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# Bridging Western management theories and Japanese management practices: case of the Toyota Way model

Low Sui Pheng and Gao Shang

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## 1. Introduction

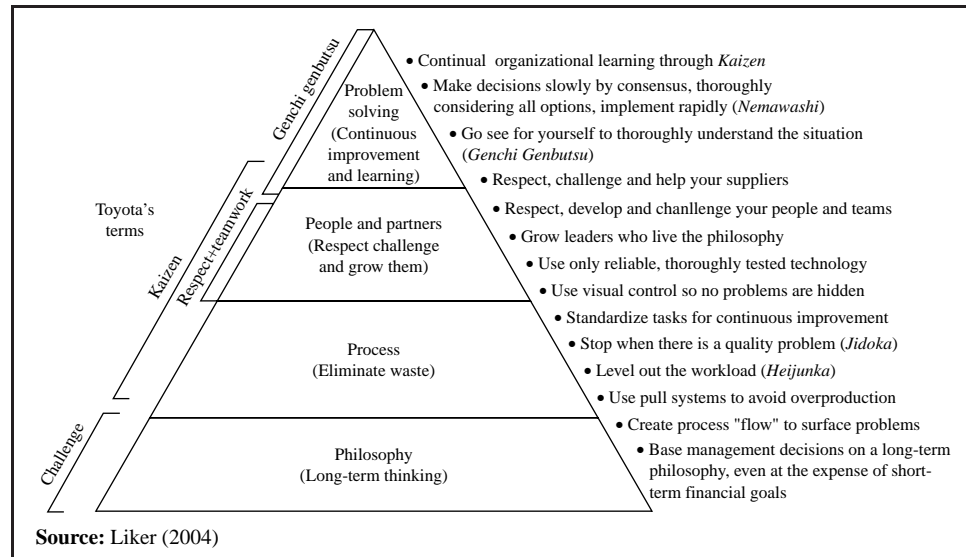
Much has been written about the Toyota Production System (TPS; Ohno, 1988; Monden, 1998) and its superiority over the mass production system (Womack *et al.*, 1990). The discussion on the practical basis for the success of TPS can be seen from a sizable literature on lean tools. Because of this practical feature of the TPS that can be applied readily as well as the promise of competitive success that appeals to practitioners, Toyota have had drawn remarkable attention from and have served as a vast testing ground for operation management (OM) research (Taylor and Taylor, 2008) for a long time. However, in comparison with mass production – a precursor to lean production – that was closely associated with scientific management and the human relations school over the years, the theory underpinning lean production however lacks attention. Moreover, the birth of the Toyota Way model (Liker, 2004), comprising the 14 management principles, arguably the most holistic model depicting the TPS, serves as a holistic management approach to explain how the Toyota model of success can be applied in any organization. Presently, when the enthusiasm for implementing the Toyota Way to various industries is at an all-time high, further steps to investigate what is the theoretical foundation of the Toyota Way model are warranted. This case paper sets out to examine if there is a management theory that is in agreement with the Toyota Way model?

## 2. From the TPS to the Toyota Way

Toyota is worthy of in-depth study because the company is extremely good at manufacturing. In 2005, Toyota became the world's leading auto manufacturer with approximately 15 percent of the global market share (Morgan and Liker, 2006) and surpassed General Motors (GM) to be the world's largest automobile maker in 2008. Objective data, including that provided by J.D. Powers and Associates[1] as well as Wyman's (2008) report shows that Toyota led its competitors in terms of quality, productivity and profitability. It is worth noting that it is profitability that keeps the business growing. It is on this ground that Toyota, among other Japanese automobile manufacturers, is leading the global automobile industry. In contrast, Ford, GM and Chrysler lost US\$1,467, US\$729 and US\$412, respectively, in terms of per-vehicle profit in the North American vehicle market in 2007 (Wyman, 2008). What makes Toyota so attractive to so many audiences is its production system, commonly known as the TPS. There are two outer pillars of the TPS just-in-time (JIT) and *Jidoka*[2]. JIT manufacturing prescribes the required units needed to produce the required quantities at the required time, wasting neither raw material nor time. Trying to achieve the JIT system led Ohno (1988) and others within Toyota to develop TPS tools such as *takt*[3] time, continuous flow, pull system, quick changeover and integrated logistics (Figure 1). *Jidoka* (also called autonomation) means that, in Toyota, machines are equipped with various devices that can detect the defects and be automatically halted. This offers an opportunity to surface the problems in the

Disclaimer. This case is written solely for educational purposes and is not intended to represent successful or unsuccessful managerial decision making. The author/s may have disguised names; financial and other recognizable information to protect confidentiality.

**Figure 1** “4P” model of the Toyota Way



first place that can be resolved immediately. Moreover, there are various foundational elements, which include the need for leveled, stable, standardized and visualized processes. These lean tools as well as quality improvement methods contribute to Toyota's operational excellence (Liker, 2004, p. 6). However, gaining a true understanding of the Toyota's philosophy requires going beyond TPS and to learn to understand the Toyota Way (Liker, 2004). Based on "the Toyota Way 2001[4]", which comprises of five key elements – "teamwork", "respect", *kaizen*, "challenge", and *genchi genbutsu*, Liker (2004) correlated these five high-level principles with his Toyota Way model (Figure 1) in a pyramidal structure, which comprises a synopsis of the 14 principles to outline the Toyota Way principles. The principles are grouped in four broad categories and each category contains relevant sub-principles.

### 2.1 Philosophy

Toyota's first (of 14) foundational management principle is "bases its decisions on a long-term philosophy, even at the expense of short-term financial targets" (Liker, 2004, p. 71). The first principle does not define hard action items but focuses on a number of guiding principles that Toyota firmly believed in. It includes four sub-principles:

1. sense of purpose;
2. long-term perspective;
3. self-reliance and responsibility; and
4. customer focus.

These sub-principles have a very strong influence on the overall philosophy of the organization and permeate down to influence other principles and tools in other layers of the Toyota Way model.

### 2.2. Process

Principles 2-8 of the Toyota Way model are part of the second broad category of "process" (Figure 1), which involve a number of TPS tools for eliminating the waste within the Toyota production shop floor to achieve a stable production flow (Liker, 2004; Moore, 2007, p. 143; Liker and Meier, 2006, p. 34). These tools and processes, including one-piece flow, *kanban*, pull system, *heijunka*, *andon*, visual management among others, are very important and practical, which were elaborated in detail in Liker and Meier's (2006) book – *The Toyota Way*

*Field Book*. Arguably, they are the most “tactical” or “operational” aspects of the Toyota Way to drive out wastes, improve quality and level up the overall performance of Toyota. Nevertheless, as Liker (2008, p. 87) highlighted, these tools can be far more effectively implemented when they are supported by a company-wide, long-term management philosophy (Principle 1). Unfortunately, “lean” has come to mean cost reduction programme for most of the so-called lean practitioners. Hence, they are still in the stage of putting too much focus on waste elimination using lean tools but failed to appreciate other equally important factors that made the TPS or lean works well (Liker, 2004).

### 2.3. People/partner

This layer of the Toyota Way places respect on people and partners, while challenging and growing them. The basic tenet of the Toyota Way is that people are the most important assets in Toyota because they make automobiles (Convis, 2001; Liker, 2004); very few companies actually behave in a similar way that supports this basic tenet. To carefully examine the “people/partner” layer of the Toyota Way model, three key words within the bracket namely “respect”, “challenge”, and “grow them” (Figure 1) serve as the guidelines indicating how Toyota selects, develops, and motivates people to become committed to the goal of building high-quality products in Toyota. These principles are also in line with core principles from “the Toyota Way 2001”.

### 2.4. Problem solving

The last hierarchy of the pyramid in the Toyota Way model is the problem solving philosophy using various improvement tools such as *genchi genbutsu* and *kaizen* to achieve continuous improvement. The problem solving mindset supported what have been discussed in the “process” category of the Toyota Way. According to Liker (2004), the problem-solving methodology is a skill that runs deep and strong at all levels of the organization within Toyota and across all functions, from manufacturing to purchasing to sales and to the rest of Toyota. A detailed examination of Toyota Way Principles 12 and 13 led to a few steps summarizing how the Toyota people solve problems (Liker, 2004, p. 239):

1. Finding out what is really going on, including *genchi genbutsu*.
2. Understanding underlying causes that explain surface appearance – asking “why” five times.
3. Broadly considering alternative solutions and developing a detailed rationale for the preferred solution.
4. Building consensus within the team, including Toyota employees and outside partners.
5. Using efficient communication vehicles to do the above 1-4, preferably on one side of one sheet of paper.

Moreover, this problem solving methodology also requires a high level of continuous improvement (Principle 14) which resulted in thousands of little lessons learned. This layer also embodies the learning cycle of Plan-Do-Check-Act (PDCA) that is used at all levels of Toyota from project, to the group, to the company, and ultimately across the company (Liker, 2004).

*Toyota's recall troubles in 2010*. It would be very dangerous, even for Toyota, to conduct business that contradicts with the Toyota Way. Since the beginning of 2010, Toyota was experiencing a serious “trust crisis” in terms of a string of safety problems that happened in the USA. After Toyota recalled of more than eight million cars and trucks, people have wondered whether the *Jidoka* concept is falling apart. Spear (2010) attributed that the rush to catch up with Ford and GM, coupled with a boom in demand, led Toyota's leaders to put sales growth above quality. This meant that new products had to be introduced more quickly, new plants had to be opened more rapidly, and supply networks had to be expanded more aggressively. Although this placed pressure on Toyota and its suppliers, this shift also made it harder for Toyota to control quality. Leggett (2010) concluded that Toyota's *Jidoka* concept must have missed something while Toyota thought it had found the root causes to the concerns identified years before the recall incident. However, it might not have completed

a proper failure mode and effects analysis. Hence, the recall incident requires Toyota to return to the basics of the TPS. For example, Mr Akio Toyoda, the current president of Toyota, announced that a new Global Quality Task Force would be established and led by him to spearhead quality-improvement activities. In the Toyota Way, leadership means direct daily involvement in an effort that digs deeply to underlying root causes and takes action to solve problems. Such problems are not laid to rest until the improvements are actually made and sustained. Nevertheless, the good thing that this recall incident bought about is that it affirmed to Toyota that without constantly bearing in mind the long-term philosophy (Toyota Way Principle 1) over short-term financial goals, as well as to be organizationally responsible, it would only get itself mired in troubles.

*Summary.* This section provides an overview of the Toyota Way principles and highlights that the Toyota Way actually supersedes TPS and is, in fact, quite different in its emphasis (Liker and Hoseus, 2008, p. 13). In TPS, the core pillars are JIT and *Jidoka* (autonomation) – both are technical concepts. Most lean applications implemented outside of Toyota only used the lean toolbox to take waste out of the process without embracing the “respect for people” principles. These are unlikely to gain more than limited and temporary results. In this regard, the Toyota Way model additionally focused on people and their way of solving problems, their continuous improvement and respect for others. Liker (2004) put the “process” part containing principles of JIT and lean toolbox in the middle of the Toyota Way model, one layer down as a sub-methodology supporting “people” in creating more value to the final products. This changing focus of the Toyota Way suggests a similar evolution process that is in line with what Western management thoughts had evolved. The following section will review the Western management thoughts and Japanese management practices and argue that the Toyota Way model shares some common grounds with the two domains.

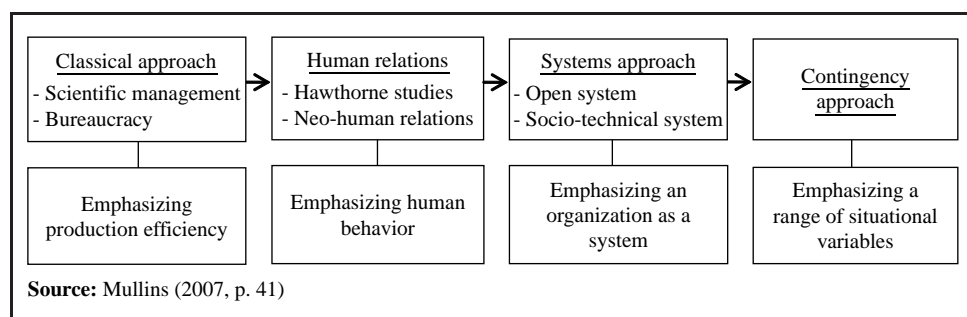
### 3. A brief history of Western management thoughts

It is interesting to note that in the past 100 years, production has been one of the critical laboratories where management theory was developed (Santos *et al.*, 2002). The evolution of management thoughts had a direct influence on the way how production system was designed. Mullins (2007) summarized four main approaches with different focus to understand the main trends in the development of organizational behavior and management theory. The earliest emphasizing production efficiency (classical approach), the second emphasizing human behavior, the third emphasizing organizations as systems and the fourth emphasizing a range of situational variables that determine the success of the organization (Figure 2). The next section, Figure 2, will review these mainstream management approaches in the domain of production management.

#### 3.1. Classical approach

*Scientific management.* Abramowitz (1967) commented that Taylor (1911) and Gilbreth (1911), among others, offered great contributions to the scientific management movement and pioneered the evolving methods. Taylor's (1911) system of scientific management had an enormous impact on the manufacturing industry a century ago. Under the influence of

**Figure 2** Main approaches to organization, structure and management



Taylor (1911) and his disciples, the American manufacturing industry became the global industry powerhouse at that time (Hayes and Pisano, 1994) by adapting the principles of scientific management to build quality and productivity into the manufacturing process (Drucker, 1990). Scientific management consists of four basic principles (Taylor, 1911):

1. The application of scientific approach using systematized experiments to solve production and management problems.
2. The scientific selection of the workers. Taylor (1911) advocated in favor of a differential piece-rate system to determine wage and incentives for workers.
3. The scientific education and training of workmen. Taylor (1911) conducted experiments to determine the amount of daily work a “first class man” could do.
4. Cooperate with the workers in the productive process so as to ensure that all of the work is done in accordance with the scientific management principles.

Time study, among all the principles, used by Taylor to discover “what was possible” in improving job performance, became the foundation of Taylor’s work. As Wren and Bedeian (2009, p. 126) outlined, Taylor’s time study had two phases: analysis and synthesis. In the analysis phase, each job was broken into its elementary movements. With a stopwatch, weight scale and tape, Taylor literally measured the distances that workers and materials covered. Non-essential movements were discarded and the remainder carefully examined to determine the quickest and least wasteful means of performing a job. In the synthesis stage, the elementary movements were combined in the correct sequence to determine the time and the exact method for performing a job. This phase also led to improvements in tools, machines, materials, methods and the ultimate standardization of all elements surrounding and accompanying a job.

Another important pioneer of the scientific management movement was Frank Bunker Gilbreth, whose early work focused on motion study which aimed to eliminate those variables that affect motion, develop, standardize and determine the best practice. In doing so, he paved the way for modern work simplification by cataloguing 17 different hand motions, such as simplification by cataloguing develop, standardize and deter’s endeavors on the quality of the operative, Gilbreth offered the view that each worker can be trained in the correct way to sustain those best practices. He sought to improve operator’s performance through reducing unnecessary motions (e.g. unnecessary motions can be eliminated through better design of the workplace) and limiting fatigue by placing far greater emphasis on the total working environment (Sheldrake, 1996). The motion study had generated a great influence on the later concepts such as waste elimination (Ohno, 1988), which became the cornerstone of the TPS.

*Bureaucracy.* A form of structure to be found in many large organizations is bureaucracy (Mullins, 2007). Max Weber, the father of bureaucratic management, showed particular concerns for what he called “bureaucratic structure”. Essentially, Weber identified a few main features of his “ideal” bureaucracy (Wren and Bedeian, 2009, pp. 231-2):

- people should specialize, thus efficiency will increase;
- there should be a clear chain of command from the highest to the lowest level of an organization;
- employee should be selected on the basis of scientific performance appraisals and tests;
- managers should specialize in management; and
- there should be formal rules and procedures to follow at all organizational levels.

However, in today’s business environment, bureaucracy can easily be associated with red tape, inefficiency and rigidity (Mullins, 2007, p. 48).

*Lessons from the classical approach.* Taylor’s method became the standard method for managerial work with its emphasis on promoting production efficiency and waste elimination (Kreitner, 2007, p. 40) and the foundation of industrial engineering (Flynn, 1998, p. 23).



Nevertheless, much of the criticisms being directed towards scientific management was concerned that this management approach and techniques have dehumanized people by making them act like machines (Kreitner, 2007, p. 40). In the 1920s, these aspects were given more attention, which eventually led to the human relations movement.

### 3.2. Human relations approach

The human relations school of management believed that firms organizing their production systems by the rigorous application of Taylor's methods could not sustain their competitive advantages. Rather, this school grew out of a series of studies in the late 1920s and early 1930s (Hawthorne experiments in particular) which pointed to the importance of human factors at work, and the latter focused on personal adjustment of the individual within the work organization (Wren and Bedeian, 2009).

*Hawthorne studies.* The famous Hawthorne studies formed the basis of the human relations school, was conducted to investigate how characteristics of the work setting (specifically the level of lighting or illumination) affected worker fatigue and performance. During the experiment, it was surprisingly found that people were strongly affected not only by physical conditions, but also by mental factors. The so-called "Hawthorne effect" seemed to suggest that workers' attitudes towards their managers affect the level of workers' performance (Wren and Bedeian, 2009). This experiment was also concerned with the importance of social and psychological factors in the work environment and gave impetus to the work on ideas such as work groups and leadership, communication, output restrictions, motivations and job design (Mullins, 2007, p. 53).

*The influence of psychology: neo-human relations.* The movement of "neo-human relations" has addressed concerns in the work in terms of:

- employee motivation;
- benefits of division of labor; and
- employee commitment to organizational goals through employee participation in decision making (Wren and Bedeian, 2009, p. 339).

Table I briefly summarizes the works of a group of notable writers such as Maslow (1954), Herzberg (1959), McGregor (1960), among others, who attempted to understand the forces which motivated people at work and the way in which individual adjustment, group relations and leadership styles impacted on worker motivation (Mullins, 2007).

*Lessons from the human relations approach.* The human relations approach, compared with the managerial-oriented classical approach, strove for a better understanding of people's psychological and social needs at work as well as improving the process of management

**Table I** A summary of a few notable works in the Neo-human relations

<i>Prevalent theories in neo-human relations</i>	<i>Concepts</i>
Maslow's (1954) hierarchy of needs	Satisfy lower level needs and move employee up the hierarchy toward self-actualization
Herzberg's (1959) motivation-hygiene theory	Remove "dis-satisfiers" (hygiene factors) and design work to create positive satisfiers (motivators)
McGregor's (1960) theory X and theory Y	Theory X assumes that employees are inherently lazy, indifferent and uninterested in excelling on the job. Theory Y assumes that employees are self-motivated, willing to work hard and rewarded by challenging work
Skinner's (1948) behavior modification	Reinforce behavior on the spot when the behavior naturally occurs
Locke's (1968) goal-setting theory	Set specific measurable, achievable challenging goals and measure progress

(Mullins, 2007, p. 53). Moreover, this management approach proved that people are the key to productivity while technology, work rules and standards do not necessarily guarantee good job performance (Mullins, 2007; Kreitner, 2007, p. 44). In contrast, success depends on motivated and skilled individuals who are committed to organizational objectives.

### 3.3. Systems approach

The system approach, which emerged in the 1950s, attempted to reconcile these two earlier approaches by addressing the interrelationships of structure and behavior and the range of variables within the organization (Mullins, 2007, p. 55). Ludwig Von Bertalanffy – founder of this school – perceived that an organization is seen as a combination of interdependent parts or subsystems which collectively make up the whole (Mullins, 2007). The value of system theory to the study of organizations is its ability to simplify complex situations by considering its subcomponents (subsystems) as well as with the relationship and interdependencies between these subsystems (Mullins, 2007).

*The socio-technical system.* The socio-technical approach to management began with investigating the low morale and psychosomatic disorder problems in the British coal industry (Mumford, 1994). Researchers from this school recognized that the new technical system had created an inferior and damaging form of social organization, which motivated them to reformulate the work design by optimizing its social and technical system (Mumford, 1994). Briefly, the “social” system is viewed as anything having to do with the selection, development and characteristics of an organization’s people and the culture that emerges through the interaction of those people. It also includes the work structure that relates people to the technology and to each other (Mullins, 2007). The “technical” system consists of the machines and methods of operations used to transform raw materials into products or service (Cummings, 1978). The term “system” implies multiple interdependent parts that interact to create a complex whole, thus it is difficult to fully understand a system by simply looking at its individual parts. Recognition of the socio-technical approach is of particular important today because people must be considered as at least an equal priority along with investments in technology (Mullins, 2007, p. 56). This approach has been accepted by Paez *et al.* (2004) to establish an integrated framework of lean production because the researchers have identified that the root elements of the system were based on human and technological aspects.

### 3.4. Contingency approach

Another approach to organizational design was suggested by a number of researchers, notably Lawrence and Lorsch (1967). The contingency approach can be seen as an extension of the system approach. It goes a stage further in relating the environment and other variables, to specific structures of organization (Mullins, 2007, p. 603). According to Wren and Bedeian (2009), it has been theorized that the more successful organizations are those that adjusted to their relevant environment. Hence, the contingency approach is seen as an effort to determine through research which managerial practices and techniques are appropriate in specific situations (Kreitner, 2007, p. 49).

## 4. Japanese management practices

Toyota, viewed as one of the birthplaces where Japanese production management (JPM) originated, is undoubtedly influenced by the Japanese management philosophy. A review of some basic practices of Japanese management can provide a better understanding of the relationship between the Japanese management practices and the Toyota Way model.

Keys *et al.* (1994) offered a comprehensive framework depicting Japanese management practices through:

- external forces (culture, industrial organization and government structures);
- general management practices (organizational structure, long-term planning horizon and consensus decision making and implicit control);



- manufacturing system (JIT manufacturing, total quality control (TQC), quality control circles (QCCs) and continuous improvement); and
- human resource management (lifetime employment and generalist career paths, seniority-based evaluation, promotion and compensation systems and company unions).

In a similar vein, Holt (1999) pointed out that there are two directions of the Japanese management philosophy that emerged to contribute to the management theory and practice around the world. The first direction is concerned with the relationship between people and the other is focused on production efficiency (Holt, 1999). Following the hierarchical structure of the 4P framework of the Toyota Way, four aspects of the Japanese management practices in the areas of “philosophy”, “production management”, “people-centered management” and “problem solving” are outlined as follows:

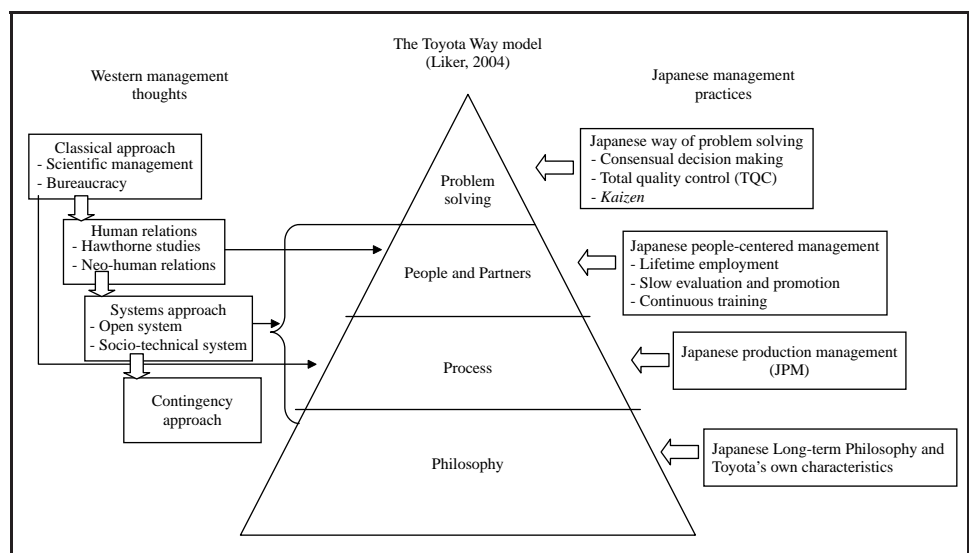
1. *Japanese long-term philosophy.* Drucker (1971) highlighted that the real reason for Japanese superiority sprang from their focus on long-term objectives. Long-term philosophy is embodied in most Japanese organizations through various activities such as life-time employment, stakeholders’ de-emphasis on annual/quarterly profits, long-term relationship with their suppliers, etc. (Drucker, 1971; Kono, 1982). Long-term thinking does not mean the short run objectives would be ignored. Instead, Japanese companies clearly stated both long- and short-range goals (Kono, 1982), which were easier for employees to understand companies’ direction.
2. *JPM.* Toyota has made an enduring mark on JPM (Haak, 2006; Schonberger, 2007). It comprised total quality management, JIT and an array of other practices such as total productive maintenance, visual management and re-engineering. These well-known practices were innovative approaches to avoid high levels of labor costs and costly investments in large-scale manufacturing systems (Cusumano, 1988; Ohno, 1988). These forms the core elements of JPM which have become a dominant influence in the field of production/OM in the early 1980s (Schonberger, 2007) and still are the contemporary trends in production management (Santos *et al.*, 2002).
3. *Japanese people-centered management.* Lifetime employment, slow evaluation and promotion, continuous training and multi-skilling have been considered as fundamental distinctive features of Japanese people-centered management that frequently appeared in the literature (Hasegawa, 1986; Kono and Clegg, 2001; Ouchi, 1981). These underlying principles are closely related. For example, from the corporate viewpoint, lifetime employment provides a rationale for the training of employees (Hasegawa, 1986). Moreover, lifetime employment involves promotion, in which managerial staff and company executives are promoted from within the company, not hired from the outside (Hasegawa, 1986). In addition, as noted by Kono and Clegg (2001), there are various ways in which employees acquire specific knowledge and develop the desired attitudes by off-the-job training, training in decision making, learning from subordinates, self-training, training through job rotation, learning from failure and learning through thinking.
4. *Japanese way of problem solving.* The Japanese way of problem solving is conducted under a *kaizen* mindset which requires the use of various problem-solving tools (Imai, 1986). There is no doubt that most of the quality techniques and management principles were transferred from the USA through the lectures given by Deming and Juran (Imai, 1986; Lillrank, 1995). However, the organizational vehicle for implementing the principles and applying the tools was home grown in Japan. Terms such as QC, statistical QC, QCCs and TQC often appeared in connection with *kaizen* (Imai, 1986, p. 9). There are nine steps comprising the “QC” story (Ishikawa, 1985) when people were engaging in the task of solving problems. These solutions to problems are subject to the group decision-making process and are then forwarded as official recommendations to higher management. This approach is known as bottom up decision making (Hasegawa, 1986; Keys and Miller, 1984; Ouchi, 1981) and consensus (Hasegawa, 1986; Keys and Miller, 1984). These features were often labeled as Theory Z (Ouchi, 1981) in some versions when discussing the Japanese management practices.

## 5. Linking the Western management thoughts and Japanese management practices to the Toyota Way model

The literature reviewed has first of all shown the evolution of management theory from different schools of management thoughts which mirrored the changes in the surrounding economic and social environment. It also shed light on the Japanese management practices following a similar pattern that parallels the Toyota Way model. Liker and Hoseus (2008, p. 24) outlined that the Toyota Way is more a reflection of Eastern culture than Western culture. The point here is that there is certainly some evidence that the Toyota Way on the one hand has absorbed the Japanese management practices as well as being influenced by the Japanese culture. On the other hand, the creation of the Toyota Way depended on many contributing factors that were not unique to Japan's culture. The discussion on Western management thoughts suggests that there are certain relationships between the Toyota Way model – its two middle layers in particular – and Western management thoughts.

With inspirations from the USA, Toyota had indeed committed a lot of its true innovations in the production system that proved to be very successful. For this reason, Toyota was credited with the distinction of being the birthplace of lean production and manufacturing techniques. In the beginning, industry practitioners observed Toyota plants and saw many tools and methods being practiced by Toyota that were very different from what they practiced. Believing this was the source of Toyota's competitive edge, many companies set out to emulate Toyota. The 2010 Compensation Data Manufacturing survey results found that 69.7 percent of manufacturing companies utilized Lean production (Compdata Surveys, 2010). Other followers included New United Motor Manufacturing Inc. (NUMMI), a Toyota and GM joint venture, Korean automakers (Lee and Jo, 2007), Chinese manufacturing plants (Taj, 2007), among others who attempted to adopt TPS to enhance their operational efficiencies and business competitiveness. In addition, its implementation beyond the manufacturing firms has also been reported in the literature, such as in the health care system (Collins and Muthusamy, 2007) and the construction industry (Koskela, 1992; Ballard, 2000). Overall, within each of the four layers of the Toyota Way model, this study will consider possible linkages to Western management thoughts and/or Japanese management practices that were adopted by and had impacted on the Toyota Way model. A conceptual model explaining these relationships is shown in Figure 3.

**Figure 3** A conceptual model of the Toyota Way model and its linkages with Western management thoughts and Japanese management practices



### 5.1. Philosophy: Japanese long-term philosophy

Toyota is a unique blend of Japanese culture, encompassing the special conditions of the Aichi prefecture where Toyota was founded, the influence of the Toyota family and the influential leaders in Toyota's history (Liker and Hoseus, 2008, p. 25). Table II shows that the Japanese management philosophy shares a common ground with the foundation of the Toyota Way (Principle 1) in the area of:

- sense of purpose;
- long-term perspective;
- self-reliance and responsibility; and
- customer focus.

### 5.2. Process: classical approach and JPM

There are seven principles in the Toyota Way that belong to the second broad category – the right process will produce the right results (Figure 1). These principles in this category were most of the TPS tools for improving manufacturing processes (Liker, 2004). A close examination unveils that these technical components of the Toyota Way was however an evolutionary output with some of its roots clearly traceable back to its counterparts in the USA and the prevalent scientific management theory at that time. On the other hand, TPS also embraced a group of innovative manufacturing techniques with the same objective to eliminate waste and inconsistencies from the workplace. These lean tools were originally expressed in their Japanese terms (*Jidoka*, *kanban*, *poka-yoka*[5], etc.). These observations postulate a picture that this layer of the Toyota Way model has certain connections with both Western and Japanese practices. To further articulate how the classical approach of management theory and JPM fit together in this layer of the Toyota Way model, a group of selected principles of “process” category in Table III suggests that they are in fact in agreement with the classical approach of management theory.

*Waste elimination.* Scientific management promotes production efficiency. This had been reflected in Henry Ford's mass production, which achieved unprecedented profitability by eliminating waste such as subsequent machining minimization, process simplification, shorten unnecessary transportation, recycling, etc. that most people would have overlooked (Levinson, 2002). It is interesting to note that some forms of waste in Henry's eyes were much alike the *muda* (waste in Japanese) identified by Ohno (1988) namely overproduction,

**Table II** Linking the “philosophy” layer of the Toyota Way with Japanese management philosophy

<i>Principle one of the Toyota Way</i>	<i>Japanese management philosophy</i>
(1) Sense of purpose	This sub-principle appears to come from the founder of Toyota, Sakichi Toyoda, who believed in contributing to the group and society (Liker and Hoseus, 2008, p. 25)
(2) Long-term perspective	All three fundamental properties of the Japanese organization (Ouchi, 1981), namely lifetime employment, approaches to evaluation and promotion and non-specialized career paths that bear a common feature which is “long-term orientation”
(3) Self-reliance and responsibility	This is one of the core values of Toyota and they started out in the farming community of the Aichi prefecture far from the big city
(4) Customer focus	The Japanese (Toyota people) broadened the definition of “customer” to include both internal and external customers For external customer, Toyota always starts by asking what the customer would like For the internal customer, each person in a production line or business process was to be treated as a “customer” and to be supplied with exactly what was needed, at the exact time needed (Liker, 2004)

**Table III** Linking the “process” layer of the Toyota Way with the classical approach of management theory

<i>S/no</i>	<i>The “process” layer of Toyota Way (Liker, 2004)</i>	<i>Classical approach of management theory (“scientific management” and “bureaucracy”)</i>
Ultimate goals	Waste elimination	Time and motion study (Taylor, 1911; Gilbreth, 1911)
P2	Creating continuous process flow to bring problems to the surface	Learning from Ford – borrowing its flow concept and conveyer system (Fujimoto, 1999; Ohno, 1988)
P6	Standardized tasks and processes are the foundation for continuous improvement and employee empowerment	Originated from the time and motion study within the scientific management approach Enabling bureaucracy

waiting, unnecessary transportation, over-processing, inventory, unnecessary movement and defects. To achieve the same objective, eliminating as much waste as possible naturally became the heart of the TPS (Liker, 2004). Technically, the application of Toyota’s waste reduction principle has some commonalities with Gilbreth’s motion study which aimed to eliminate redundant motions and to determine the best practice. According to Towill (2010), Shigeo Shingo who was credited with much of the detailed design work of TPS, performed over 6,000 motion study experiments when planning for the optimization of particular operations in Toyota.

*Creating continuous process flow.* The assembly line was developed by the Ford Motor Company, where large batch of Ford cars were built around the concept. Womack *et al.* (1990) attributed that the gradual realization of the interchangeable parts and the simple methods used to attach each part were the manufacturing innovations that made the assembly line possible. Like Ford’s mass production, the TPS had not really changed the Fordist system as it has kept the line as the guiding principle underlying the organization of work (Muffatto, 1999; Ohno, 1988). However, what distinguishes TPS from mass production is its pull system which resulted in less inventory.

*Time-and-motion regained: standardization.* Standardization is one of the principles that can be viewed as an important legacy from the scientific management theory to the Toyota Way. In the traditional manufacturing mode, based on time and motion studies, standards represent “one best way” of scientific principles of work. Research conducted at the joint venture between Toyota and GM at the NUMMI, where the TPS was deployed, revealed that Taylorist time-and-motion discipline and formal bureaucratic structures were still essential for efficiency and quality in routine operations (Adler, 1993). What differentiated Toyota’s practice on standardization was that, in NUMMI, team members themselves held the stopwatch to time one another, looking for the safest and most efficient way to conduct each task at a sustainable pace. This has become a day-to-day assignment for all workers – a standard, in the world of lean production, is never perfect or finished.

*Enabling bureaucracy.* Taylorism created very rigid bureaucracies in which workers were to blindly and simply follow the standardized procedure; whilst managers play the role of doing the thinking. NUMMI had all the characteristics of bureaucracy but also had many characteristics such as extensive employee involvement, a lot of communication, high morale and a strong customer focus, which were associated with flexible organizations; Liker, 2004). Liker (2004) adopted Adler’s (1999) study on Toyota’s organizational practice and summarized how the coercive bureaucracy uses standards to control people, catch them breaking the rules and punish them to get them back in line. By contrast, enabling bureaucracy system is designed and improved upon with the participation of the workforce, where standards help people control their own work.

*Japanese production management.* The remaining principles from the “process” category were viewed as Toyota’s innovations in production management, which are linked to JPM as illustrated in Table IV. All these principles work together to eliminate the non-value adding activities within the whole manufacturing process and business.

**Table IV** Linking the “process” layer of the Toyota Way with JPM

S/no	The “process” layer of Toyota Way (Liker, 2004)	JPM (Toyota’s innovation)
P3	Pull system to avoid overproduction	<i>Kanban</i> (pull system) is an innovation to avoid overproduction based on the American supermarket inventory system
P4	Level out the workload ( <i>heijunka</i> )	Toyota’s innovation which contradicts the traditional mass (push) production in the USA
P5	Build a culture of stopping to fix problems, to get quality right the first time ( <i>Jidoka</i> )	Greatly influenced by Edward Deming and Joseph Juran’s lectures given to the Japanese on QC. The Toyota Way is to build in quality through <i>Jidoka</i>
P7	Visual control helps to reveal the hidden problems	Toyota’s innovation to highlight the variations through visual tools
P8	Only reliable, thoroughly tested technology can be used that serve the people and process	Not applicable here. It is more applicable when discussing P8 under the socio-technical system

### 5.3. People: human relations approach and Japanese people-centered management

As discussed earlier, the human relations approach to management focused on trying to understand the factors that affect human behavior at work. Through job design, management style and other organizational factors, higher-order needs of employees can be satisfied (Miller, 2008). The principles of the human relations approach to management are certainly intuitively appealing to Toyota.

Sugimori *et al.* (1977, p. 554), in the first published English version of the TPS, equally elaborated on the other major theme of the paper related to the role and treatment of the workers. This later became one of the two pillars of the TPS (Ohno, 1988; Liker, 2004) – “respect for people”. According to Monden (1998, p. 366), investments have been made by Toyota (Japanese manufacturers) in the following three major areas to promote respect for humanity and improve working environment since the 1990s:

1. Installing machines that are compatible with workers.
2. Improving the working conditions surrounding workers. This includes eliminating dangerous, noisy, dirty, hot or smelly conditions.
3. Avoiding work strain imposed on workers.

Apart from these investments spent to improve the external working environment, Toyota also worked on some internal issues such as developing the capable leaders and employees, promoting teamwork and providing tremendous training opportunities as well as working closely with their partners. All of these parallel the central theme of the human relations approach and its later neo-human relations movement. Both laid significant emphasis on people and acknowledged that people were the key to productivity and technology success. Unlike most managers who only installed lean tools such as *kaizen*, 5-S, etc. Toyota managers put in extra efforts, as noted by Bodek (2008), to motivate and inspire people. Moreover, Liker (2004, pp. 194-8) linked the five most prominent motivation theories to the Toyota’s approach of developing people and teams, and commented that each was used to great effect in Toyota (Table V).

Furthermore, a number of distinctive features of Japanese people-centered management include lifetime employment, slow evaluation and promotion, continuous training and multi-skilling that can also be linked to this layer:

- *Lifetime employment.* Toyota’s internal manual – human resource management guiding model – cited in Liker and Hoseus (2008, p. 345) stated that: “through precise allocation, optimized fixed headcount and a lean and efficient workforce, we ensure the ability to adapt flexibly to fluctuations in production and secure stable employment”. This flexible workforce strategy allows Toyota to ride out the ups and downs of the market without layoffs (Liker and Hoseus, 2008). As observed by Liker (2010), during the financial

**Table V** Various motivation theories and the Toyota Way

<i>Motivation theories</i>	<i>Toyota's approach</i>
Maslow's (1954) hierarchy of needs	Job security, good pay and safe working conditions satisfy lower level needs Culture of continuous improvement supports growth towards self-actualization
Herzberg's (1959) motivation hygiene theory	5-S, ergonomic programs, visual management and human resource policies address hygiene factors Continuous improvement, job rotation and built-in feedback support motivators
McGregor's (1960) theory X and theory Y	Each employee has responsibility and is trusted for QC and safety Various <i>kaizen</i> programmes are challenging work that appeals to the employees
Skinner's (1948) behavior modification	Continuous flow and <i>andon</i> create short-lead times for rapid feedback Leaders constantly on the floor and providing reinforcement
Locke's (1968) goal-setting theory	Sets goals that meet these criteria through <i>hoshin kanri</i> (policy deployment) Continuous measurements relative to targets
Source: Liker (2004, p. 195)	

recession period, in some plants, 40 per cent of the workers who were not needed for production were paid full-time to relearn its famous production system and to attack problems in the plant with a vengeance.

- *Slow evaluation and promotion.* The principles underlying the promotion system at Toyota are built in fairness and strictness (Liker and Hoseus, 2008). A plant manager at a Toyota plant does not have the power to decide who get promoted because personal biases would erode the trust between the company and himself (Liker and Hoseus, 2008). The best leader should demonstrate their Toyota Way values of mutual respect and continuous improvement, through competencies such as communication, collaboration, problem solving ability, etc. (Liker and Hoseus, 2008). Throughout Toyota's history, key leaders have been found within the company, at the right time, to shape Toyota's development (Liker, 2004). Shopping for "successful" CEOs and presidents is not the practice in Toyota because their leaders must understand the Toyota culture and philosophy well (Liker, 2004).
- *Continuous training and multi-skilling.* Toyota conducts systematic company-wide and divisional training and assignments for training purposes with an emphasis on on-the-job training to ensure that associates can fully utilize their abilities (Toyota Motor Company, 2003, p. 80). Toyota's training practice has evolved from an American method called Training Within Industry (Liker and Hoseus, 2008; Dinero, 2005). This practice is regarded as a foundation of the TPS (Dinero, 2005, p. 52; Jusko, 2008), which develops qualified people who are able to engaged in a variety of jobs in production, and think proactively and analytically about their jobs. More than that, in order for the employees to remain engaged in the repetitive working environment, Toyota provides many additional opportunities for employees to use their creativity and to develop greater skills (Liker and Meier, 2006).

#### 5.4. Process and people: systems approach (socio-technical system)

The "process" and "people" layer of the Toyota Way is complementary to each other. The processes of TPS are designed to surface problems so that people can solve them, thereby continually strengthening the system. People are carefully selected and developed over long periods of time to be knowledgeable of problem solving, standardized tasks, etc. that will continually improve the processes. However, as Liker (2004) observed, most US companies have adopted a few of these technical tools but failed to understand the



importance of the “people” value that made the system work. In this sense, the socio-technical system can be used to highlight the missing link that because technology and organizational structures may change, the rights and needs of the employee must be given as high a priority as those of the non-human parts of the system (Mumford, 2006).

Morgan and Liker (2005, p. 16) highlighted that only by studying people and equipment working together can we see the way the whole system functions. The socio-technical system model aided Morgan and Liker (2005) to build up Toyota’s product development system based on three primary subsystems:

1. process;
2. people; and
3. tool and technology.

These three sub-systems are interrelated and interdependent and affect an organization’s ability to achieve its external purpose. Morgan and Liker (2005, p. 17) noted that: “[...] what makes lean production development truly powerful is the whole system of mutually supportive tools, processes, and human systems working in harmony”. This sentiment exactly parallels the pivotal theme of the “system approach” that equal priority should be given to both the people and technology aspects in the organization.

Liker and Hoseus (2008, p. 13) have highlighted that the Toyota Way model is much more close to the ideal of the socio-technical system thinking, where the “people” and “process” aspects have been incorporated in the middle of the 4-P model. What is more, the pyramidal structure of the Toyota Way model indicates that Toyota values their employees even more than these lean principles, as “people and partners” is placed one layer above its famous “process” layer. Liker (2004, p. 145) noted that: “the Toyota way preaches that the worker is the most valuable resource – not just a pair of hands taking orders, but an analyst and problem solver”.

Furthermore, the results of socio-technical design were always closely monitored and recorded to establish if it had led to the efficient use of the technology (Mumford, 2006). Therefore, another observation that connects the socio-technical system to the Toyota Way model is that the last principle (Principle 8) of the “process” category can actually determine what kind of technology is the most appropriate for Toyota to choose. Usually, the requirements of technology were rarely discussed in the literature relating to the TPS (lean tools). In contrast, Principle 8 of the Toyota Way follows the guidelines such as “use technology to support people, not to replace people” (Liker, 2004, p. 39) are among others concerning the new technology procurement. This reflects the central idea of the socio-technical system that does not allow the technology to become a controlling factor when new work systems were implemented (Mumford, 2006). It explicitly reflects that Toyota places equal priority on people by always asking “does this technology support people, and adding value to the current process” (Liker, 2004).

### 5.5. Problem solving: a Japanese way

Referring to the discussion on the Japanese management practices earlier in terms of its unique approach to problem solving, it is interesting to see that the last three principles of the Toyota Way model may have possible connection with this practice. Toyota is probably the best, among the Japanese organizations, at problem-solving practice.

*Genchi genbutsu and consensus.* The first step of the Toyota Way in dealing with the problem is called *genchi genbutsu*. It is viewed as one of the founder’s philosophies in Toyota, infers that the root causes of problems are revealed by on-site investigation and inquiry. It also reflects another characteristics of the Japanese way of problem solving that they think and speak based on personally verified data rather than theorizing on the basis of what others or the computer screen indicate (Liker, 2004). Apart from *genchi genbutsu*, the Toyota Way model equally emphasizes the importance of building agreement (consensus) in decision making. As Liker (2004) pointed out, how the decision being made is viewed just as important as the quality of the decision in Toyota. Moreover, Principle 13 of the Toyota Way

includes the important process of *nemawashi* (Liker, 2004, p. 241), which describes how junior people build consensus by collectively gathering their inputs and circulating it broadly for management approval.

*Kaizen and organizational learning.* The last three principles of the Toyota Way have their root in the *kaizen* philosophy which uses a systematic procedure based on Deming's PDCA. A close examination of the PDCA methodology and the last three principles of the Toyota Way model is tabulated in Table VI.

Liker (2004) highlighted that Toyota is probably one of the best learning organizations in the world. This cannot be achieved without the unique Japanese *kaizen* philosophy, with using the PDCA approach running at all level of the company.

#### 5.6. Toyota Way model application: a contingency approach

The last management approach in Figure 2 – contingency approach – cannot be directly linked to any layers of the Toyota Way model. However, it is more applicable when considering the implementation of the Toyota Way model outside of Japan, or, to a non-manufacturing industry. Researchers have noticed that the contingency approach focuses on the environment, and other variables, to specific structures of organization and it has been theorized that an organization spontaneously establishes for itself the most effective organizational structure for the environment in which it exists. Monden (1998) outlined that the international transfer of the Japanese production system seems possible but only if the social environment of the country is altered to adapt to the new system. In this sense, there were two key environmental factors, pointed out by Monden (1998), including:

1. maker-supplier relationship; and
2. the management-labor relationship that must be implemented to accommodate the transfer of the TPS in the US manufacturing firms.

This is indicated by “contingency theory” that “the most efficient production systems for the USA and Japan are different because of differences in their respective environment conditions” (Monden, 1998, p. 336). Similarly, the contingency theory can be applied when the Toyota Way model serves to improve the inherent problems in other industries, for example, construction. Much has been written on the differences between these two sectors (Koskela, 2000). This enables the practitioners to think deeper about how to minimize such gaps with appropriate modifications to pave the way for better implementation of the Toyota Way model.

**Table VI** Linking the PDCA methodology and problem-solving principles in Toyota

PDCA methodology	Toyota Way Principles 12-14
Plan: before any corrective action is taken on the problem at hand, a number of activities should be undertaken: Define the problem Gather relevant information Identify the root cause of the problems Develop and consider the possible solutions Select the best alternative for implementation	The Plan methodology of PDCA corresponds to Principles 12 and 13 of the Toyota Way The Toyota Way (P12) enables the leaders to go and see the actual situation for them to understand the problem source and identify the problem Make the decision on the verified data 5-whys methodology (P13) as a useful tool is employed to probe the root causes Alternative solutions will be discussed (P13) until a consensus is agreed Solve the problem
Do: implement the solution chosen as the best Check: monitor the implemented solution and gather data of the effects of implementation and comparing these with the target or prediction Act: Establish the new process, solution, or system as the standard if the results are satisfactory, or taking remedial action if they are not	Principle 14 indicates that <i>hansei</i> is part of the check part of the PDCA cycle. (Note: <i>hansei</i> is a Japanese term for self-reflection.) Principle 14: <i>kaizen</i> activities

## 6. Discussion

Integrating possible theories from the management domain to each layer of the Toyota Way model resulted in better instituting of this model. This paves the way for an improved understanding of the Toyota Way to potentially serve the non-manufacturing industry such as construction. In the construction industry, the application of lean principles or TPS is not a novel undertaking. The term “lean construction” has been widely promoted in the academia and industry in more recent years. The concept of lean construction embraced two slightly different interpretations as observed by Koskela *et al.* (2002): one is to synthesize Koskela's (2000) transformation-flow-value (TFV) view of the construction process as a theoretical foundation of lean construction; the other discusses the application of lean production methods to construction, which adopts the last planner approach (Ballard, 2000) to the planning and management of the construction process. Another school of thought that should be taken into account is that lean thinking principles (value, value stream, flow, pull and perfection) as is promoted as guidelines (Womack and Jones, 1996) to the construction industry. The Egan (1998) report has undoubtedly been responsible for popularizing the lean label amongst construction professionals (Green and May, 2005) who see lean thinking primarily as a set of techniques that can be directly applied to construction.

Several cases of the application of lean thinking in construction have been reported. Most of them focused on isolated tools and techniques with limited results (Picchi and Granja, 2004). This echoed Liker's (2004) observation in the manufacturing context. Picchi and Granja (2004) therefore advocated that the construction company should be considered as a whole and on a long-term basis in order to reap broader results when practicing lean. This acknowledged the first principle of the Toyota Way model, but failed to shed light on human resources and problem solving principles for the construction organizations. Furthermore, Paez *et al.* (2005) introduced a higher view of lean construction and lean manufacturing as a socio-technical system. This framework implies that the operational improvement will always rely on the joint effort of the technical and human elements that characterize the lean enterprise (Paez *et al.*, 2005). It also concluded that the tools presented in the context of the lean manufacturing scenario can fit the construction industry to support the same principles (e.g. JIT, production smoothening and automation).

The Toyota Way model, after Koskela's (2000) TFV view of the construction process, might become an alternative framework to the construction industry. This is because it is able to offer a more comprehensive perspective of an organization as well as to facilitate the development of a theory of production to the construction process. A comparative study of the TFV framework and the Toyota Way model has been examined by Gao (2010), who outlined several common basis that the two frameworks share. For example, the flow concept is very similar to the “process” layer of the Toyota Way model. This is because the TPS is the mother platform from which the flow concept was derived.

## 7. Conclusion

This paper sheds light on establishing the relationships between the Toyota Way model and the management theories from the West and Japan. It needs to be acknowledged that there is a rich theoretical foundation supporting this management model and its 14 management principles. Mathews (1995) outlined that there were three competing production paradigms, namely the mass, lean and socio-technical system. Firms were searching for workable strategies at any one time, would inevitably draw inputs from all three models. The discussion around the Toyota Way model suggested its linkage to the evolution of management approaches that are also indirectly connected to all three models.

Efforts was made to correct an unbalanced and inconsistent view on the application of the Toyota Way principles that existed among a majority of the industrial practitioners by demonstrating that the hidden mechanism of the Toyota Way is integrated with its philosophy, production system, human development and problem solving mindset. A technical mindset is in favor of using operational methods to achieve improvements in productivity and quality, reduction of defects and lead-time, cost savings, etc. (Emiliani, 2006) while ignoring the

importance of the “respect for people” principle is a normal phenomena. In construction, the term “lean construction” – borrowing principles of lean production – is still reeling from its weak theoretical debate. On the contrary, the Toyota Way model is available with a solid theoretical discussion as presented in this paper. It requires the construction researchers to revisit the mother platform of lean principles to appreciate the essence of the Toyota Way model in their own work environment. As these principles can be put into practice, it can achieve a far-reaching application for firms themselves over time as top managers’ understanding of them deepens.

## Notes

1. J.D. Powers and Associates is a global marketing information services firm, which is best known for its customer satisfaction research on new-car quality and long-term dependability.
2. *Jidoka* is literally translated as “automation with a human touch”, yet it is still a technical term because it means that when a problem occurs, the equipment stops immediately, preventing defective products from being produced.
3. *Takt* is a German word for rhythm or meter. *Takt* is the rate of customer demand – the rate at which the customer is buying a product.
4. The Toyota Way 2001, based on the dual pillar of “respect for people” and “continuous improvement”, is an internal training material published by Toyota Motor Corporation in 2003.
5. *Poka-yoka* is a Japanese word that refers to checking devices installed in the machines to prevent defective work.

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