The Cambridge International Handbook of Lean Production

This handbook focuses on two sides of the lean production debate that rarely interact. On the one hand, management and industrial engineering scholars have presented a positive view of lean production as the epitome of efficiency and quality. On the other hand, sociology, industrial relations, and labor relations scholars focus on work speedups, management by stress, trade union positions, and self-exploitation in lean teams. The editors of this volume understand the merits of both views and present them accordingly, bridging the gaps among five disciplines and presenting the best of each perspective. Chapters by internationally acclaimed authors examine the positive, negative and neutral possible effects of lean, providing a global view of lean production while adjusting lean to the cultural and political contexts of different nation-states. As the first multi-lens view of lean production from academic and consultant perspectives, this volume charts a way forward in the world of work and management in our global economy.

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The Cambridge International Handbook of Lean Production

Diverging Theories and New Industries around the World

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To
Victoria Janowski,
Heidi Tulisalo Hill and
Victoria Plotkowski
TJ

To
All the scholars devoted to researching the impact of
managerial and organizational practices, and
improving the quality of workers' lives.
DL

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Preface

Lean production has received much attention world-wide for two reasons. First, in the late 1970s and 1980s, Americans and later Europeans saw Japanese production methods as a threat to their home-grown industries. The threat was economic but also took on many cultural overtones, such as, for example, Japanese culture being much more group-oriented and willing to make sacrifices. Western culture was based on individualism and perhaps selfishness. Many predicted that Japanese production methods could not survive in a Western environment. When trade restrictions motivated Japanese companies to establish plants in the US and the West, these predictions largely proved to be false. Often, US and European workers liked the participation and status-leveling involved in Japanese production methods. However, American and other middle-level managers had to change from being authority figures giving orders to being team leaders. Many did not like the perceived status-lowering process and resisted (or later quit). After the Japanese transplants started creating jobs and promoting growth in their new countries of production, interest in Japanese production methods declined among scholars and reporters. The cultural invasion was no longer an issue.

Second, in the 1990s, the blockbuster book – *The Machine that Changed the World* by James Womack, Daniel Jones, and Daniel Roos (1990) – gained massive attention among the business managers of the world. The book, for the first time, labeled Japanese production methods or the Toyota production system as "lean production," a term used by John Krafcik a year or two earlier. In some ways, this was a Westernization of Japanese production methods for a larger business audience and it was widely accepted. Many of these and similar writings on lean production in this period were what we might pejoratively call "cheerleader" books that proselytized lean production. In many ways there was much to proselytize because lean production was clearly a superior way to organize production. However, a bit of the critical edge of scholarly work was lost in the process. Nonetheless, this handbook largely backs their claim that lean production has indeed changed the world.

However, in the new millennium, lean production and Japanese production methods faded into the background. Many of the scholars and academics who had written about lean production moved into the consulting business where considerable money could be made. These consultants spread the theory of lean production to new industries with medical services being particularly prominent. They still published books and articles but they tended to appear in specialized presses like Productivity Press, CRC or in topical series in some private presses like Taylor &

Francis. Journal articles in the social sciences on lean production became quite rare, management journals produced a few, but the main exception was industrial engineering journals, which continued unabated in scholarly views of lean production. In talking to a number of mainstream academic presses about prior works on lean production, we found that they would say "that's so 1980s and 1990s," so "we already did that and there is nothing new in this area." It was true that the waves of "cultural fear" and the "cheerleading" were over. While scholarly and journalistic interest in lean production largely faded, businesses in manufacturing and services around the world were being transformed by lean production and the above-mentioned consultants found considerable interest in their talents at seminars and plant visits. So the diffusion of lean production and its larger and larger impacts went on, even though many presses and journalistic outlets did not seem to be interested in it anymore. The exception to this trend was an increase in specialized journals connected to quality control (e.g., *The Journal of Supply-Chain Management*, *The International Journal of Quality Control* and so forth).

This *Cambridge International Handbook* is an effort to bring lean production much more into the scholarly focus of informed readers. In the process it avoids the "fear" of the first stage of cultural invasion, but also the "cheerleading" of the strong proponents in the second stage of "changing the world." It represents multiple disciplines as they have very different approaches to lean production from the highly positive to the exploitative and negative. These different approaches are generally neglected in previous works. Previous works tended to plow their own discipline and its predominant mood toward lean production. This *Cambridge International Handbook of Lean Production* is very different. The scholarly viewpoints are different, the implementation in various industries varies (e.g., a patient in open-heart surgery is not the same as assembling a car) and the contextual reception of lean production in different countries puts theory to the test (e.g., from the US to Russia and China). While there are differences in theoretical disciplines, the different contexts of industry and nation-state produce twists, turns, and innovations in implementing lean production. This is despite the often overgeneralized claim that globalization "makes the world flat," where industry and country differences are leveled. As a result, lean production has progressed tremendously, but not uniformly. There are tweaks and sometimes major changes that lean production has to deal with in different cultural and economic contexts.

This *Cambridge International Handbook* changed a bit in its development. Since many different disciplines are involved, there will be contrary views on a number of topics. We have not imposed a unitary view of lean production and, indeed, this *Handbook* will have many diverse discussions about the values and consequences of lean. We also encountered a number of difficulties in doing this edited work. We had to replace a number of chapter authors after they could not reasonably meet a number of extended deadlines. We had to search out a few new authors who then needed the time to write their chapters. Also, some chapters were just hard to fill. After ten invitations, we found it well-nigh impossible to get authors from the oil, gas, and chemical industries to

write on lean production. We even contacted *Power Magazine* for advice and they recommended the nuclear power industry as especially concerned with quality and safety. However, out of seven requests, we only received a reply from one person who declined.[1] We also asked many authors to do the chapters on the social sciences and the chapter on merchandizing. We finally decided that we definitely needed each chapter. So the two co-editors and Andreas Signoretti wrote the chapter on the social sciences and the two co-editors wrote the chapter on merchandizing, which is an update on a similar chapter we did for *Framing and Managing Lean Organizations* (2020). These issues demonstrate a larger problem of editing a book that is outside an author's discipline – the editors are not generally known to other disciplines and potential authors from other disciplines more or less think "why should I publish in a work that will probably not be seen by most people in my own field?" Fortunately, we received acceptances from generous authors in many other disciplines, including engineering, management, human resources, labor and management relations, and the social sciences. We especially thank all of our authors for their work, cooperation, and patience. We greatly appreciate their participation.

The Cambridge International Handbook targets six audiences. First, business and industrial engineering departments in the American and European markets have a great interest in how lean production will develop in different contexts of industries and national institutions. Second, the social sciences including sociology, economics, geography, anthropology and labor, and industrial relations. Third, a global audience concerning production and human resource managers who need to work in different national contexts. Fourth, labor leaders who have almost been totally neglected by the lean production literature on how workers encounter the different contexts of lean production. Fifth, we will appeal to a wide audience in the consulting industry in lean production who will be interested in these issues. Sixth, a global audience that is concerned with the different perspectives on lean production from management, state, and workers' viewpoints. *The Cambridge International Handbook* also targets upper division undergraduate and graduate classes. It has a large national and international audience since lean production is a timely issue for courses in the following ten disciplines: business management, industrial engineering, economics, sociology, labor and industrial relations, political science and public policy, medicine, education, geography, and anthropology.

Finally, one word about the tenor of this book. Unlike some edited books, especially on lean production, the authors of these chapters may strongly disagree with each other. We initially proposed a book where each author in the theory section

1 Subsequently, we found that Koch Industries, which deals with oil refining and equipment, demonstrated a penchant for lean production, especially through W. Edwards Deming. Christopher Leonard refers to the Koch system as based on Deming's principles and even gives an example of how its transportation division employed these methods (*Kochland: The Secret History of Koch Industries and Corporate Power in America*, Simon and Schuster 2019, pp. 121–124 and 152). However, Koch's approach does not extend to teamwork among hourly workers.

would respond to critiques or issues raised by the other authors. Our reviewers dissuaded us from this plan. Accordingly, the reader should keep in mind the theoretical orientation of each author while reading various chapters. In Part I these orientations are clearly identified by the authors, but in Parts II and III the authors' purpose is to cover countries or industries and the theoretical orientation of each author may be less visible. It would behoove the reader to keep this in mind.

Acknowledgments

In our own journey concerning lean production we would like to thank the many managers, current workers, and former workers whom we encountered at: Toyota Motors Corporation at Georgetown, Kentucky; Nissan Manufacturing at Smyrna, Tennessee; Honda Motors at Ana, Ohio; Honda Motors at Marysville, Ohio; Honda Motors at Lincoln, Alabama; the Ford Motor Company truck plant at Louisville, Kentucky; the Chrysler Corporation plants in Toledo, Ohio, and Trenton, Michigan; Toyota assembly plant in Toyota City, Japan; and the General Motors Corporation plants in the US and Shanghai, China. We especially appreciated talking to managers and workers on the extensive tours we took of the long-time VW Assembly plant and the new state-of-the-art Audi Assembly plant, both in Puebla, Mexico.

Equally important were visits to the VW Wolfsburg plant in Germany in connection with the International Labor Process Conference that was held in Berlin. We also had previously taken tours of the BMW plant in Bavaria and Spartanburg, South Carolina, and the Ford Motor Truck plant at the Ford Rouge Complex in Dearborn, Michigan. These tours were particularly helpful in understanding and seeing first-hand how the production process operates. For instance, one cannot miss the Andon boards at Toyota and their absence at the Honda plant in Marysville. Further, the conferences often attached to these tours gave us a link to scholars in the area of lean production when our own discipline of sociology has so few people studying this field. We also thank the managers and employees at Walmart, Costco, Amazon, and many other facilities in the US.

At the National Science Foundation (NSF) we would especially like to thank Patricia E. White and Jan Stets of the Sociology Section of NSF for their help in developing our proposal "The Maturing of Lean Production" (NSF-ARRA 0940807). The anonymous reviewers were also helpful in sharpening the grant proposal with their incisive, critical, and helpful commentary. This generous grant was particularly helpful in providing summer support for both authors and for acquiring research assistants David Luke (now at the University of Michigan, Flint) and Baiqing Zhang (now at Central Washington University). These research funds were also especially helpful in doing interviews in ten states – Alabama, California, Georgia, Indiana, Kentucky, Michigan, Ohio, South Carolina, Tennessee, and the state of Washington. University travel funds at both of our home institutions were helpful in traveling to Japan, Brazil, Mexico, France, and Germany.

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At the University of Kentucky, the first editor, Thomas Janoski, would like to thank Patrick Mooney who, as chair of the Sociology Department, supported our project by administering the National Science Foundation grant and providing the coffee cups that we gave out as a small token of our thanks to those we interviewed. Claire Renzetti, the current chair at the Sociology Department at the University of Kentucky, and Mark Kornbluh. The Dean of Arts and Sciences, also provided for a phased retirement plan that was like having a six-month sabbatical every year for five years. This provided much of the time and resources to finish the project and this book. Janoski would also like to thank many of the people in the True Lean Program at the University of Kentucky, especially M. Abbot Maginnis, Ken Kreafle (also of Toyota), and Glen Uminger (also of Toyota).

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At Cambridge University Press, we wish to thank Robert Dreesen who was most helpful in conceptualizing the project and the reviewers who gave us guidance into what was and was not possible with authors from a wide variety of disciplines.

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JAMES P. WOMACK was the Research Director of the MIT International Motor Vehicle Program when the term lean production was introduced in 1987. In 1990 he was co-author, with Daniel T. Jones and Daniel Roos, of the MIT program's report *The Machine That Changed the World*, which explained the full lean system of product and process development, supplier coordination and development, support of the customer through the use cycle, fulfillment from order through production to delivery, and general management. This volume also measured the performance consequences of transitioning from mass production to lean. Subsequently he co-authored *Lean Thinking* (1996) with Daniel T. Jones and founded the Lean Enterprise Institute (1997), which he led for thirteen years before transitioning to his current role of Senior Advisor. He also co-founded the Lean Global Network (1998) of thirty-one organizations in as many countries promoting the concepts of lean production and lean management. Subsequently, he co-authored *Seeing the Whole* (2003) and *Lean Solutions* (2005) with Daniel T. Jones and authored *Gemba Walks* (2011).

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Abbreviations

AG	*Aktiensgesselschaft*, a joint stock company with limited liability in Germany.
AHRD	Academy of Human Resources Development.
AMA	American Medical Association (US).
AME	Association of Manufacturing Excellence.
ANA	American Nursing Association (US).
AP	Accounts Payable in accounting (debts that need to be paid).
AQP	Association for Quality and Participation (formerly known as the International Association for Quality Circles – IAQC).
ASQ	American Society for Quality, the current engineering association for quality.
ASQC	American Society for Quality Control, renamed American Society for Quality.
ASTM	American Society for Testing and Materials.
AWCS	American Working Conditions Survey.
AXA	French multinational financial and insurance firm.
BAA	*Bundesanstalt für Arbeit* or Federal Employment Administration in Germany, which was renamed in the 2000s to the *Bundesagentur für Arbeit* or Federal Agency for Work to sound more entrepreneurial.
BBRT	Beyond Budgeting Roundtable.
CAD/CAM	Computer-assisted design and computer-assisted manufacturing.
CalPERS	California Public Employees Retirement System, a very large interest group that invests California pension funds for employees and workers.
CE	Chief Engineer.
CEO	Chief Executive Officer, the most powerful manager in a corporation.
CFO	Chief Financial Officer.
CIGREF	Club Informatique des Grandes Entreprises Françaises – a French network for large corporations founded in 1970 to promote digital culture.
CME	Coordinated Market Economies like Sweden and Germany (a VoC term).
CMM	Capability Maturity Model.
CoE	Center of Excellence.

COO	Chief Operating Officer.
CPA	Certified Public Accountant.
CPE	Continuing Professional Education for accountants and other professionals.
CPFR	Collaborative planning, forecasting and replenishment program used at Walmart.
DFMA	Design for Manufacture and Assembly are standardized designs of component parts across suppliers, which reduced the number of parts needed across different organizations.
DMAIC	Define, Measure, Analyze, Improve, Control strategy in Six Sigma. It is somewhat similar to PDCA or PDSA in lean production.
DMAIV	Define, Measure, Analyze, Improve, Verify strategy in Six Sigma.
DQP	Diversified Quality Production, or the German approach to quality.
ECAM	ECAM-Lyon is a prestigious *Grand École* in France for engineering.
Env.	Abbreviation for Environment.
EOQ	Economic order quantity in obtaining parts and supplies.
EU	European Union.
EWCS	European Working Conditions Surveys that survey thousands of workers in the European Union countries.
FIFA	*Federation Internationale de Football Association*, or the controlling organization for international soccer or football.
FLA	Fair Labor Association organized to protect foreign workers.
FMC	Ford Motor Company.
FTC	Federal Trade Commission (US).
GAAP	Generally Accepted Accounting Principles in the profession of accounting. See also IFRS.
GE	General Electric Corporation.
GERPISA	Research organization for the study of automobile production and wages based in Paris, France, or *Groupe d'études et de Recherche Permanent sur L'industrie et les Salariés de l'Automobile* (Group to Study and Research Industry and Salaries in the Automobile Industry).
G/L	Group Leader.
GM	General Motors Corporation.
GMAD	General Motors Assembly Division that makes decisions on design and production for most GM automobiles. It has generally been a force for centralization and standardization.
HPS	Hyundai Production System in Korea.
HR	Human Resources department (see also SHRM).
HRM	Human Resources Management (academic discipline).
IAQC	International Association of Quality Control (name changed to Association for Quality and Participation in 1987).
IFRS	International Financial Reporting Standards (see also GAAP).
IG Metall	*Industriegewerkschaft Metall* or the metal workers union that handles automotive and other metal-related production.

ILO	International Labour Organization headquartered in Geneva, Switzerland.
ILPC	International Labour Process Conference.
ILRA	International Labor Relations Association, associated with LERA and IRRA.
IMVP	International Motor Vehicle Project at MIT.
IPO	Initial public offering when a private company sells shares on the stock exchange.
IRRA	Industrial Relations Research Association, replaced by LERA (US).
IR4TD	Institute of Research in Technology Development at the University of Kentucky.
IS	Information Systems, concerning computers in an organization.
ISO	International Organization for Standardization (ISO in French) located in Geneva, Switzerland. It is closely linked with Six Sigma.
IT	Information Technology department.
JCT	Jobs Characteristics Theory of Greg Oldham and J. Richard Hackman.
JIT	Just-in-time inventory system, a specific version of supply chain management.
JPM	Japanese production methods, very much like Toyotism.
JUSE	Japanese Union of Scientists and Engineers.
KPI	Key performance indicators that are relevant to firm performance, rather than standard measures of production or accounting.
LEAF	Lean Education Advancement Foundation.
LERA	Labor and Employment Relations Association, replaces IRRA (US).
L-L-L	Lean-Loyal-Long-term view of lean production that tends to emphasize the opposite of the "cutting" approach that neo-liberalism might envision.
LME	Liberal Market Economies like the US and UK (a VoC term).
LMM	Lean Manufacturing Manager at Ford who reports to top management.
LPPD	Lean product and process development.
LSP	Lean Systems Program at the University of Kentucky.
LVMH	French luxury goods conglomerate that includes Moët Hennessy and Louis Vuitton.
M&I	Materials and Information (flow chart).
MBO	Management by Objectives. The name for a process to evaluate employees. It was much criticized by Deming.
MBWA	Management by Walking Around (*genbutsu*).
MCW	*The Machine that Changed the World* by Womack, Jones and Roos (1990).
M-Form	The multi-divisional form of organization used at GM with multiple divisions.
MIT	Massachusetts Institute of Technology.
MLB	Major League Baseball (US).

MRP	Material requirements planning connected to scheduling and inventory.
MT	Management Theory (as opposed to Operations Management) is the main area of academic management that deals with theory.
NAFTA	The North American Free Trade Agreement of 1994, which is being replaced by the United States-Mexico-Canada Agreement (USMCA).
NBA	National Basketball Association (US).
NCAA	National Collegiate Athletics Association (US).
NDPP	Nissan Dechard Powertrain Plant in Dechard, Tennessee.
NFL	National Football League (US).
NHTSA	National Highway Transportation and Safety Administration (US).
NLRA	National Labor Relations Act that created the NLRB in 1933.
NLRB	National Labor Relations Board (US).
NMUK	Nissan Motors in the United Kingdom.
NRP	Nissan Revival Plan under Carlos Ghosn as CEO.
NSVAP	Nissan Smyrna Vehicle Assembly Plant in Smyrna, Tennessee.
NTT	Nippon Telephone and Telegraph (Japanese phone company).
NUMMI	New American United Motors Manufacturing, Inc., a project of GM and Toyota.
NYSILR	New York School of Industrial and Labor Relations at Cornell University.
OEM	Original equipment manufacturer (usually a big manufacturing corporation).
OM	Operations management area in the academic management profession that deals with production.
OPEC	Organization of Petroleum Exporting Countries.
Ops	Abbreviation for Operations.
PDCA	Plan-Do-Check-Act (from Deming and Japan).
PDSA	Plan-Do-Study-Act (more connected to Shewhart).
PO	Purchase order, especially concerning JIT.
PSA	French automotive group composed of Peugeot, Citroën, DS, Opel and Vauxhall.
PVMI	Program on Vehicle and Mobility Innovation at the Wharton School at the University of Pennsylvania.
QCC	Quality Control Circle.
QR Codes	Quick Response codes that are two-dimensional improvements on bar codes.
R&D	Research and Development department or spending.
RFID	Radio frequency identification device.
RMG	The Repetitive Manufacturing Group that sponsored research in lean production by the American auto industry in the late 1970s.
SACOM	Students and Scholars Against Corporate Misbehavior, an organization against sweatshops.
SCM	Supply chain management.
SHRM	Society for Human Resources Management.

SIOP	Society for Industrial and Organizational Psychology.
SME	A professional association formerly known as the Society of Manufacturing Engineers. Can also mean "small- to medium-sized enterprise."
SPC	Statistical Process Control that measures conformance to quality standards.
STS	Socio-Technical Systems.
STT	Socio-Technical Theory.
SUV	Sport and utility vehicle.
SWOT	A strategic management strategy of identifying Strengths, Weaknesses, Opportunities and Threats.
TKM	Toyota Kirloskar Motors located in Bidadi in the Indian state of Karnataka.
T/L	Team Leader.
T/M	Team Member.
TMC	Toyota Motor Corporation.
TMCA	Toyota Motor Corporation Australia that produced cars from 1958 to 2017. It was located in Port Melbourne (an inner suburb of Melbourne) in the state of Victoria.
TMMBC	Toyota Motor Manufacturing de Baja California in Tijuana, Mexico.
TMMK	Toyota Motor Manufacturing in Georgetown, Kentucky.
TNGA	Toyota New Global Architecture.
TPCA	The Toyota Peugeot Citroën Automobile joint venture between Toyota and PSA located in the Czech Republic.
TPM	Total Productive Maintenance.
TPS	Toyota Production System, or Toyotism.
TQC	Total Quality Control (related to TQM).
TQM	Total Quality Management (related to TQC) where quality control is a concern of all levels of management.
UAW	United Autoworkers Union, American union that handles autoworkers except for Japanese transplants.
USMCA	The United States (US), Mexico (M), and Canada (C) Agreement that replaced but is largely similar to NAFTA. US ratification should be completed in 2020.
VoC	The varieties of capitalism theory composed of liberal market economies and cooperative market economies. Similar but not the same as the productive models theory.
VPS	Valeo Production System in France used by the Valeo auto parts firm.
VW	Volkswagen, the largest automobile company in the world, based in Germany.
WRAP	Worldwide Responsible Apparel Production.
WSP	Work Simplification Program.