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Lean Production and Its Critics

[ABSTRACT]

"LEAN production" or "the Toyota production system" has been recognized as the most efficient way of management at least since the early 1990s. Not only does this recognition stem from the empirical success of the Japanese automobile industry in the world market but is also confirmed as the ultimate useful concept by one of the most influential books, "*The machine that change the world*", written by Womack, Jones and Roos (1990). The pre-eminent status of Toyota as the world's leading automobile producer contributes to the embrace of "lean production" even outside the automobile industry. Perceived by practitioners as the most efficient way of organizing production, lean production is being implemented in a wide range of industries, including retail (Wright and Lund, 2006), banking, insurance, and public administration (Sengenberger 1994).

However, "lean production" is criticized in various ways. It is thus the objective of this paper to present lean production with a fair assessment. In doing so, I will first sketch a picture of lean production by exploring its philosophy and core components. Then, I will discuss the critiques over lean production, which can be classified into 4 accounts: 1) the negative effects on workers, 2) the myth of optimal efficiency, 3) the lack of concept clarity, and 4) the improper guide for practitioners.

Keywords: *lean production, the Toyota production system, Kanban, Just-In-Time, Kaizen, Quality of Workers' Life (QWL)*

Exploring lean production

LEAN production has come to its prime status with the success of Japanese companies, particularly in the automobile industry. After surviving the Oil Shock of 1973, the Japanese automobile industry, spearheaded by Toyota, had continued to grow dramatically in the world market both in terms of exports and production overseas (Ohno 1988). As a result, the Toyota production system has become a standard management concept considered more efficient, than the traditional management like Taylorism and Fordism.

It was the five-year study (1985-1990) of the International Motor Vehicle Program (IMVP) at the Massachusetts Institute of Technology (MIT) that first showed empirical confirmation on the success of pursuing the Toyota production system (Womack, Jones' and Roos 1990). According to the report, a normal product development time in the Japanese automobile industry is half of that in the United States and Europe, productivity was twice more effective, faulty production was far fewer, and inventories and stock were more fraction. Womack, Jones and Roos termed the Toyota production system as "lean production", arguing that it merges the best features of previous traditional production systems like the craft and the mass production system. Lean production was made superior by combining flexibility and quality of the craft system with the reduction of time and unit costs of mass production. They also claim that in the 21st Century, "lean production" will become the dominant mode of production which the whole world should adopt as quickly as possible to achieve the highest efficiency (Womack, Jones and Roos 1990, pp. 13, 277-278).

The philosophy of the Toyota production system was firstly promulgated from the original source by a top executive at Toyota, Taiichi Ohno in his book "Toyota production system" (1988). To increase product efficiency in the market with shrinkage and turbulence, Ohno argues that manufacturers have to change their mindset from just pushing their products to the market to improving their product quality and producing just limited products at the right time to satisfy customers' needs. In doing so, there is only one philosophy to keep in mind, "a thorough elimination of waste". This statement was reconfirmed by the outsider's eyes of Womack (1990, 1996) reporting that Toyota has created its own philosophy by producing products with considerably less of everything, e.g. people, material, resources, space, etc. The term "lean production" is thus used to represent the philosophy of eliminating anything considered waste.

To achieve such philosophy, lean production emphasizes five components (Jones 1992, pp. 195-196):

1) use visual factory control,
2) use just-in-time to eliminate in-process buffers and waste,
3) encourage employees to involve in continuous improvement or "kaizen",
4) managed by work teams, and
5) devote more responsibilities to workers

1) The use of visual factory control

In terms of visual factory control, the plant layout is designed under the idea of "panopticon" (a special architectonic construction designed to let every space easily to be seen) (Sewell and Wilkinson 1992, pp. 271-274). This special physical architecture cames from removal of buffers and unnecessary

inventories, shortened production line, and simplification of work process. Not only does it ensure the work flow but it also provides a permanent visibility to assure automatic functioning of power over workers in terms of supervision.

2) The use of Just-In-Time to eliminate in-process buffers and waste

Unlike traditional automobile makers in which huge inventories and spare parts were always prepared in advance to ensure a smooth production line, lean production eliminates such unnecessary waste through Just-In-Time (JIT). With JIT, minimal buffers are possible because its concept is to make only what is needed in the amount required at the right time (Ohno 1988, pp. 4). Accordingly, JIT is practiced to the level of zero inventory.

3) Employees are encouraged to involve in continuous improvement or "kaizen"

In order to assure the products' quality from JIT production, continuous improvement is needed. The improvement of working process does not come from the management level but from useful suggestions by workers who are working in the production line. Workers are encouraged to participate with management in improving work process and practice by contributing their ideas through small group activities geared toward problem solving (Forza 1996, pp. 46).

4) Team work

Just-In-Time (JIT) and continuous improvement (Kaizen) are practiced by team work. Team members are assigned a set of assembly steps; meanwhile, the team leader (or "Shusa") work as coordinator of the team (s/he should fill in for any absentee). To achieve best performance, they are trained a wide variety of skills and are encouraged to think actively to devise solutions before a problem becomes serious (Womack, Jones, and Roos 1990, pp. 99). The whole assembly line can be stopped at any time by workers, if there are any problems emerging and workers cannot fix it and then the whole team would come over to work on the problem. In other words, dynamic work team emerges as the heart of the lean factory.

5) The devolution of responsibilities to workers

Under lean production, workers are expected more responsibilities. They are carefully selected and trained to have multi-skills to pursue multi-tasks. Not only do they have to perform well on their task but are also able to replace other duties in their team if needed, have a high interpersonal skills and creativity, and are able to figure out the problem occurring during the work process (Fucini and Fucini 1990, pp. 69-70). Multi-responsibilities are considered as job enrichment and enlargement that make work more challenging for workers.

Notwithstanding, lean production is not without an intense debate over its utility. Although its philosophy sounds very impressive and plausible, the practices of lean production are accompanied by several problems. The following part will review the critiques over lean production.

Negative effects on workers

ALTHOUGH the MIT study concludes that automobile plants in Europe, Japan, and the United States, in which "lean production is pursued, provide superior quality of work life, there are empirics and critiques claiming negative effects on workers. Fucinis (1990), based on their field research at Mazda Flat Rock Plant, show workers' negative opinions on lean production. For instance, UAW (united auto workers) President at Mazda's Flat Rock plant said "*they promise us a rose garden but they gave us a desert*" (Keeling 1990, cited in Berggren 1993, pp. 164). A statement from an exit interview of a manager who was quitting Mazda is also telling.

> "*I had come to Flat Rock ready to buy into the Mazda philosophy but after one year has passed, I had lost my faith in Mazda's orientation promises. The plant portrayed in the orientation center, with its open communication, mutual trust, and respect. But in reality Flat Rock was just another version of General Motors plant, except that its workers tended to work harder-and to have fewer rights...*" (Fucini and Fucini 1990, pp. 143).

According to Fucinis (1990), during the orientation and training programs newcomers were not aware that they are prepared to face with hard work. They were impressed by the colorful words which generated positive attitudes toward the company, such as "we are in the same family" and "the will to participate". Moreover, they were encouraged not only to create self-discipline (e.g. designing their own jobs, acting as a quality control inspector, and contributing ideas to improve the production process) but also to improve their interpersonal skills (e.g. communication skills, stress management, how to be a good listener, how to diffuse another person's anger, and how to criticize without hurting others).

Specifically, the components of lean production discussed above are criticized on the account of work intensification. Sewell and Wilkinson (1992) argue that "*the use of visual factory control*" does not only limit workers' autonomy but subjects workers to more control in both tangible and intangible ways. On the one hand, "visual factory control" can be considered as a tangible control pursued by physical rearrangement of equipment and production line, in the "panoptic gaze" manner, to simplify the working process. On the other hand, it also contributes to intangible control over workers through management process, such as using "kanban" (a board designed to clearly identify any defect of work among others) to identify and eliminate any defect. Pursuing JIT (producing only a number of parts needed for the next operation and removing unnecessary buffers), a worker has to work harder and quicker to complete his/her task on time in order to be able to send the work piece to the next worker. Such work process leads to more and more stress (Parker and Slaughter 1988, pp. 38). Moreover, by "kaizen" (continuous improvement), workers are forced to often come up with a better way to work, which tends to become a higher and higher working standard applied on them (Rosenberg 1982, pp. 60-66 and Sayer 1986, pp. 53 cited in Hampson 1999, pp. 372).

As a result, subject to peer pressure, workers are required more attention to do their work, which increases stress and the fear for public humiliation (Sewell and Wilkinson 1992, pp. 279-280). Likewise, Rinehart, Huxley, and Robertson (1997) found a similar trend at the CAMI plant in Canada (a joint venture between General Motors and Suzuki opened in 1989). From actual experiences of shop-floor workers, lean production represents a more insidious form of mass production, designed to pump more work out of workers through a combination of a fast-paced work and peer-enforced discipline.

From negative effects on workers reviewed above, it can be claimed that the core components of lean production are accompanied with some considerable detriment to workers. They are under stress and have high risk to face health problems from faster paced, intense and repetitive work. This is such a huge intangible cost that the organization pursuing lean production fail to recognize. Such cost can be considered as another form of waste regarding human capital.

The myth of optimal efficiency

THERE are two major critiques against the claim by Womack et al (1990) and Ohno (1988) on optimal efficiency generated by lean production: one on the universal utility across industries, another on the meaning of efficiency itself. The first group of critics is skeptic on the applicability of lean production in other industries apart from automobile. William et al (1992) and MacDuffie (1991 cited in Berggren 1992, pp. 167) argue that the perspective toward the success of lean production may partly correct just for the automobile industry, but cannot easily be confirmed as a universal formula for the success of all industries in different environment and contexts. Likewise, some critics raise a doubt why the full set of its original components is not always adopted, despite the claim that lean production contributes to optimal efficiency (Price 1994, Kenney and Florida 1991 and Lowe et al 1997). Some German cases are supportive to this critique. Bender and Bijsterveld (2000) contend that lean production has been discussed more intensively in Europe than elsewhere; however, the widespread use of lean production does not necessarily mean that significant changes are taking place in practice. Specifically, only a few components, such as teamwork and total quality control (TQC), were actually applied (Lentz 1993, cited in Bender and Bizejsterveld 2000, pp. 56). Similarly, Daimler-Benz adopted lean production only partially in terms of work team and employee involvement in continuous improvement (kaizen)

day pursued in many countries, seems hard to fit into the concept of lean thinking. Such long hours of work lead to a tragic phenomenon called "Karoshi" (death from overwork), which has become a standard jargon in the Japanese society.

Such claimed limitation on lean production induces some scholars to offer other alternatives of manufacturing management. According to Berggren (1993) and Sandberg (1995), an assembly line under lean production (detailed regimentation of work process and its 60-second individual work cycle) lead to unsustainable efficiency, since such working conditions are detrimental to workers. As an alternative, Berggren (1992) argues that "integrated assembly" production design, in which assemblers build a whole car, is better than a short moving assembly like in lean production. According to his book titled "Alternative to Lean Production: Work Organization in the Swedish Auto Industry", Berggren uses the case at Volvo plants at Kalmar and Uddevalla during the 1970s-1980s, both of which were highly profitable. Instead of a short assembly line, the Kalmar Plant implemented teamwork assigned to do multiple tasks during a much lengthened work cycle (individual cycle times ranged from 1.5 to 3.5 hours). The Uddevalla Plant, meanwhile, eliminated the assembly line completely to allow teams to build entire vehicle. According to his survey on worker assessments of working conditions at several Swedish plants pursuing integrated assembly, the further the organizations departed from the short-time assembly line (which is the core idea of lean production), the less monotonous and stressful the work became. Although both plants of Volvo were later closed because of disastrous market, it reminds us that lean production may be not the most efficient way to raise productivity and simultaneously enhance the quality and autonomy of working life.

Another alternative is "Batch production", which refers to manufacturing in which products are largely tailored designed for

(Pruiji 1997 cited in Cooney 2002, pp. 1137).

Another critique is on the meaning of efficiency. Ohno (1988) sets out the definition of efficiency as follows: *"efficiency in modern industry and business means cost reduction like the Toyota system has been increase production efficiency by consistently and thoroughly eliminating waste"*. Critics doubt if such definition is true and appropriate. In other words, if efficiency means only to increase productivity with less waste, then lean production can achieve such goals. As seen from the MIT report mentioned above, the Japanese manufacturers were twice more effective than their Western competitors (Lewis 2000, pp. 960).

However, if efficiency includes the quality of workers' life (QWL), then such claim on efficiency seems not true since the implication of lean production is detrimental to human capital. According to ILO (International Labor Organization) report, in 1990 and 1991 when lean production is extremely pursued in Japan, effective annual working hours in the Toyota and Nissan plants amounted to approximately 2,300, nearly 700 more those than in Belgium and Germany. Overtime in the two Japanese companies ran as high as 400 hours per worker per annum (ILO 1992, cited in Sengenberger 1994, pp. 6). Likewise, in 1992 average Japanese people worked a total of 2,500 hours per year and one out of six had a total work time of 3,100 hours (Jida 1994 cited in Berggren 1995, pp. 59). The eight-hour day, a norm for work duration per

different customers in low volumes (Woodward 1965, cited in Clegg et al 2005). Cooney (2002) argues that if lean production fails to provide an optimal efficient way of management, then batch production which adopts some lean production practices is an alternative way of manufacturing. To support his argument, he presents two cases of new automotive component manufacturing companies in the Australian automotive industry, Austral Wire and Austral Forge, which are both batch producers. Unlike other component manufacturers, the success of these two companies stemmed from having low volumes in total but provided a wide range of products for a diverse customer base. Organized by autonomous manufacturing processes, the production has long manufacturing cycle times. Just-in-time delivery is pursued only for achieving particular customer requests, but over all there is no just-in-time flow within plants.

The lack of concept clarity

APART from the critiques on negative effects to workers and the myth of optimal efficiency, lean production is also questioned by academicians in terms of its concept. For example, Sengenberger (1993), Unterweger (1993), Cooke (1993), and Williaim et al (1992) pose similar questions toward lean production in terms of concept clarity. Below are some sample questions in this regard.

- What are the organization features of lean production that lead to a better productive organization?
- Can one disentangle lean production form Japanese work practice?
- Does lean production provide adequate basis for understanding competition in the world cars business?

To answer such questions and thus defend lean production, more reliable publications are needed. Unfortunately, apart from the book "Toyota production system: an integrated approach to just-in-time" by Yasushiro Monden (1993), most of books launched by Toyota focus on the history and philosophy of the Toyota production system rather than clarifying its concept (see, for example, Toyoda 1985, Ohno 1988, and Shimokawa 1988). To avoid criticism for insiders' bias, works by outsiders seem to be more reliable. Yet, such works also remain wanting. The most influential book exploring Toyota production system by Womack et al does not help clarify the concept either. Although useful in terms of presenting merits of lean production in comparison to traditional management system such as craft and mass production, the major problem of Womack's work is that it provides neither a sound definition of lean production nor how to implement and how to measure lean production. Moreover, its detail analysis fails to meet the standards of conceptual design and evident support (William et al 1992). For example, in stead of presenting how the Japanese take labor out and control labor costs, it simply argues that lean production leads to "half the human effort". Although presenting the new way of organizing workers such as JIT and Kanban, the work lacks evident support to show how these techniques contribute to more efficiency on managing people at work (William et al 1992, pp. 329-338). Likewise, Underweger contends that there is a number of factors

that the book omits to explain. **"***Just reading the book, one would never learn that massive outsourcing of parts and final assembly combined with low supply industry wages, better manufacturability of the product, high-capacity utilization and work intensification may actually explain all measurable differences in manufacturing effectiveness***"** (Underweger 1993, pp. 115).

Similarly, according to Bender and Bijsterveld (2000), although the publications related to lean production in Germany have grown over 12,500 by the year 2000, most of them have less focus on exploring the concept of lean production. They elaborate lean production in terms of rhetoric rather than clarifying the concept. Moreover, even Danile Jones, one of the author himself, admitted that the success of **"**the machine that change the world**"** (sale 60,000 copies) in Germany due partly to luck, partly to good marketing and partly to quick adoption by German academic and business elite (Underweger 1993).

Accordingly, works on lean production remain superficial, lacking reliable evident support across the board. As a result, lean production is currently lack of concept clarity, which leads to different interpretations among academicians and practitioners.

Improper guide for practitioners

Although lean production is questioned in many aspects, it still attracts a huge number of followers, thanks to the success of the Japanese automobile industry. In fact, lean production has been diffused and embraced by other manufacturers around the world (Semgenberger 1994). However, the implementation of lean production is not easy and does not always contribute to increasing efficiency. Lean production can be considered improper guide for practitioners, since it fails to provide a consistent format. As a result, it yields a variety of implementations in different ways, depending on the interpretation of practitioners.

When implementing lean production, several critical questions remain. Is it necessary to adopt all the core elements of lean production (e.g. teamwork, continuous improvement

(kaizen), JIT, zero defect principle, integration of suppliers). Or is it sufficient to implement just some of them? Is there a guarantee that lean production will lead to more efficiency? (Wilson 1993 and Robertson 1933 cited in Sengenberger 1993, pp. 116). It is hard to find out consistent answer to these questions. While scholars, such as Cooke (1993), argue that all elements of lean should be adopted, others think that there are other significant factors which practitioners should also concern. For instance, Hampson (1999) situates that the degree of leanness used depend on the power of union. Strong unions with a supportive industrial relations system do not allow extreme leanness implementation; while, leanness is likely to be generally implemented where union's power is limited.

In addition, there are evidences from the case of Germany and Korea showing differences of pursuing lean production. According to a survey on lean production in Germany, only a few methods of lean production, such as **"**team work**"** and **"**total quality**"** is applied and experimented (Lentz 1993, cited in Bender and Bijisterveld 2000, pp. 56). Moreover, some top decision-makers who recognized themselves as lean practitioners interpret lean management differently from its original version. Specifically, they define lean production as compressing the organization and reduction of hierarchy, while a central pillar of lean production

such as "kaizen" is rarely adopted (Sussmann 1994, cited in Bender and Bijisterveld 2000, pp. 56). Although this study does not provide empirics showing the success after adopting lean production, the author conclude that lean production is a model which widely followed in the German automotive industry and individual company develop their own version which deviate from the Japanese original (Bender and Bijisterveld 2000). Meanwhile, KIA Motors in Korea found its productivity shrinking at plants pursuing some components of lean production, compared to mass production ones. It is true that KIA aimed to implement a full set of lean production, but failed to do so due to space constraints, inefficient linkage between old and new machines, and difficulties in changing production layout (Lansbury, Lee, and Woo 2002). Even not so, it remains unclear if a full set of lean production will lead to higher efficiency at KIA.

As elaborated above, practitioners are subject to trial and error and have to find out for themselves how lean production should be implemented. Yet, pursuing lean production does not automatically guarantee productivity improvement.

Conclusion

ALTHOUGH lean production has been the rising management concept for efficiency improvement, it became increasingly apparent that lean production is not without limitations. As elaborated above, there are at least four significant critiques. First, lean production yields negative effects on workers, especially on the quality of workers' life (QWL). Second, critics claim that optimal efficiency from lean production is only a myth, since it fails to yield universal utility in all industries across the board. The meaning of efficiency is also problematic, defined too narrowly on productivity, while neglecting human capital negatively affected by lean production. Third, lean production lacks concept clarity, working more as a superficial argument. Lastly, related to the third critique, lean production is viewed as improper guide for practitioners, since it is under-defined and thus subject to different interpretations from practitioners.

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