industry. In 1985, the Massachusetts Institute of Technology (MIT) organized the "International Motor Vehicle Program (IMVP)" research project. Led by Professor Daniel Luce, the research team conducted a comprehensive investigation of nearly 90 automotive assembly plants in 14 countries over a period of five years, and compared Western production methods with Toyota's production methods. In 1990, they published "Tools to Change the World", which for the first time named Toyota's production method lean production (LP) [3].

If the early Ford production method is called the Lean Production 1.0 era, Toyota's production method can be called the Lean Production 2.0 era [4].

In 1998, The American Production and Inventory Control Society (APICS) defined lean as identifying and eliminating all non-value-added activities in a company's business operations.

Lean management originates from lean production, just as a solid foundation is the cornerstone of high-rise buildings, lean management is the soft power for enterprise upgrading and transformation, cost reduction and efficiency improvement, and the cornerstone for enterprises to imprint the symbol of Industry 4.0 era.

3. Current Situation of Lean Management in Chinese Manufacturing Enterprises

The industry 4.0 revolution has just commenced. Confronted with these historic opportunities, some domestic enterprises, which are still in the industry 1.0 to 3.0 stages, solely concentrate on short-term benefits, resting on their laurels without establishing long-term plans and objectives, undergoing change, transformation and upgrading.

Some enterprises have weak management foundations, and their senior management lacks systematic learning and mastery of enterprise management knowledge. They rely on their authority to carry out "big pressure small" tough management or prioritize technology over management, thereby constraining employees' initiative and creativity.

Some enterprises have achieved rapid growth in output value, yet their profit-to-output ratio remains very low. Despite their size, they are not strong due to high manufacturing costs, low qualification rates, and subpar product quality. Ultimately, this stems from extensive management and the absence of established lean production management models. Consequently, such enterprises find it difficult to survive in future competition.

Some companies only introduce lean management on-site, and after several years of implementation, they fail to systematically apply lean tools such as 5S management improvement, equipment layout optimization, equipment management, rapid production changeovers, and standardized operations. Moreover, they lack even the most fundamental lean management systems. The senior management of these companies still continues to hold daily production progress coordination meetings, while frontline workers are often required to work overtime. Production site operations remain unstandardized, material flow is irregular, equipment efficiency is low, and there is a prevalent waste of resources, including both employee time and materials.

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Some enterprises have imperfect talent mechanisms, lack clear career promotion channels for employees, Lack of talent strategic reserve mechanism, lack systematic strategic planning for talent cultivation in important departments and positions, Some enterprises suffer from imperfect talent mechanisms, characterized by a lack of clear career advancement pathways for employees. They engage in on-the-spot hiring, neglect systematic strategic planning for talent development in crucial departments and positions, and invest insufficient funding and effort into talent nurturing. Consequently, these enterprises experience high talent turnover, lack a robust corporate culture, and fall short in demonstrating humanistic care.

At present, many senior executives of domestic enterprises still have the following shallow understanding of lean management: "Do manufacturing enterprises need lean production?", "Is lean production completely suitable for domestic manufacturing industry?", "Will lean be like ISO in the 1990s, blown by the wind?", "Is lean management necessary for enterprise management? "[5] …….

Production is not lean, manufacturing technology is not innovative. The disappearance of enterprises is due to the lack of lean improvement and innovative culture caused by numbness to low efficiency, and even the overall lack of the enterprise in all aspects.

If a company is still outside of lean, then it is already in the old age zone of improvement and innovation. Without lean, the enterprise is already outdated.

If a company is not lean, it will become old. This "old" refers to the awareness, cognition, processes, technology, methods, and talents of the enterprise, especially the aging of the system and culture for enterprise improvement and innovation. Many people may not necessarily agree with this statement, especially those enterprises that have not practiced lean or have not persisted in lean. Only those enterprises that have always believed in lean, practiced lean, and gained full benefits over the years will deeply understand the truth behind it.

4. Countermeasures and Methods for Solving Lean Management in Enterprises

4.1. Strengthen the Thinking of Revolution from Top to Bottom

All aspects of production and management are intertwined with people. Only by transforming people's mindset can we alter their working methods and, ultimately, enhance the production format and management mode of the enterprise. Therefore, senior executives of enterprises should possess self-denying and forward-thinking mindsets.

Lean management emerges as a novel paradigm, forged through questioning and rejecting established management frameworks. For senior executives, self-negation and corporate negation serve as catalysts for personal and organizational growth, while the negation of the present is the pursuit of the future of the enterprise. In 1985, Zhang Ruimin, the director of Qingdao Refrigerator Factory, the predecessor of Haier Group, personally smashed 76 refrigerators with quality problems, reflecting the negative thinking of the senior management. From then on, the factory continued to innovate and strive for excellence in its products, ultimately becoming a world-renowned enterprise.

Therefore, senior executives of enterprises must start from themselves, constantly reflect and summarize themselves, and constantly improve their ability to identify problems. Concurrently, they must ignite a spark of self-doubt within employees, kindling ambition and nurturing a culture of critical thinking. This necessitates boldly challenging assumptions, both internal and external to the organization, and relentlessly seeking more optimal solutions to minimize the likelihood of problems. Crucially, during an enterprise's infancy, both leadership and staff are fueled by enthusiasm and a drive for progress. However, as the company matures and attains milestones, complacency can creep in, dampening ambition and fostering a mindset of ease. In

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such junctures, self-denying and forward-thinking become paramount for sustaining lean improvements. When leaders perceive complacency in themselves or their teams, they must adopt a "three reflections daily" mindset, benchmarking industry leaders or peer organizations to identify gaps, address shortcomings, and enhance the company's sense of crisis.

4.2. Proficient in Change Methods, 'Before the Troops Move, Food and Supplies Come First

Lean transformation requires personnel with lean management experience to form a lean management department or team, and build a systematic lean management policy, plan, and standardized process from five aspects: Tao, Law, Technology, Tools and Power. Only with sufficient provisions of lean management can lean management be fully implemented or executed.

(1) Tao is a clear direction, and Tao refers to lean ideas, thoughts and planning to guide the direction of improvement. Because lean has only a beginning and no end. So we need to firmly believe in lean, have a correct understanding of the core idea of continuous improvement in lean, grasp the will of lean change, and incorporate lean thinking and management into the top-level strategy of the enterprise.

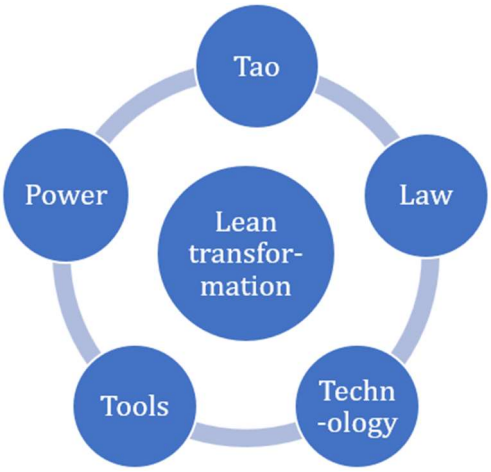

Figure 1. Five Major Aspects of Lean Transformation

(2) Law is the foundation, and it refers to the main line, system, and norms of lean management. Senior management and employees of enterprises should be clearly familiar with the top-level planning of lean promotion, take the value stream as the main line, formulate phased tasks and goals for lean transformation, as well as long-term tasks and goals, standardize and process lean management, and ensure the smooth implementation of lean management.

(3) Technology is based on strategy, and technology refers to the lean model. In lean improvement, various improvement tools and methods of lean and IE must be transformed into a logically related system process and standard routine in order to establish a sustainable system and culture.

(4) Tools make things happen. Tools refer to tools, means, and methods of lean, mainly referring to lean management tools, such as KPI, VSM/VSD, A3 reports, visualization, 5W1H, OEE, QCO,8S, TPM, Fishbone diagram,8D,6Sigma, pull, Production kanban, supermarket, ABC classification system, etc. Enterprises should find one or several lean management tools that are suitable for their own situation, and make good use of these tools with specialized expertise.

(5) Power builds people, and power refers to lean behavior and culture. For example, how to make lean a common language among employees; How to make concepts, tools, and methods of lean a daily routine for employees. Everyone in the enterprise participates in the daily

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improvement process from bottom to top, which becomes a lean improvement culture with full participation of all employees [5].

Without Tools, overcoming challenges becomes daunting; without Technology, Power remains elusive. Enterprises must systematically promote lean management from five aspects: Tao, Law, Technology, Tools and Power, and put food and supplies first to get twice the result with half the effort.

4.3. Lean Management and Top-level Design Complement Each Other

The key to lean management resides in top management. Without the strategic vision and top-level design of the enterprise's top management, lean management is akin to water without a source. Enterprises should establish business objectives and medium- to long-term strategic development directions that align with lean management, grounded in their unique vision, goals, and strategies. This top-level design must incorporate the structural blueprint of the lean management system, outlining its purpose, strategy, concepts, processes, and action plans. It should establish a process-oriented and standardized system, ensuring the continuity and operational efficiency of the lean management system.

It's crucial to clearly define the rights, responsibilities, roles, and accountabilities of senior management and managers within the lean management system in a rational organizational structure. They must take hands-on approaches, setting exemplary standards. The strategic backing of senior management is vital; without it, lean management resembles a headless fly. This support manifests in consistently adhering to lean management practices, directly correlating lean management outcomes with performance evaluations and promotions, and consistently providing necessary human, material, and financial resources.

Only with such support can lean management be targeted and have a clear direction, enabling lean management departments or teams to strive, consolidate achievements, and continually advance. Now, many enterprises rush to develop intelligent factories without adequately considering their reality, unaware that lean management serves as an irreplaceable "soft power" for enterprises. Intelligent factories devoid of a lean foundation become intellectually handicapped. Without lean design planning, enterprises will only have numerous loopholes, low efficiency, and even start over from scratch.

4.4. Senior, Middle, and Grassroots Levels, Each Performing Their Own Duties and Involving All Staff

Lean management is a typical "top leader" project, and only when the senior management of the enterprise first agrees with lean management and persistently strives to improve, can they form a joint force with all employees. For instance, the Tangshan Maintenance Branch of HBIS Group Co., Ltd. appointed the company's general manager as the project leader, collaborating closely with all functional departments to implement lean management [6]. Similarly, H Textile Enterprise's leaders have established a three-tiered organizational structure, spanning decision-making, facilitation, and execution levels, to carry out lean management effectively [7]. Nantong Acetate Fiber Co., Ltd. implemented the "1283" equipment lean management model under the guidance of senior management [8]. Furthermore, Shengu Group Co., Ltd. has created and implemented a lean management model for the entire value chain that suits its own characteristics [9]. They have all achieved extraordinary results. All these cases emphasize the importance of implementing lean management.

A wise senior executive in a company must first learn lean management well and transform themselves into a semi coach of lean management in order to better lead all employees in implementing lean management. Some senior executives of companies spend huge amounts of money and effort to introduce lean management, and then earnestly instruct the lean team: I have introduced lean management to provide everyone with good learning and training

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opportunities. Everyone should cherish the hard-won opportunities and strive to do a good job in lean management projects... Lean is not done for the team, nor is it done for employees. Don't think that it gives employees the opportunity to learn and train. Lean is the responsibility of employees. Throughout the entire lean management process, the ultimate beneficiaries are always the enterprise, and the success or failure of lean ultimately rests with the top management of the enterprise."

The difficulty of lean management lies in the middle management. Without the support of the middle management, lean management cannot take root. As is well known, the middle management of an enterprise is the direct manager of the enterprise, serving as the "intermediary" for instructions. If the middle management is unwilling to implement lean improvement, they will not arrange for the grassroots employees under their jurisdiction to execute it, nor mobilize resources to support lean change, nor will they coordinate lean work. When encountering problems, they will not actively respond and solve them. On the contrary, the middle management will magnify any problem as a reason for opposition or an excuse for failure. Even situations where the middle management "controls or kidnaps the top management" have occurred. So the top management or lean management team should always keep an eye on the middle management, let them understand the concept, purpose, and significance of lean management, set an example by personally taking part, do a good job in supervision and rewards and punishments, dare to "show the sword", be brave to " kill a chicken before a monkey", and let the lean management concept blossom in the middle management.

The focus of lean management is at the grassroots level, without grassroots execution, lean is like a castle in the air. The basic work of manufacturing is carried out at the grassroots level, and the efforts of lean management should be placed at the grassroots level; The focus of lean management should also be lowered to the grassroots level. At the same time, lean tools and methods such as rationalization proposals, 8S management, standardized operations, proposal improvement, Multi skilled worker, visualization, group activities and five-star teams, QCC project improvement, and the promotion of benchmarks and role models need to be developed and built around the grassroots level. Only by solidly cultivating and improving lean improvement systems and culture at the grassroots level, can true lean management be more than just a castle in the air or a flash in the pan.

The top management values lean management, the middle management values lean promotion and guidance, and the grassroots changes their original thinking and work habits, implementing it meticulously in a people-oriented corporate culture. That’s to say, the top management does the right thing, the middle management does the right thing, and the grassroots does the right thing. The concept, ideas, and methods of lean management are always embedded in the process from strategy to execution, eliminating all waste and achieving the maximum value and benefits of the company. Enterprises from top to bottom, each performing their own duties, closely collaborating, have given wings to soar towards Industry 4.0.

4.5. Adhere to People-oriented and Everyone Lean

The classic movie line 'What is the most expensive in the 21st century? Talent.' still has profound practical significance today. Talents are the core and soul of lean management, the only bridge connecting enterprise strategy with lean management system and continuous improvement culture, the key factor for the success of lean management, and a crucial link in promoting technological progress and management innovation. Professor Henk from the Fraunhofer Society in Germany believes that "people" are the core of Industry 4.0, and that change directly affects people. Enterprises should always adhere to talent development strategy, care for and love talents, and do a good job in the construction of talent echelons.

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Since ancient times, China has emphasized the importance of putting people first. Mr. Zeng Shiqiang, the author of "Chinese Style Management" once said: Management is a process, starting with self-improvement and ending with human tranquility. The "self-improvement" of lean management refers to learning lean management knowledge, mastering lean management skills, and elevating the understanding of lean management theory. We also need to cultivate awareness of lean management, master the goals, principles, and tools of lean management, and flexibly solve on-site problems based on the combination of theory and practice; The "human tranquility" in lean management refers to first stimulating individuals' work passion, creating personal value through on-site practice, and then influencing and stimulating other employees' interest in lean management, subtly imparting theories and skills, and ultimately achieving full participation of all employees in lean management of the enterprise from bottom to top, realizing that everyone is the small owner of the enterprise and the enterprise is the second home of employees.

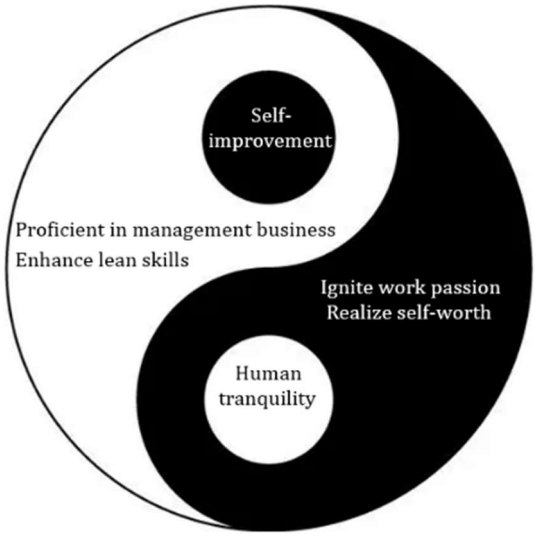

Figure 2. Self-improvement and Human Tranquility of Lean Management

"Toyota not only produces cars, but also talents." Toyota has always regarded respecting and cherishing people as the top priority of lean production management. Its connotation is as follows: business lies in people, employees are a part of enterprise capital, the key to business success lies in people's strategy, and all employees are the most valuable intangible assets of the company [10]. It is the implementation of this policy that has given Toyota's lean production a soul, actively mobilizing employees' sense of belonging and participation in lean production, and ensuring the smooth progress of lean production.

The innovation of Toyota's production method is also a concrete manifestation of Toyota's people-oriented approach. Transforming ordinary employees into proactive thinkers who utilize their mental abilities, transforming manual laborers who follow a routine into continuous improvement mental laborers, and allowing office mental laborers to delve into the "three aspects" of problem-solving, turning them into manual laborers. Thus, every employee can receive care and respect from the company, tap into their potential, contribute their strength and wisdom, and fully reflect the value of each employee [11].

Therefore, to prioritize people, the following three initiatives should be undertaken: firstly, reducing the labor intensity of employees. The essence of lean management is to simplify complex problems and make cumbersome problems lighter. Through reasonable planning and design, enterprises make work simple and lightweight, reducing employees' workload and improving work efficiency. Secondly, moderate authorization. Empower employees to become

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the masters of their own work, rather than servants, making autonomous decisions and fully unleashing their subjective initiative. For example, when there is an abnormality in production, employees immediately determine whether to stop the machine, which can minimize the losses of the enterprise to the greatest extent possible. Finally, cultivate, care for, and motivate employees. To put the slogan that employees are the most valuable asset of the enterprise into practice, continuous theoretical and operational training should be conducted to enhance employees' professional skills and comprehensive qualities; Caring for employees, providing them with humanistic care, emotional care, family care, etc., enhancing their sense of belonging and loyalty, and improving their job satisfaction; By implementing salary incentives, promotion incentives, recognition incentives, and personalized incentives, employees' work enthusiasm can be improved. At present, Henan mining crane Co., Ltd., and Henan Donglai trading group embody the pinnacle of a people-centric approach.

4.6. Building a Lean Culture, Customer First

Throughout Toyota's development history, it is not the TPS philosophy that has shaped Toyota culture, but rather Toyota culture that has nurtured TPS.

"Customers are God, our sustenance and shelter" The original intention of building a lean culture in enterprises must be customer-oriented. Customer orientation is the basic principle of enterprise management and also a concrete manifestation of the primary principle of lean management, "flexibility". Lean means thin and slim. Establishing a customer-oriented lean culture means "slimming down" various organizational structures of the enterprise, reducing or breaking down hierarchical settings, such as establishing independent small teams of less than 150 people, whose sole purpose is to serve customers wholeheartedly. The "RenDanHeYi" model of Zhang Ruimin, Chairman of the Board of Directors and CEO of Haier Group, the "Amiba Operation" led by Inamori Kazuo, the founder of Kyocera, and Canon's "Cellular Production Mode" all enable the value of employees to be fully reflected in the value-added of customer value, which subverts the previous model of managers being above customers. Putting customers at the center and focusing on implementation requires the enterprise to streamline its existing hierarchical structure with real skills. Each employee has infinite creativity, and we should not treat everyone as a screw. We should provide them with platforms and opportunities, let them unleash their creativity, and give them matching rights. At present, some enterprises in China have also developed their own unique management models based on actual conditions, such as the "Platform Manager" implemented by Pingbei Oilfield, which has cultivated a composite team with exquisite technology, proficient business, strict management, and high-quality service. At the same time, the "Platform Manager Management Method" has won the first prize of China Petrochemical Management Modernization Innovation Achievement [12].

Cheng Zheng and others from Tianjin University contend that lean culture can be divided into three distinct levels. The material level pertains to the tangible attributes evident in the production and office environments of lean enterprises, encompassing practices like 8S on-site management and the elimination of 6H (assuming "6H" refers to a specific set of issues or hazards, which may vary contextually). The conceptual level, alternatively known as inner cultivation, encapsulates the mindset and problem-solving approaches adopted by managers and employees, prominently reflected in their work ethic and attitude. Lastly, The basic assumption level is the deepest content in organizational culture, which should be a belief shared and inherited by all employees of the enterprise in the long run [13].

Therefore, enterprises should establish a positive and healthy corporate culture and lean culture to enhance their cohesion and core strength. Actively advocating the corporate spirit, establishing lean management concepts and methods centered on employees, and using management concepts, methods, incentives, competition, benefits, and other aspects to

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motivate and inspire all employees; Plan and design the grand development plan of the enterprise, determine the goals and policies of the enterprise's vision, and enable employees to carry out various work closely around the goals and policies; Establish a set of human centered rules and regulations to regulate the behavior of all employees; To handle affairs objectively, fairly, and justly, creating a democratic atmosphere within the organization; Care for and show concern for subordinates, unite employees and generate centripetal force. Leaders at middle and senior levels should lead by example, setting role models and benchmarks, inspiring employees with the power of role models and benchmarks, fully mobilizing their participation and enthusiasm, and cultivating and forming a mutually owned positive and excellent corporate culture in the long run.

4.7. Live Water Does Not Rot, Flow is the Priority

The book "The Inheritance of Flow" by Takehiko Harada elaborates in detail that flow is Toyota's pursuit of excellence, the responsibility of operators and managers is to achieve the flow of people and things, with flow as the core for continuous improvement.

The five basic principles of lean thinking are value, value stream, flow, pull production and the relentless pursuit of perfection. Lean thinking requires the reasonable connection and uninterrupted flow of every step in creating value to eliminate various wastes. That is to say, as soon as the previous process is completed, it should immediately switch to the next process for processing, establishing an uninterrupted workflow.

The flow production model created by Toyota refers to the rational allocation of work sites, personnel and equipment. Parts are processed and moved one by one through various processes and equipment in a certain order of operation. Each process has at most one work in progress or finished product, and there is no work in progress turnover from the beginning of production to completion. The specific characteristics of a flow production are: making one, transporting one, inspecting one, rather than processing and moving one batch at a time; The homework personnel follow the work in progress and perform multi process operations. The various production lines in the factory also adopt a synchronized production flow, so that the entire factory is like using an invisible conveyor belt to connect the various processes and production lines, forming an integrated "one flow production" of the entire factory.

One criterion for determining the scope of application of lean management is that wherever there are processes, there is a place for lean management. With the changes in the industrial era and consumers' pursuit of personalized products, "multi-variety, small-batch" has become mainstream. Toyota has always adhered to the lean production concept, improved production efficiency, and continuously improved. The production mode has evolved from a single stream to a U-shaped production line. Whether it is a flow or a U-shaped production line, Toyota is committed to pursuing zero inventory or minimizing inventory in the flow, with the lowest parts or raw material handling volume, lowest machine failure rate, and shortest production preparation time. We always believe that any form of interruption, pause, waiting, etc. is a worthless waste. Therefore, when promoting lean production, enterprises should pay attention to the importance of flow, identify and solve problems in flow, actively optimize production processes, and achieve continuous improvement.

4.8. Everything Changes and Continues to Improve

All things change, only change remains unchanged. Faced with the uncertainty, volatility, and complexity of the global market, being content with the status quo will inevitably be crushed by the rolling wheels of history. Maintaining crisis awareness and continuous improvement can ensure the permanent operation of the enterprise. Machiavelli once said, "Only those who constantly change themselves with the times and the world can truly control their own destiny." Martin Luther King once said a famous quote: "If you can't fly, then you run; if you can't run,

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then you walk; if you can't walk, then you climb; no matter what you do, you must move forward." This is true for both people and businesses. For any enterprise, it is important to be prepared for danger, adapt to changes, and continuously improve. Lean management is the process of implementing a PDCA(Plan-Do-Check-Act) cycle, allowing enterprises to continuously make subtle improvements, making progress every day and becoming increasingly sophisticated.

The once-famous Japanese company Kodak, at the dawn of the digital age, still clung to traditional film technology and failed to make timely changes to digital technology, resulting in bankruptcy in 2012. In 1993, Huawei invested huge manpower and material resources to develop the JK1000 analog air separation switch, which was eliminated before it could fully demonstrate its capabilities. Since then, Huawei has carefully analyzed the current environment and market situation, identified its own problems, changed its research and development strategy, and targeted customer needs. Continuous improvement in research and development, pilot testing, manufacturing, sales, and service is necessary for sustainable development.

In lean management of enterprises, managers should not only possess their own abilities, but also fully tap into the potential of each employee, unleash the power of each employee and the management system, and ensure continuous improvement of the enterprise. If Samsung Group improves the "proposal improvement" system, creates a harmonious cultural atmosphere, and allows every employee to "engrave" the idea of improvement in their hearts, actively discover and solve problems in their work, Samsung Group will develop rapidly, healthily and sustainably in the "gathering wisdom and strength of everyone". The "RenDanHeYi" model of Haier Group has made its employees become the masters of the enterprise, stimulated the continuous creativity of employees, and turned Haier Group into a "maker" platform. While contributing wisdom to the continuous improvement of the enterprise, it has also realized the "triple win " of the enterprise, employees and customers.

5. Conclusion

Lean management, with "precision" meaning refinement and "benefit" implying the pursuit of excellence, progresses from practice to theory and back again. The dedication and focus of enterprises on "lean" demonstrate their persistence and dream of "precision" and "continuous improvement". Over the past half century, enterprises global enterprises have increasingly prioritized this management approach, integrating it into their daily operations. Esteemed enterprises like Huawei, Haier, Toyota, Bosch, and General Motors are constantly recognizing and practicing lean management, adhering to the lean belief, continuously promoting lean management, and reaping substantial rewards.

Chinese enterprises should seize the opportunity of Industry 4.0, be prepared for danger in times of peace, enhance their awareness of lean management, understand the core ideas of lean management, master the essence of lean management, and practice lean management with Chinese characteristics that are in line with their own needs. In the tide of implementing the "Made in China 2025" strategy and the 14th Five Year Plan for the development of intelligent manufacturing in China, they should deeply cultivate and implement the soft power of lean management, eliminate all waste, continuously improve and perfect, and strengthen their bodies; Concurrently, we should seek truth from facts, gradually improve innovation and automation levels, accelerate digital manufacturing, interconnected manufacturing, and intelligent manufacturing, enhance our own hard power, improve both software and hardware, and adhere to technological innovation and management innovation two-wheel drive. We should take small steps and run fast, and achieve a turning point overtaking in China's manufacturing industry in the era of Industry 4.0.

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