

Comparative Study of Manufacturing Strategy between Japanese and Western Approaches: An Overview

(Kajian Perbandingan Strategi Pembuatan antara Pendekatan Jepun dan Barat: Satu Tinjauan)

Mohd Nizam Ab Rahman, Chan Kien Ho, Rahim Jamian,
Norhidayah Fathirah Ramli and Neo Ming Cherng

ABSTRACT

Japan and the West have contributed different manufacturing strategies based on their own unique practices and cultures. This study aims to identify and differentiate the approaches towards the manufacturing strategies of the Japanese from those of the West, which could provide important implications for manufacturing practice and performance. The factors being compared for both the Japanese and Western approaches include manufacturing strategy, basis, focus, production method, production line, operations, equipment, workforce, quality, organizational philosophy, business strategy, improvement, and overall aim. The Japanese and Western manufacturing are also compared in terms of culture, personnel, organization, management, and appraisal. Blending the advantages between Japan and the West will be a struggle that, if succeeded, would end in the enhancement of manufacturing strategies to pursue competitiveness.

Keywords: Comparison; Japanese; manufacturing strategy; western

ABSTRAK

Negara Jepun dan Barat menyumbang kepada strategi pembuatan yang berbeza-beza berdasarkan keunikan amalan dan budaya masing-masing. Matlamat kajian ini adalah untuk mengenalpasti dan membanding pendekatan daripada Jepun dan Barat ke arah strategi-strategi pembuatan yang boleh memberi implikasi penting terhadap amalan dan prestasi pembuatan. Faktor-faktor perbandingan dalam kajian ini merangkumi strategi pembuatan, teras, fokus, kaedah pengeluaran, talian pengeluaran, operasi, peralatan, tenaga kerja, kualiti, falsafah organisasi, strategi perniagaan, penambahbaikan, dan matlamat keseluruhan. Perbandingan juga dibuat dari segi budaya, individu, organisasi, pengurusan, dan prestasi pencapaian. Mengadun kelebihan antara pendekatan Jepun dan Barat adalah mencabar. Namun sekiranya berjaya, ia dapat menambahbaik strategi-strategi pembuatan untuk mencapai keberdayasaigan.

Kata kunci: Perbandingan; Jepun; strategi pembuatan; barat

INTRODUCTION

Manufacturing begins with the concept of producing something using skilled craftsmen, and eventually ends with a mass production concept. Although mass production has supplanted craft industry as the preferred approach to production, two philosophies, namely, Toyota Production System (TPS) and Lean Manufacturing (LM) have emerged from Japan to replace the mass production practice in the West (Worley & Doolen 2006; Dettmer 2011).

The unique work practice and culture from both Japan and the West have resulted in the development of different manufacturing strategies. Japanese companies are said to emphasize the long-term approach, and are currently leading the world manufacturing industry. By contrast, the short-term approach adopted by Western companies

is causing them to suffer in terms of manufacturing competitiveness. This difference in approach is one among the major differences between Japan and the West (Hayes & Wheelwright 1985; Abegglen & Stalk 1985; Hayes et al. 1988; Voss & Blackmon 1998).

Although the emergence economies such as China and South Korea are reported as having a significant contribution of the world economy development since 2009 (United Nations 2011), the major efforts to improve manufacturing systems and strategies are linked with TPS and LM (specifically, Japan and the United States of America) (Nordin et al. 2010). Therefore, identifying the differences between Japanese and Western approaches may help practitioners and researchers gain lessons and input for further development of better manufacturing strategies.

This study aims to differentiate the approaches of Japanese from those of Westerners towards manufacturing strategies in terms of various aspects. In addition, the implications of different approaches on manufacturing practice are also determined to better understand both approaches.

This study employs a secondary data review and analysis. Several reference books and scholarly journals related to manufacturing strategy have been identified as literature sources. According to Frenz (1961), the literature review provides a general overview of unfamiliar research and reveals the similarities and differences for comparison, and provides new ideas that help us determine the complications or weaknesses in existing research.

After the introduction, this paper presents three more sections. In the second section, an overview is provided about the evolution, definitions and model of manufacturing strategy, as well as the differences between the two main regions of the world, namely, Eastern (Japan) and Western (United States of America). The third section outlines the strategy of manufacturing and firm competitiveness. The comparative analysis of manufacturing approaches between Japanese and Western companies in various aspects is presented in the next section. Then, this study highlights the research results and comparisons, and concludes with the final considerations.

OVERVIEW OF MANUFACTURING STRATEGY

EVOLUTION OF MANUFACTURING

Manufacturing began with craftsmen, skilled labourers who made what people needed. In the early 1900s, Fred Taylor and Henry Ford worked together to overcome the drawbacks of factory production, namely, low productivity and high operating cost. Taylor introduced several methods, such as work standardization, cycle time reduction, motion study, and time study. Meanwhile, Ford innovated the use of assembly lines, repetitive motion, and the division of labour to make his factories as efficient as possible. In 1960, Toyota Motor Corporation focused on reducing waste and increasing employee involvement to improve the manufacturing strategies obtained from Henry Ford (Krafcik 1988; Worley & Doolen 2006; Dennis 2007).

Sakichi Toyoda and his son Kiichiro Toyoda are the founders of the Toyota Motor Corporation, which began with the production of sewing machines and later delved into the production of cars in the 1930s (McCarthy & Rich 2004). Kiichiro Toyoda visited the Ford Motor Company in Detroit to learn and gain experience from the American automotive industry. Eventually, Kiichiro returned to Japan with comprehensive fundamental knowledge of Ford's production system, where was ready to modify the system to make it suitable for small-scale production (Becker 2006).

After Kiichiro Toyoda passed away in 1952, Taiichi Ohno continued to research and developed the TPS based on the following vision of the two Kiichiros: to deliver

the product "just-in-time" and to empower employees to make changes to develop and ensure quality products in the manufacturing process (Bocock & Martin 2011; Poppendieck & Poppendieck 2006). The first concept was derived from Henry Ford's book *Today and Tomorrow*, which built the basis of the manufacturing system, whereas the second concept was derived from the supermarket system of replacing products on the shelves, which forms the basis of supplying material continuously (Becker 2006). Toyota practiced a pull system for production, which depends on the demands from each department rather than forecasting, to overcome the problem of lack of resources after World War II (Ohno 1988).

In 1982, Toyota signed a joint venture agreement with General Motors to operate a manufacturing plant in Fremont, California, named New United Motor Manufacturing Inc. (NUMMI) (Hallam et al. 2010; Shah & Ward 2007). John Krafcik served as a quality engineer at NUMMI before pursuing his Masters degree at the Massachusetts Institute of Technology (MIT). In 1988, Krafcik, as a team member of the International Motor Vehicle Program (IMVP) at MIT, coined the term "lean" in his Master's thesis to describe the manufacturing system used by Toyota (Shah & Ward 2007). The research of Krafcik was continued by the members of the IMVP at MIT and was published an international best seller book titled *The Machine That Changed the World* in collaboration with authors, such as Jim Womack, Daniel Jones, and Daniel Roos (Holweg 2007). This book introduced LM, describing in detail the Toyota manufacturing system without providing a specific definition. After publishing the book in 1990, the concept of LM began to be practiced around the world.

During the development period of LM, a significant number of terms that refer to the same object or idea were created. These terms include TPS, Japanese Production System, Zero Inventory, Stockless System, Time-based Manufacturing, World Class Manufacturing (WCM), and Best Manufacturing Practices. In the succeeding research, these terms adopted a meaning similar to LM (Holweg 2007; Shah & Ward 2007).

JAPANESE MANUFACTURING IN BRIEF

Following the end of World War II, Japan was prohibited from producing military weapons. Indefatigable, the defeated Japan transformed itself to an economic superpower. The Japanese government and the manufacturing industries adopted initiatives to improve manufacturing strategies and technologies. The possession of strong economy was derived from the diligence and proficiency of Japanese firms, while technological expertise was developed by learning and improving the imported industrial machinery from the West with patience and determination. The characteristics of Japanese manufacturing industries are summarized as follows (Hall 1983; Bolwijn & Brinkman 1987; Voss & Blackmon 1998; Frohlich & Dixon 2001):

1. Most Japanese companies produce products similar to those produced by Western companies, but the Japanese products are inexpensive, reliable, and durable.
2. The manufacturing superiority of Japan can be attributed to the traditional precepts in manufacturing strategy.
3. Japanese have adopted consistent policies in their pursuit of high efficiency and quality, emphasis on repetitive manufacturing, just-in-time production, smooth work flow, as well as continuous improvement.
4. Japanese factories practicing LM have simultaneously achieved lower costs, better quality, higher flexibility, and faster new-product introductions.
5. Japanese companies emphasize speed and flexibility rather than the volume and cost emphasized by Western companies.

large volumes, while maintaining the quality of products. Frederick Taylor introduced the principles of scientific management, which aim to optimize and simplify jobs, and eventually increase productivity of the workers (Taylor 1996). According to Taylor’s view (Taylor 1996), optimization is more vital than working hard to avoid effort being wasted. The collaboration between workers and managers also has a crucial role in the success of the business (Taylor 1996). Overall, the revolution of manufacturing in America involves the mass markets, standard designs, and the utilization of interchangeable parts to achieve high volume of production (Drejer et al. 2000).

DEFINITIONS AND CONCEPTUAL MODEL OF MANUFACTURING STRATEGY

Several researchers have proposed their respective definitions and explanations in describing manufacturing strategy. The definitions of manufacturing strategy are simplified in the Table 1 (Dangayach & Deshmukh 2001). In brief, manufacturing strategy could be defined as an approach to improve the current performance of company to achieve the short- and long-term goals.

Manufacturing activity has the potential to affect the competitive ability of a company (Rho et al. 2000). Manufacturing strategy as an important functional component of business strategy was proposed by Skinner (1969). Ward & Duray (2000) have suggested a manufacturing strategy model, recommending that both competitive and manufacturing strategies were affected by environmental dynamism, wherein manufacturing strategy is directly influenced by competitive strategy. The conceptual model of manufacturing strategy is presented in Figure 1.

WESTERN MANUFACTURING IN BRIEF

Manufacturing in America did not fully develop until after the war of 1812 with England. More factories and industries were developed in America after the war to ensure that they had access to their own necessary products without depending on other countries. The manufacturing sector then evolved into a larger scale during World War II as machinery demand increased.

The war forced manufacturers to ascertain ways to produce automotive gadgets and equipment rapidly at

TABLE 1. Definitions of manufacturing strategy

Researchers	Definition
Skinner (1969)	Exploiting certain properties of the manufacturing functions as a competitive weapon.
Hayes & Wheelwright (1985)	Consistent pattern of decision making in the manufacturing function that is linked to the business strategy.
Hill (1987)	Coordinated approach which strives to achieve consistency between functional capabilities and policies for success in the marketplace.
Swamidass & Newell (1987)	A tool for effective use of manufacturing strength as a competitive weapon for achievement of business and corporate goals.
Swink & Way (1995)	A decision and plan affecting resources and policies and directly related to sourcing, production, and delivery of tangible products.

Source: Dangayach & Deshmukh 2001

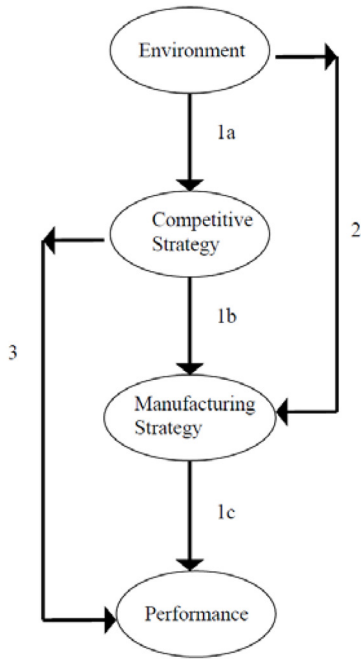


Figure 1. Conceptual model of manufacturing strategy
 Source: Ward & Duray 2000

There are two core elements in manufacturing strategies, namely, manufacturing tasks and pattern of manufacturing choices as suggested by Miller & Roth (1994). Manufacturing choices are competitive priorities, such as quality, cost, delivery, and flexibility, that concern manufacturing structure and infrastructure created by the company to accomplish the pre-determined manufacturing tasks (Rho et al. 2000). Three broad approaches have been used in manufacturing studies, namely, manufacturing capabilities, strategic choices, and best practices (Miller & Roth 1994).

MANUFACTURING STRATEGY AND FIRM COMPETITIVENESS

MANUFACTURING CAPABILITIES

Wheelwright (1984) defined four basic competitive priorities of manufacturing based on how manufacturing can support firm competitiveness, namely, cost efficiency, quality, flexibility, and dependability. Dangayach & Deshmukh (2001) summarized the competitive priorities identified by Spring & Boaden (1997) in describing manufacturing capabilities (Table 2).

Miller & Roth (1994) provided detailed taxonomy of manufacturing capabilities and categorized them into 11 categories, namely, low costs, design flexibility, volume flexibility, quality performance, product performance, speed of delivery, delivery dependability, after-sales service, advertising, broad distributions, and broad product line. The listed taxonomy has been partially used by D'souza & Williams (2000) in their manufacturing research on flexibility dimensions. Meanwhile, Frohlich & Dixon (2001) as well as Zhao et al. (2006) have used all of the

TABLE 2. Competitive priorities in manufacturing

Competitive Priorities	Description
Cost	Production and distribution of product at low cost
Quality	Manufacture products with high quality or performance standards
Delivery Dependability	Meet delivery schedules
Delivery Speed	React quickly to customer orders to prompt delivery
Flexibility	React to changes in product, changes in product mix, modifications to design, fluctuations in materials, and changes in operation sequences.

Source: Dangayach & Deshmukh 2001; Spring & Boaden 1997

listed taxonomy in their respective manufacturing strategy research. The four categories of manufacturing strategies are summarized in Table 3, and the marketer strategy is being replaced by designers to focus and compete together with product development and low price mid 1990 (Frohlich & Dixon 2001).

STRATEGIC CHOICES

Dangayach & Deshmukh (2001) and Skinner (1969) have listed five key choice areas in manufacturing strategy, namely, plant and equipment, production planning and control, labour and staffing, product design and engineering, and organization and management. In addition, Hayes & Wheelwright (1985) added process and infrastructure in the list of key choice. Meanwhile, Hill (1987) proposed two pillars of manufacturing strategies, namely, structural issues and infrastructural issues. Strategic choices depend on internal operation and external business, and matching these elements with the appropriate product and customer will enhance the market share (Hayes & Wheelwright 1985; Dangayach & Deshmukh 2001).

BEST PRACTICES

Hanson & Voss (1993) viewed world-class manufacturing in terms of practice and performance. Dangayach & Deshmukh (2001) agreed with Hanson & Voss (1993); best practice includes flexible manufacturing system, total quality management, lean production, and concurrent engineering. Manufacturing resource planning, optimized production technology, group technology, and the just-in-time concept are also considered as best practices (Dangayach & Deshmukh 2001).

Dangayach and Deshmukh (2001) also mentioned that Hayes and Wheelwright (1985) classified the concept

TABLE 3. Categories of manufacturing strategies

Categories	Orientation	Characteristics
Marketers	Oriented towards reliability in the manufacturing process especially in quality and delivery	<ul style="list-style-type: none"> ▪ Top priorities: quality conformance, dependable deliveries, and performance quality. ▪ Demonstrated some price consciousness. ▪ It is no longer exists and been replaced by new manufacturing strategy called Designers.
Designers	Compete with the twin weapons of product development and low price	<ul style="list-style-type: none"> ▪ Highlighting high degrees on design productivity and broad product lines. ▪ Dual emphasis on quality performance and after-sale service along with new product design accentuation. ▪ Emphasize quality conformance and delivery dependability.
Caretakers	Preoccupied with low price over all other potential competitive capabilities	<ul style="list-style-type: none"> ▪ Low price was dominant competitive capability. ▪ High priorities in delivery dependability, delivery speed and quality conformance. ▪ After-sale service and high performance products were least important concerns.
Innovators	Emphasis on quality and price competition avoidance	<ul style="list-style-type: none"> ▪ Shared certain characteristics with Marketers. ▪ Cluster most highly valued conformance and performance quality along with delivery dependability. ▪ Price was relatively lower priority.

Source: Frohlich & Dixon 2001

of WCM into seven sections, namely, formal thrust on strategic planning, communication of strategy to all the stakeholders, long-range orientation, strategic role of manufacturing, stress on continuous improvement through TQM, supplier-customer integration, and strategic focus on human resource development.

Best practice will not only lead to superior performance and capability, but also to increased competitiveness among companies. Thus, best practices must be continuously developed within a company to increase manufacturing competitiveness (Hanson & Voss 1993).

COMPARISONS BETWEEN JAPANESE AND WESTERN MANUFACTURING STRATEGIES

Voss & Blackmon (1998) identified that Japanese manufacturing companies used the long-term approach to formulate and execute their manufacturing strategies, whereas Western companies adopted a short-term orientation. In addition, the managers' opinion becomes a major problem that also affects their business performance.

Voss & Blackmon (1998) concluded that Japanese firms possess both a stronger long- and short-term orientation,

adopting a higher proportion of practices associated with quality management and preventive maintenance that result in higher cost allocation compared with Western companies. They also stated that Hall (1983) perceived that Japan has been characterized as a high-context society marked by *polychronicity*, where things can be understood even without saying anything. Meanwhile, the Westerners have been characterized by absoluteness, known as *monochronicity*, such as scheduling things one at a time and perceiving time as an outside force used to help organize their lives.

In terms of manufacturing capabilities, Frohlich & Dixon (2001) perceived that the Japanese manufacturers focus more on price and quality, whereas Western manufacturers focus on manufacturing flexibility and service after sales. In addition, Western manufacturers tend to emphasize single capability for instant service after sales and restrained price and flexibility. By contrast, Japanese firms experience limited competitive capabilities because they paid attention only to low price and design flexibility. In the context of manufacturing strategy, the comparison between Western approaches based on mass manufacturing and Japanese approaches based on TPS are summarized in Table 4.

TABLE 4. Comparison between Western and Japanese approaches

Factors	Japanese Approach	Western Approach
Manufacturing Strategy	<ul style="list-style-type: none"> ▪ Toyota Production System / Lean Manufacturing 	<ul style="list-style-type: none"> ▪ Mass production
Basis	<ul style="list-style-type: none"> ▪ Taichi Ohno 	<ul style="list-style-type: none"> ▪ Henry Ford
Focus	<ul style="list-style-type: none"> ▪ Customer 	<ul style="list-style-type: none"> ▪ Product
Production Method	<ul style="list-style-type: none"> ▪ Make low volume variety product but high total volume 	<ul style="list-style-type: none"> ▪ Make high volume of standardized product
Production Line	<ul style="list-style-type: none"> ▪ Short U-shape assembly line ▪ Cellular Manufacturing 	<ul style="list-style-type: none"> ▪ Long moving assembly line ▪ Continuous Flow
Operations	<ul style="list-style-type: none"> ▪ Pull system ▪ Synchronized flow and pull 	<ul style="list-style-type: none"> ▪ Push system ▪ Batch and queue
Equipment	<ul style="list-style-type: none"> ▪ Manual and automated ▪ Flexible machines 	<ul style="list-style-type: none"> ▪ Expensive ▪ Single purpose machines
Workforce	<ul style="list-style-type: none"> ▪ Multi-skilled worker in a team 	<ul style="list-style-type: none"> ▪ Narrow skill professionals
Quality	<ul style="list-style-type: none"> ▪ Prevention (built in by design and method) 	<ul style="list-style-type: none"> ▪ Inspection (a second stage after production)
Organizational Philosophy	<ul style="list-style-type: none"> ▪ Empowerment ▪ Share responsibility 	<ul style="list-style-type: none"> ▪ Hierarchical ▪ Management take responsibility
Business Strategy	<ul style="list-style-type: none"> ▪ Flexibility ▪ Adaptability 	<ul style="list-style-type: none"> ▪ Economies of scale ▪ Automation
Improvement	<ul style="list-style-type: none"> ▪ Workforce-driven continuous improvement 	<ul style="list-style-type: none"> ▪ Expert-driven periodic improvement
Overall Aim	<ul style="list-style-type: none"> ▪ Eliminate waste ▪ Add value 	<ul style="list-style-type: none"> ▪ Reduce cost ▪ Increase efficiency

Referring to Bolwijn & Brinkman (1987), the comparison between Japanese and Western manufacturing in terms of culture, and personnel, organization,

management, and appraisal can be simplified in Tables 5 and 6, respectively.

TABLE 5. Comparison of Japanese and Western culture

Japanese	Western
<ul style="list-style-type: none"> ▪ Adaption to the outside world 	<ul style="list-style-type: none"> ▪ Confrontation with the outside world
<ul style="list-style-type: none"> ▪ Buddhism and Shinto aimed at avoiding worries and anxieties 	<ul style="list-style-type: none"> ▪ Christianity concerned with absolute moral values, good and evil, and redemption of the soul
<ul style="list-style-type: none"> ▪ How to live 	<ul style="list-style-type: none"> ▪ What to live for
<ul style="list-style-type: none"> ▪ Present and tangible 	<ul style="list-style-type: none"> ▪ Future and abstract
<ul style="list-style-type: none"> ▪ Man makes 'The Way' great 	<ul style="list-style-type: none"> ▪ God makes man great
<ul style="list-style-type: none"> ▪ Society is built on direct personal relationships 	<ul style="list-style-type: none"> ▪ Society is built on legalistic contractual relationships
<ul style="list-style-type: none"> ▪ Group orientation, group egoism 	<ul style="list-style-type: none"> ▪ Individualistic orientation
<ul style="list-style-type: none"> ▪ Behaviour controlled by group adaption 	<ul style="list-style-type: none"> ▪ Behaviour controlled by rules, punishment and rewards
<ul style="list-style-type: none"> ▪ Frame groups are important (neighbourhood, department, company, nation) 	<ul style="list-style-type: none"> ▪ Attribution groups are important (family, class, occupation)
<ul style="list-style-type: none"> ▪ Strong hierarchical structure and direct personal relationships 	<ul style="list-style-type: none"> ▪ Weak hierarchical structure and contractual relationships
<ul style="list-style-type: none"> ▪ Personal relationships based on mutual obligations and mutual dependence 	<ul style="list-style-type: none"> ▪ Contractual relationships based on rights and duties
<ul style="list-style-type: none"> ▪ Education aimed at cooperation and dependence 	<ul style="list-style-type: none"> ▪ Education aimed at personal development and independence

(Source: Bolwijn & Brinkman 1987)

TABLE 6. Differences in management and organization characteristics between Japan and Western

Japan	Western
Personnel	
<ul style="list-style-type: none"> ▪ Company life and private life are two things in one ▪ Devoted and dependent ▪ Company training courses with examinations ▪ Great deal of job rotation ▪ Active and direct participation and indoctrination ▪ Competition between groups 	<ul style="list-style-type: none"> ▪ Strict separation between company and employee ▪ Has a say and independent ▪ Company training courses without examinations ▪ Little job rotation ▪ Passive indirect participation ▪ Competition between individuals
Organization	
<ul style="list-style-type: none"> ▪ No clear-cut definition between functions ▪ No function description and classification ▪ Greater need for coordination ▪ Emphasis on role more than on function and in language usage ▪ Line strong as compared with staff, little distinction ▪ Small span of control ▪ Many small problem-oriented groups and multidisciplinary project teams 	<ul style="list-style-type: none"> ▪ Clear-cut definition between functions ▪ Function description and classification ▪ Greater need for self-assertion ▪ Function and role are identical ▪ Line weak as compared with staff, sharp distinction ▪ Great span of control ▪ Few or no problem-oriented groups
Management	
<ul style="list-style-type: none"> ▪ Higher management does not change position rapidly, often from R&D and/or production field ▪ Long-term benefits ▪ Management paternalistic and watchful ▪ Decision emerge collectively ▪ Two-sided vertical communication and by-passes ▪ Cooperation between management and workers and no external differences in status 	<ul style="list-style-type: none"> ▪ Higher management changes position rapidly, often from the legal or commercial field ▪ Short-term successes ▪ Management authoritarian and controlling ▪ Individual takes decisions ▪ Vertical communication weak and/or one sided ▪ Contrast between management and workers and great external differences status
Appraisal	
<ul style="list-style-type: none"> ▪ Results attributed to the group ▪ In appraising the leader, the performance of his group plays a great part ▪ Age and length of service play a great part in payment and promotion ▪ Part of wages as bonus depends on company results and behaviour/performance 	<ul style="list-style-type: none"> ▪ Result attributed to an individual ▪ In appraising the leader, the performance of his group plays hardly any part ▪ Age and length of service play a small part in payment and promotion ▪ Scarcely any link between payment and company results

Source: Bolwijn & Brinkman 1987

CONCLUSION

Manufacturing strategy could be considered as an approach to improve the performance of companies to achieve their goals. High quality, low cost, prompt delivery, and flexibility are among major characteristics of manufacturing strategy to pursue competitiveness of manufacturing companies. This paper has presented the comparison of manufacturing strategy between the developed economies, specifically, Japan and the West (America). The comparisons include manufacturing approaches, culture, performance, organization, management, and appraisal.

The manufacturing strategy adopted by the Japanese companies can be perceived as LM (TPS), which focuses on the customer rather than the product. LM encourages production of a variety of products at low volume, but results in higher total volume. Japanese companies also empower employees to make decisions and continuous improvement, thus providing them a share in responsibility. Overall, the Japanese manufacturing strategy emphasizes

flexibility and adaptability, aiming to eliminate waste and add value to the manufacturing process in the long term.

By contrast, the mass production adopted by Western companies is concerned with production of high volume of a standardized product. The Westerners generally utilize the long moving assembly line and push system. The hierarchical structure in Western companies restricts involvement and decision-making among low-class workers, enabling the management to assume full responsibility. Overall, manufacturing in the West involves the mass markets, standard designs, and the utilization of interchangeable parts to achieve high volume of production. Continuous development in the Western manufacturing sector made the American the world's leading producer of manufactured goods.

In brief, different manufacturing strategies exist because of the unique work practice and cultural characteristics of Japan and the West. Integrating the advantages between Japan and the West will be a challenge that, if conquered, would result in the improvement of manufacturing

strategies. The comparative study could also be extended into the emergence of new economic power such as China and South Korea in order to provide new information towards enhancement of future manufacturing strategies.

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- Mohd Nizam Ab Rahman^{1*}, Chan Kien Ho¹, Rahim Jamian^{1,2}, Norhidayah Fathirah Ramli¹ & Neo Ming Cherng¹
- ¹Mechanical & Materials Engineering Department
Faculty of Engineering & Built Environment
Universiti Kebangsaan Malaysia
43600 UKM Bangi,
Selangor, Malaysia
- ²Manufacturing Section
Universiti Kuala Lumpur Malaysian
Spanish Institute
Lot 13-16, Kulim Hi-Tech Park
09000 Kulim, Kedah, Malaysia
rahimj@msi.unikl.edu.my
- *Corresponding Author: mnizam@eng.ukm.my

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