

# 1 Lean Production as the Dominant Division of Labor

Theories, Industries, and National Contexts

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The *Cambridge International Handbook of Lean Production* provides an overall argument that lean systems are the dominant division of labor in the world, which are spreading in diverse ways to the service industries and around the world. Whether you think lean is great or not, it is the overwhelming influence on the world-wide division of labor. Further, this Handbook examines the many sides of the lean production debate that rarely interact. One side sees efficiency and quality as paramount, and the other side sees the protection of workers as key. Consequently, this Handbook focuses on three major parts:

- 1 Theories of lean systems differ considerably, and they largely ignore each other. A major divide exists between management/industrial engineering and social science/sociology on the good (high efficiency and quality) and not-so-good aspects of lean (work speedup, long overtime, and outsourcing);
- 2 Applications of lean systems started in the auto industry and spread throughout manufacturing, but these principles are now being applied to the service industries in medical, legal, financial, and retail services; and
- 3 While many theorists and consultants believe lean principles will apply in much the same way in different countries around the world, this Handbook will show that lean production will be resisted, modified, and reinterpreted according to the national cultures in which they are embedded.

The result is an international Handbook that is a comprehensive interdisciplinary examination of the future of the world of work and management in our global economy.

This book does something previous books in the field have not done – it puts multiple theoretical traditions together in the same setting and assesses their strengths and weaknesses. An ideological wall – efficient production versus protection of workers – divides these scholars so that they rarely, if ever, talk to each other. We see strong points and gaps in each view, and we present these views side-by-side. This *Cambridge International Handbook* bridges the gap between these disciplines and presents the best of each discipline's perspective. The industrial engineers and managerial authors are largely proponents of lean production because they see it as

increasing both efficiency and quality, while the social science and critical authors are strong detractors of these methods because they view lean production as exploiting workers. This Handbook brings them side by side in one volume to compare and possibly synthesize their views. This characterization of each side ignoring variation and each other's work may irritate both of these camps on lean production, but we take the position that lean production has a great deal of variation (i.e., it is neither totally negative nor totally positive). Its benefits are improved quality, moderately higher training, and moderately more worker empowerment, and it has often brought higher wages in some regions of advanced industrialized countries. Most workers in a lean system view these changes as major positives. However, lean production's emphasis on mandatory overtime, work intensification, outsourcing and offshoring, and the use of temporary workers are negative aspects of lean production (Lepadatu and Janoski 2018). And overseas, lean production may largely be jettisoned for Fordist methods but still maintain just-in-time inventory and cost cutting. Scholars need to address the many sides of these variations, and, while they may not agree, the positive and negative aspects of lean production need to be presented.

Existing work on lean production began with an emphasis in industrial engineering and management with a few critical and sometimes nationalistic works in social science in the 1980s and 1990s. First, the industrial engineers W. Edwards Deming and Joseph Juran went to Japan in the 1950s and are famous for developing quality control concepts. Juran has produced six editions of the *Quality Control Handbook* and each one has expanded over the years. But its focus is on management and industrial engineering. The important points about Juran's handbooks are that they are only focused on one side of the theoretical domain in their coverage of countries and industries. Second, there is no handbook on lean systems or production in the social sciences, and, in fact, little sociological research has been done in this area for the last 20 years (Matt Vidal, Robert Boyer, Michel Freyssenet, and Tommaso Pardi are exceptions). The earlier social science books and edited volumes on lean systems focused on Japanese transplants in the United States from 1980 to the mid-1990s. They first examined how Japanese cultural practices would translate into the US environment, or how lean production exploits workers through "management by stress" (Babson 1995) or "chaos on the shop floor" (Juravich 1985). Kochan et al. (1997) present a more balanced view of lean in the American industrial relations setting. The last major books in this ethnographic tradition were Terry Besser's *Team Toyota* (1996), based on the Toyota Motor Manufacturing in Kentucky (TMMK), Rick Delbridge's *Life on the Line in Contemporary Manufacturing* (1998), examining British factories, and Darius Mehri's *Notes from Toyota-Land: An American Engineer in Japan* (2005). Since then the topic has dried up because whether American or British workers can work under lean production has been answered with a resounding "yes." But still, no work has viewed all of the competing theories of lean production.

Three decades after the classic *The Machine that Changed the World* (Womack, Jones, and Roos 1990), this interdisciplinary Handbook offers a comprehensive evaluation of lean systems in their mature phase across many disciplines, industries, and countries. This international Handbook is the first comprehensive social science

approach that includes causes, consequences, and modifications of lean production as a rational, social, and political phenomenon. No multidisciplinary handbook on lean production exists in the social sciences, especially one that presents the very different theoretical approaches to lean production. Coverage on countries and industries from a management perspective exists in parts and parcels, but a systematic approach from the social sciences cannot be found. Thus, our approach, which takes a multiple theoretical viewpoint – business, management, and industrial engineering; and the social sciences, industrial relations, and sociology – is much more comprehensive and balanced than any previous efforts. No book that we have seen looks at lean production in our wide focus on countries using social science approaches to economy, society, and politics. Further, these different theoretical schools do not talk to each other, and our focus will be to synthesize some of their strengths and weaknesses in our synthetic essays at the end of each of three parts of the book.

In the rest of this introduction, we will do four things. First, we define lean production and explain why it is different from Taylorism and Fordism, and just plain bureaucratization. Second, we demonstrate why lean production now dominates the division of labor, including arguments to the contrary. Third, we introduce our three models of lean production – Toyotism, Nikeification, and Waltonism – to show that firms can fully use all lean principles or pick and choose among them.<sup>1</sup> Finally, we briefly introduce the chapters in this *Cambridge International Handbook of Lean Production*.

**What Is Lean Production and Why Is It Different?**

Although the term “lean production” was not initially used by the Japanese who invented it, “lean production” is a term that has stuck in practitioners’ minds throughout the world. “Lean production” was first used by John Krafcik (1988) at Massachusetts Institute of Technology (a graduate student then, and later the CEO of Hyundai-America and now Waymo) to describe the Japanese methods of production that had been successfully applied in manufacturing and service firms worldwide. Christian Berggren (1992, 1993) uses the term “Toyotism” to specifically target the system used at Toyota called the Toyota Production System (TPS). Practitioners and academics also describe lean production as an economic system that focuses on minimization of waste, continuous improvement (*kaizen*), and obsession with quality (Womack et al. 1990). Interestingly enough, the *kaizen* concept had become popular in Japan after the quality control training series offered by American management experts to help rebuild Japanese industry after World War II. The Emperor of Japan awarded the Second Order Medal of the Sacred Treasure to W. Edward Deming in 1960 for his efforts to spread the *kaizen* philosophy in Japan. Deming is celebrated as having had more impact on Japanese management

1 Some of our authors and others will provide their own models. See Smith and Vidal in Chapter 6 and our discussion of the Productive Models approach in Chapter 5.

than any other individual not of Japanese descent, and the Deming Prizes are awarded annually for achievement in quality in Japan (Petty Consulting 1991).

However, two Japanese men went beyond Deming’s original statistical control ideas and formed the core of the lean production breakthrough. At Toyota, Taiichi Ohno is credited with just-in-time inventory and breaking down the varieties of waste at work (*muda*). Although the idea was in Henry Ford’s writings, Ohno found it not at a Ford plant but at the Piggly-Wiggly grocery stores. He was then the first to apply it to manufacturing (Ohno 1988a, 1988b).<sup>2</sup> In addition, Kaoru Ishikawa at the University of Tokyo discovered the fishbone diagram method and quality control circles (Kondo 1994), which then laid the basis for strong teams in lean production. Therefore, in formalizing lean production for manufacturing, teamwork and just-in-time inventory were largely indigenous Japanese ideas.

Continuous improvement is the mantra of Toyotism. Even after the Toyota Motor Company had become the world’s largest automaker in the world in 2007, its President, Katsuaki Watanabe, said that the Toyota DNA is to wreck your brain until you find a solution to problems:

We’ve never tried to become number one in terms of volumes or revenues. Being the number one is about being the best in the world in terms of quality on a sustained basis. As long as we keep improving our quality, size will automatically follow. (Stewart and Raman, 2007)

Lean production can be summarized as follows:

- 1 company decisions are based on a long-term philosophy because managers want leaders and exceptional workers who thoroughly understand their work and company philosophy;
- 2 tasks are standardized on an assembly-line, making them amenable to visual control using thoroughly tested technologies and processes;
- 3 just-in-time inventory (JIT) systems create a production process with continuous flow, which will bring problems to the surface especially through a pull rather than push system;
- 4 a trusted network of suppliers is integrated into the planning, design, and production process including JIT;
- 5 team cultures produce quality the first time but stop the production process to fix problems using consensus to make slower but more implementable decisions;
- 6 permanent employees are buffered by temporary employees who fill in for sick or injured team members and are let go during times of economic recession. (Liker 2004; Liker and Ogden 2011; Lepadatu and Janoski 2011; Besser 1996.)

While the word *lean* connects to points 3 on JIT and 6 on buffering, the points about long-term philosophy, job rotation and flexibility, and quality control teams do not denote anything particularly connected to the word “lean.” As a result, the term “lean” is not the best description of Toyotism processes. Perhaps “lean, long-term, and loyal” (L-L-L) would be more appropriate, but since lean has such a strong hold

2 Ohno started using the grocery-store example for JIT in 1948, but he did not actually visit a grocery store in the US until 1956 (Roser 2015).

on the literature, we use it. Lean production is different from Fordism in two additional ways. First, job rotation, cross-training, multiple skills, and teamwork show the lean model as being antithetical to the rigid division of labor of Fordism (Jaffee 2001). W. Edwards Deming sees lean production as being totally different from Fordism since one of its main tenets is to “drive out fear,” which allows the criticism of ineffectiveness without being afraid of losing your job. Second, lean production in the United States is accompanied by a weakening of labor unions and the development of labor flexibility. Whereas lean production was invented in Japan in the context of job security and life-time employment, in the United States the system seems to be sustained through the long-term employment of its core labor force of associates but also an expansion of precarious labor through temporary workers (Lepadatu and Janoski 2011; Bernier 2009).

### **Does Lean Production Dominate the Current Division of Labor?**

Following the prediction of *The Machine that Changed the World* (Womack et al. 1990), we argue that lean production is the new dominant division of labor (Janoski and Lepadatu 2014).

### **Lean Production in Europe and the Americas**

The diffusion of lean in the Western World has been covered by Womack et al. (1990), Robert Cole (1991), David Strang (2010; Strang and Macy 2001), and others. From an ad hoc perspective, this diffusion of lean production in the automobile industry and in particular, firms has been seemingly irrefutable. The diffusion of lean production principles in the service industries has also been considerable. However, systematic analysis of this diffusion has been lacking until recently.

Using the systematic and representative European Working Conditions Survey (EWCS) and the American Working Conditions Survey (AWCS), Timo Antilla, Tomi Oinas, and Armi Mustomäki demonstrate the widespread use of lean production methods in the general working labor force. In their article on Europe, they show that 43 percent of employees in 35 countries in Europe were in lean production environments, and an additional 25 percent were in socio-technical or intensive teamwork workplaces (Antilla, Oinas, and Mustomäki 2018). This leaves only 32 percent divided between batch production and traditional workplaces (about 3 percent) and Taylorist or Fordist workplaces (about 29 percent). In their chapter in this volume, they show that about 47 percent of American workers are in lean production workplaces, with 4 percent in traditional workplaces, 20 percent in knowledge-based workplaces with extensive teamwork, and 29 percent in Taylorist workplaces (Chapter 17, this volume). This definitively shows that lean production is the most numerous form of work organization throughout the workforce, and that related forms of knowledge-based work as about 20 to 25 percent more of the workforce. The old division of labor with Taylorism and traditional forms of work amount to less than a third of the labor

force. This probably does not differ much from Fordism and Taylorism at its peak in the 1950s and 1960s as no system of production carries 100 percent of the workforce.

There are some contrary voices concerning the competitive advantage of adopting lean production methods. One is that some top producers do not use lean methods. This applies to such luminaries as Nike, Apple, Dell, and others who largely use just-in-time inventory, but China and other Asian countries use largely Fordist production methods without the considerable teamwork that promotes quality through statistical process controls. We will discuss this application of lean production in the following section on three models of lean production – Toyotism, Nikeification, and Waltonism. Like Fordism and Taylorism before it, lean production does not completely penetrate every production facility in the world. However, we argue that it penetrates the planning, design, marketing, and financing of production in a lean way, especially using just-in-time inventory and supply chain management, but then does less in its offshore plants.

A stronger critique is that lean production is not as efficient as Fordism in the automobile industry because it involves labor inefficiencies, especially in countries with labor unions. Tommaso Pardi (2005, 2007, 2017, and this volume) argues that Japanese transplants in Europe and China have suffered labor unrest and strikes due to lean production. These are not so much caused by low wages, but rather by work intensification, mandatory overtime, and a general lack of worker representation. In *Diversity at Kaizen Motors* (Lepadatu and Janoski 2011) we argue that human resource departments often function to protect workers from these and other issues on the shop floor. However, strong human resource departments and insightful understandings of other cultures are not always present in new workplaces using lean production. However, where they are present, as in Japanese transplants in the US, lean production is clearly the superior method of producing complex products. However, we do believe that there should be stronger protections through representation of labor in lean production firms.

### **Japan's Lost Decade and the Effectiveness of Lean Production**

From the opposite direction, a major issue concerns lean production in Japan. If Japan is the home of lean production, which is a tremendous advantage to the economy, why has the Japanese economy been in the doldrums in the new millennium? George Ritzer and others claim that the economic stagnation in Japan since the late 1990s and in the first decade of the new century is proof that lean production is not a cure-all (Ritzer 2004, 2019). Ritzer and Stepinsky say that lean production is “tarnished by the precipitous decline of Japanese industry in the 1990s” and “there are great problems with these systems, and they may even serve to *heighten* the level of exploitation of the worker” (2011: 306). One could add the safety issues that emerged in 2009 to 2010. During this “Lost Decade” or “Japan’s Financial Crisis” from 1995 to 2007 absolute GDP (i.e., not deflated and not per capita) in Japan fell about a trillion dollars, real wages fell 5 percent, and there was an overall decrease in prices. This was an economic disaster for Japan,



which was then followed by the Great Recession in the USA and world economy in 2008. There are three reasons for this decline and none of them is related to lean production.

First, Jennifer Amyx (2006) cites political and economic institutions in Japan that failed to adjust to changing economic circumstances. The decline was preceded by an asset bubble from 1985 to 1990 in the Nikkei Stock Index by a factor of over 700 percent. As this bubble burst, the economy plunged. While bubbles and recessions periodically occur in capitalist economies, what is crucial is how the financial community and its institutions respond. In Japan, the government was extremely slow to respond to distressed banks, and then, when it did, the government's financial reforms were ineffective (Amyx 2006; *Economist* 2013). This failed response was seen as an object lesson by the USA in its response to the Great Recession (Krugman 2009). In this introduction we do not need to go into the finer points of financial rescues, but one point is that the strong institutional features of the Japanese economy such as *keiretsu* bonds between banks and non-competing industrial firms became a clear disadvantage to profitable firms who felt obligated to assist their long-term partners. Even Toyota was criticized for this. However, this has little to do with lean production itself.

A second factor is that this occurred after the USA instituted automobile quotas on Japanese cars entering the USA. What happened later is not seen by the West as a major offshoring event, but, from the Japanese perspective, massive amounts of investment moved from Japan to build plants in Marysville, Ohio, Georgetown, Kentucky, and then many other locations. These plants were quite successful; however, they did not create jobs, new supplier firms, and more investment in Japan itself. In some ways, Japan may have been the biggest outsourcing and offshoring country of automobiles in the world. Moreover, a major recipient of this offshored investment has been the USA.

Third, and perhaps somewhat controversial, Japan's immigration policy has always been highly restrictive. New populations of immigrants become a growth factor through their demand stimulation and increase in labor supply. This was matched by the slow rate of growth in the population in Japan and, when accompanied by one of the fastest aging populations in the world, Japan was declining in population in the prime working ages of 18 to 64. Japan's labor force participation rate was about 68.9 percent in 2000 rising to 76.8 percent in 2018, and its female labor force participation rate was only 59.6 percent in 2000 rising to 69.6 percent in 2018 (OECD 2019). This is combined with one of the lowest fertility rates in the industrialized world (World Bank 2019a). This somewhat contradicts the second factor, which implies a lack of jobs, but increased investments in Japan may have changed Japanese immigration policy to increase labor supply if those jobs had been created (Janoski 2010). Further, the crisis led to a suicide epidemic (Amyx 2006: 5–6).

It is well beyond the scope of this book on lean production to go into a complex financial and demographic analysis of Japan in the last thirty years, but suffice it to say that the economic stagnation that occurred in Japan is not in the least due to the use of lean production or Toyotism in the Japanese economy. It is instead the result of a complex mix of institutional rigidities, internationally influenced investment

decisions, and population dynamics. As a result, we categorically reject George Ritzer's claim that lean production has not worked in Japan or the rest of the world, or that it has dissolved into Fordism (Ritzer 2004; Ritzer and Stepinsky 2011).<sup>3</sup>

However, we can discuss a much updated Japanese production system or lean model. Japan has not stayed the same for the last 50 to 60 years since the TPS or lean production system emerged. In a sense, the early Japanese model can be called Japanese production methods 1 or JPM-1. After 50 years, JPM-2 has emerged with similar but not the same weaknesses as the original model. First, there has been considerable weakening of permanent employment and job security in general. Even Toyota has increased its hiring of temporary workers in Japan and pays them less (Adams 2010). Second, Japan's birth rate has declined dramatically and its population is aging. However, the Japanese nation-state has not opened the doors to immigration. To some degree, a great amount of offshoring has occurred to the Western countries and China. Some of this was due to import quotas and domestic content laws imposed on Japanese cars by the US government. However, this does not alleviate the low supply of labor in Japan. Third, the *keiretsu* system and the role of the Ministry of International Trade and Industry (MITI), which were so strongly criticized by Chalmers Johnson (1982) as unfair trade practices, have declined extensively so the tight-knit horizontal networks of different firms helping each other in their times of need have been mostly jettisoned. The role of MITI clearly changed as it was reconfigured as the Ministry of Economy, Trade and Industry (METI). Consequently, trust within the firm with less job security and trust between firms in *keiretsus* are no longer part of the Japanese or JPM-2 model.

Two points can be made about the new JPM-2. First, the lean production model is still part of the major manufacturing firms in Japan, and especially in those in the automobile sector like Toyota and Honda. Second, there is a different interpretation of the current economic approach that Japan has taken. Eamonn Fingleton (2012) makes the argument that there is a "myth of Japan's failure." He states that Japan's economy has done better than that of the US. Growth of absolute GDP or even real GDP does not take into account GDP per capita where it becomes an advantage to have a smaller population number. So, in 2012, the USA and Japan were nearly the same at 49 and 48 billion dollars though the difference increased by 2018. Unemployment in Japan from 2018 to 2019 has averaged 2.3 to 3.5 percent per quarter compared with 3.6 to 4.0 percent for the USA (Trading Economics 2020). Yet much of the US income has gone to the upper 1 percent, while Japan's income has not. Life expectancy there is 4.8 years longer with national health insurance, and the Gini index of income inequality has always been lower in Japan since the 1950s, but now the US Gini at 40.5 in 2004 and 41.5 in 2016 is massively higher than the Japanese Gini at 32.1 in 2008 (World Bank 2019b). The enormous amounts of CEO pay in the USA compared with modest pay in Japan make up much of this difference. The final point is that Japan's currency, the yen, has risen 87 percent against the US

3 We had asked a number of prominent scholars to write a chapter on this topic, but they turned down our offer because the two topics – lean production and financial crisis – appear to them as totally different and inherently unrelated topics. They further indicated that the thought that lean production had anything to do with the financial crisis or vice versa was utterly preposterous.



dollar and 94 percent against the British pound (1989–2012), and Japan frequently has a large and positive trade balance while the USA has not been positive since 1975 and is currently 678 trillion dollars. What Fingleton argues is that the Japanese economy is a strong example of sustainability for an increasingly crowded planet. Therefore, all in all, the Japanese economy is not an argument against lean production, but rather an argument for it.

In sum, we believe that the lean production system is now the dominant model in the division of labor, and the one that all companies strive for, even though many of them will fall considerably short. Just as Fordism was not present everywhere, lean production is now the gold standard for the vast majority of firms. However, this is not a “one-size-fits-all” model. Firms in different countries will adapt their model of lean production to meet the cultural inclinations of their managers and workers. However, once those are met, lean production in its various forms, including strong and lesser models, is the gold standard for quality and efficiency.

Three Existing Models of Lean Production

In our assessment of lean production we see three models of implementing lean production, which we will call Toyotism, Nikeification, and Waltonism. These models go from a full implementation to a partial one. In the next sections, we discuss each one.

Toyotism as the Full Implementation Model of Lean

According to Jeffrey Liker’s award-winning book *The Toyota Way*, there are more details to the six tenets of lean production, which he presents as 14 points.<sup>4</sup>

First, base company decisions on long-term philosophy and not on short-term goals like price or getting the cheapest items. They use this long-term philosophy to develop thoroughly Toyotized leaders and exceptional workers who thoroughly understand the work, philosophy, and methods of their system (Liker 2004: items 1, 9, and 10). Long-term philosophy also applies to stock prices and investment, which avoid short-term reporting pressures and, hence, dividends are low. Second, standardize tasks on an assembly line and make them amenable to visual control using thoroughly tested technology for their people and processes. Nevertheless, at the same time, reduce the number of job descriptions so that workers can rotate jobs and do many different tasks (Liker 2004: items 6 and 8 with job rotation

4 W. Edwards Deming also presented 14 points of the “yet to be named” term “lean production” (Deming 1982). Liker’s 14 points come along much later and are a bit more concise and comprehensive. Deming’s points were: (1) develop “constancy of purpose” for improving products; (2) adopt a new philosophy; (3) stop depending on inspection for quality control; (4) avoid focusing on price and concentrate on minimizing cost; (5) improve process for planning and production; (6) consistently train on the job; (7) adopt new leadership; (8) “drive out fear” of learning and speaking by workers; (9) break down barriers (level the organization); (10) remove slogans and numerical goals; (11) drop numerical quotas (à la Taylorism); (12) eliminate annual rating systems; (13) create programs of education for everyone; (14) involve everyone in the company on transformation.

Table 1.1 *Jeffrey Liker’s 14 points of lean production*

1	A long-term philosophy, even at the expense of short-term financial goals.
2	Continuous process flow to bring problems to the surface.
3	The Pull systems to avoid over-production.
4	Level out the workload ( <i>heijunka</i> ).
5	Culture of fixing problems to get quality right the first time.
6	Standardizing tasks for continuous improvement and employee empowerment.
7	Visual control so no problems are hidden.
8	Use thoroughly tested technology that serves your people and processes.
9	Develop leaders from the inside because they understand the work, live the philosophy and teach it to others.
10	Develop exceptional teamwork ( <i>chimuwaku</i> ).
11	Create and respect an extended network of partners and suppliers by integrating, helping, and challenging them.
12	Manage by walking around to thoroughly understand the situation ( <i>genchi genbutsu</i> ).
13	Make decisions slowly by consensus after considering all options. Then implement decisions rapidly ( <i>Ringi</i> system).
14	Become a learning organization through relentless reflection and continuous improvement ( <i>kaizen</i> ).

Source: *The Toyota Way* (2004).

coming from elsewhere). Third, use just-in-time inventory to create a production process that has continuous flow, which will bring problems to the surface. This creates a pull system oriented toward customers to avoid over-production and to level out the work (i.e., you do not produce a product until you are sure that you have an order). It also leads to flexibility and customization of products (Liker, 2004: items 2–4). Fourth, create a respected network of suppliers and partners and integrate them into the planning, design, and production decision-making process including the JIT system (Liker 2004: items 2, 3, and 11). Fifth, make a team culture that produces quality the first time and stopping the production process to fix problems. Make decisions slowly by consensus and implement them rapidly. Manage by walking around (MBWA) and going to see for yourself (Besser 1996; Liker 2004: items 5, 10, and 12–13). Sixth, buffer your permanent employees with temporary employees who can easily be let go when they are no longer needed. This requires a non-union or a company-dominated union environment. While the word lean connects to points 3 on JIT and 6 on buffering, the points about long-term philosophy, job rotation and flexibility, and quality control teams do not denote anything particularly connected to lean. Again, we reiterate that “lean” is not the best description of the Toyotism process, but, since it has such currency, we feel that we must use it.

In evaluating the specifics of lean production, there are positive and negative aspects for workers and society. In terms of problems, lean production exerts a great deal of pressure and stress on workers, especially with mandatory overtime and exacting requirements concerning quality and cycle or *takt* times (i.e., the seconds