Compatibility of Human Resource Management, Industrial Relations, and Engineering Under Mass Production and Lean Production: An Exploration

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La “production limitée” (“lean production”) est une nouvelle approche de la production susceptible de modifier la gestion des ressources humaines, les relations industrielles et les processus de travail dans les entreprises américaines. Apparaissant après une longue période de stabilité reposant sur des règles relationnelles et opérationnelles basées sur la production de masse, la transition vers la production limitée est controversée et traumatisante. Le modèle émergent suggère que la transition s’amorce avec des innovations qui mettent l’accent sur l’amélioration de la productivité et s’affirme avec le comanagement et la participation. En s’appuyant sur une revue de la littérature et sur une évaluation raisonnée des résultats disponibles, cet article propose un point de vue structuré sur la nature des changements dans le processus productif et sur leurs conséquences institutionnelles.

“Lean production” as a new production concept is believed to be transforming human resource management, industrial relations, and work processes in American firms. Coming after a long period of stability under operational and relational rules supported by mass production, the transition to lean production is controversial and traumatic. The emerging pattern suggests that transition begins with workplace innovations that emphasise productivity enhancement and develops to co-management or joint governance of the enterprise. On an extensive review of the literature and by selective weighting of findings and evidence, this paper develops an integrative perspective on the nature of changes in the mode of production and its institutional correlates.

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INTRODUCTION

Bearing in mind the complexity of the subject matter, this paper pursues limited objectives: (1) primarily to develop an integrative perspective on the nature and problems of transition from mass production to lean production, with an emphasis on recent experience in the United States in the field of human resource management and industrial relations, and (2) to utilise firm-theoretic insights for the evaluation of the place and prospects of lean production in strategic choices of the firm. As an extension of this paper's approach, some implications of lean production for Europe are explored. Some tentative hypotheses are suggested as a way of inviting more informed experts' attention to the issues involved.

THE FRAMEWORK AND A FEW CAVEATS

Although this paper's emphasis is on the workplace, lean production as a mode of production has far-reaching implications for human resource management, industrial relations, and engineering at all levels of the firm. Further, whether the internal mode of production is lean or not shapes the firm's external relations with markets and other firms. This broader view of lean production can be inferred from the range of topics covered by Womack, Jones, and Roos (1990).

In the discipline of industrial relations, too, a new broader paradigm directs attention to employee involvement/representation/participation at three levels of the firm: i.e. strategic, executive/administrative, and manufacturing (Bluestone & Bluestone, 1992; Kochan, Katz, & McKersie, 1986). These levels parallel hierarchies like top management (headquarters), middle management (divisions), and workforce (plants).

The concept of lean production even goes beyond the confines of the firm and extends to alliances and networks with other firms in complementary activities, suppliers, and distributors. The multiplicity of relationships needs the “core firm” for organisation, orchestration, or coordination of diverse activities. For economic reasons, the core firm internalises or externalises activities related to its basic competences. For example, in automobile manufacturing, the core firm is the assembler. The related activities range from product development and design, through manufacturing of intermediate inputs, parts, and components, to marketing, distribution, and post-sales services of the final product. The vertical and horizontal inter-relatedness of functions and processes gives rise to problems of industrial organisation and transaction costs, as in Williamson (1985). Lean production requires its own strategy for minimising the transaction costs, distinct from that which was developed under mass production.

From this perspective, becoming lean only at the workplace for the final stage of manufacturing may cause considerable disjunctions with related
activities and go counter to desired cost-effectiveness. This point, although often missed in discussions of narrowly focused lean production, is important and informs this paper’s discussion of the subject matter.

Another complicating factor in the discussion of lean production is that two countries, Japan and the United States, are seen to be associated with one or the other of the production concepts, Japan with lean and the US with mass production. This evokes a different analytical issue: international diffusion of technological and institutional innovations. As innovations are tied to productivity growth, international diffusion of a mode of production is a force behind the international convergence of productivity, a subject that has lately become popular among economists (Baumol, Nelson, & Wolff, 1993).

The “convergence hypothesis” that is particularly germane to this paper has to do with institutional convergence in human resource utilisation as argued by Kerr, Dunlop, Harbison, and Meyers (1960). It was suggested that because of world-wide industrialisation, institutions and practices should become increasingly similar throughout the world. As the United States was then the most industrialised country, the hypothesis implied that other countries should converge on the US, replicating US experiences. This was a convergence hypothesis in the age of mass production. With the rise of lean production in Japan, the direction and process of convergence have apparently been reversed. This gives a different twist to the convergence hypothesis (Taira, 1992).

The issues of compatibility of human resource management and industrial relations with lean production are most vividly observed in the transition of the United States from its original innovation—mass production—to lean production. In the US, it is new and still sounds much like a borrowed concept. However, earlier emotional, Luddite-like resistance to lean production (cf. Parker & Slaughter, 1988) has been overcome. In essence, whether or not any firm should adopt any mode of production is a question tied to its survival (or at least, competitiveness) and does not allow the luxury of a nationalistic reaction. The determining factor is efficiency, productivity, or profitability, which requires an analytical approach to lean production.

MASS PRODUCTION AND LEAN PRODUCTION: THE MODELS

During the “glory days” of post-war American capitalism, correlation was perfected between human resource management (HRM), industrial relations (IR), technology, and engineering under mass production. The thrust of HRM was autocratic Taylorism backed by the doctrine of “employment at will”.
Engineering was dominated by the idea of a maximum division of labour and that of a minimum cycle time (maximum speed-up of task completion), while problem solving meant a relentless search for foolproof technology. The ceaseless simplification of tasks and the mass production of a few standardised products were represented by the fast-moving assembly line and extensive single-purpose mechanisation.

In protest, job control unionism arose based on a national and international industry-wide labour movement and, clashing with autocratic management, generated adversarial IR. Labour law sharpened the differences between “management” and “labour” in terms of functions, rights, and interests and, while glorifying arm’s-length collective bargaining, made any notion of labour–management cooperation undesirable or unlawful.

The mode of production so characterised harboured many vulnerabilities which eventually reduced productivity growth in the American economy. Under increased international economic competition, the traditional mode of production failed to produce quality products matching the increasingly sophisticated and diverse consumer/customer tastes. It then became clear that competitiveness in terms of product design, quality, variety, and delivery schedule required changes in the principles and practices of production.

Lean production designs, produces, and delivers high-quality products in great varieties and at high speed to satisfy diverse and impatient consumers/customers, approximating the taste and quality of customised (individualised) products, although at affordable prices. The cost-effectiveness of lean production in pursuit of its goal requires efficiency and flexibility of closely coordinated machine process and labour process. Machine process flexibility requires a waste-minimising factory layout and a maximum use of re-programmable automation. Labour process flexibility requires highly intelligent multi-skilled workers who can program, maintain, and complement the flexible machine process. Engineers and workers cooperate in designing and implementing the efficiently integrated machine/human interface.

Womack, Jones, and Roos offer an insightful formulation of the contrasts of workplace mass production and lean production. First, they define the “key to mass production” as: “the complete and consistent interchangeability of parts and the simplicity of attaching them to each other” (Womack et al., 1990, p.27, original italics). This is the engineering dimension of mass production. But the concept also dominates the human side of production: “Ford not only perfected the interchangeable part, he perfected the interchangeable worker” (ibid., p.30). Ideally, workers were to be reduced to brainless, voiceless automatons.
Second, the MIT scholars point out two key features of lean production, which may be considered the basic principles of lean human resource management and industrial relations: “It transfers the maximum number of tasks and responsibilities to those workers actually adding value to the car on the line, and it has in place a system of detecting defects that quickly traces every problem, once discovered, to its ultimate cause” (ibid., p.99, original italics). The maximum transfer of tasks and responsibilities to workers implies a drastic reorganisation of management process and a revolutionary redistribution of power and dignity.

Much of the engineering dimension of lean production is buried in the phrase “workers actually adding value to the car on the line”. Lean engineering must maximise value added, which requires every minute of working time to be adding value. This is no trivial principle. Many research findings in the United States indicate that workers waste a good deal of their “working” time in motions that add no value to the product such as waiting, queueing, moving, carrying, inspecting, and other activities not contributing to the making of the product (Maskell, 1991, p.124). Lean production minimises such waste (muda) and maximises the value-adding portion of working time. Factory layout, line configuration, repair and maintenance of the line, ordering and delivery of parts, and other engineering and ergonomic aspects of production process are streamlined so as to eliminate all causes of wasted time.

The second feature of lean production pointed out by Womack, Jones, and Roos—defect detection and problem solving—implies a special type of quality control that has developed under lean production: quality is built into the product where value is added and problems are solved where they occur by the workers. This presupposes multi-skilled workers with considerable intellectual resources. Under mass production, quality is inspected after the product is completed and defects are corrected in the repair/rework shop. When problems arise on the line, the single-task mass production workers cannot handle them. Qualified technicians or engineers are called out for problem solving.

An ideal–typical comparison of mass production and lean production as alternate modes of production suggests that transition from mass to lean requires much more than a “re-engineering” of work processes. Lean production requires workers with considerable intellectual preparations. They should then be trained in a number of operational and problem-solving skills and empowered to take the matter into their own hands when problems arise. Ultimately, all routine simple tasks are automated (jidōka) and workers specialise in prevention and solving of problems. Human resource management must be sophisticated enough to identify, hire, train, and retain the right kind of workers (Bronfenbrenner, 1988).
PROBLEMS OF TRANSITION TO LEAN PRODUCTION IN THE AMERICAN WORKPLACE

Mass production is an entrenched principle and mode of production. Lean production is an idea waiting to displace mass production. An important question, then, is what should be done about the existing workforce that has been “dumbed down” to the level of skills and habits of thought and action appropriate to mass production. A radical answer would be: shut down the plant, build a new one on a green field site, and hire workers who pass the test of qualifications for lean production. An alternative idea would be: replace mass production with lean production in the existing plant and transform the current workforce into one that is compatible with lean production. This of course begs the question: are workers transformable as required?

An affirmative answer to this question needs faith in the indestructibility of people’s intrinsic qualities: namely, that years of mind-numbing routine work under mass production has not destroyed workers’ innate resourcefulness, which can be tapped and developed by new principles, concepts, methods, and practices in human resource management and industrial relations. From the standpoint of social cost minimisation, the workforce transformation solution should be preferred to the plant closure solution.

The human side of learning and adaptation is full of inertia hindering speedy organisational adjustment to lean production. Management dislikes the idea of employee empowerment, which goes counter to beliefs in management prerogatives (Thomas & Kochan, 1992). Engineers resent the narrowing of status distance between them and the now highly skilled, sophisticated former blue-collar workers. The hesitations and equivocations of managers and engineers undermine the confidence of workers and unions. For their part, however, workers and unions are also hesitant about lean production, given the required training and efforts for job integration, problem-solving, multi-skilling and team work as well as the pains of change in attitudes, habits, and outlook.

THE AMERICAN TRAJECTORY, PHASE I: COOPERATIVE INDUSTRIAL RELATIONS AND WORKPLACE INNOVATIONS

American labour unions need creative responses to the challenges of lean production. The required responses must also be consistent with their traditional role as workers' agents to fight for better working conditions and higher standards of living. Fortunately, although the adversarial nature of
traditional labour–management relations tends to make both sides look on collective bargaining as distributive or as a kind of zero-sum game, there is a usable element in this tradition: productivity bargaining. This may very well be the American gateway to a different kind of unionism that is more compatible with lean production.

In general, under productivity bargaining, labour and management search for and agree on measures to raise productivity and ways to share equitably in the resulting gains. In practice, this would take various forms, formulas, and labels. The greatest merit of productivity bargaining is that it is cooperative, not adversarial. Empirical research on union impact generally shows that wages and productivity are higher in unionised than in non-union firms (Freeman & Medoff, 1984).

Both unionised and non-union firms have adopted various workplace innovations. But there are differences between the two types of firms in the kind and effect of innovations chosen. Unionised firms are more likely to choose team production systems, Quality of Work Life committees and Quality Circles, all of which are likely to lead to different ways of organising work. Non-union firms go for easier choices like profit sharing. Eaton and Voos (1992, p.180) observe: “The programs that predominate in the union sector make on average a greater contribution to increasing productivity than the one program, profit-sharing, which is more likely to be found in the nonunion sector.”

Serious bargaining with the union enables management to make hard, but correct choices that can at least finance higher wages. It seems that non-union firms, lacking a reliable machinery for listening to employee voices, play safe by choices that may appear to be “nice” to employees, but are not necessarily productivity-enhancing. In order to remedy the lack of information on employee expectations, many non-union firms unilaterally set up joint labour–management committees. A widely known study comparing the productivity effects of joint labour–management committees between unionised and non-union firms (Kelley & Harrison, 1992) finds that, other things being equal, the presence of joint labour–management committees is inversely associated with labour productivity, whereas the presence of a union is positively associated with it. Further, compared with firms having neither unions nor committees, those with committees but without unions show worse productivity performance.

One may conclude that in the experience of the United States, unions are productivity boosters. This is because unions can bargain for higher productivity, a fair share in it, and employment security at the same time. As lean production improves productivity, it should be compatible with the philosophy of productivity bargaining.
Of course, fully-fledged lean production cannot be brought about overnight. How a firm becomes a lean producer is an incremental process, well epitomised by one of its central concepts, continuous improvement (*kaizen*). This would require continuous productivity bargaining over a long period. What has now become very clear is the importance of a steady, benign (as against unpredictable, adversarial) climate of labour–management relations in which both sides strive to keep *kaizen*-ing. There is considerable evidence that this kind of HRM/IR system is possible in the United States (Bluestone & Bluestone, 1992).

The UAW (United Auto Workers' Union) is a good example. In particular, if ironically, the UAW–Ford relationship has pushed Ford substantially towards lean production through innovative employee involvement. Employee involvement consciousness at Ford goes back to 1973, but the real earnest start was a Letter of Understanding signed in October 1979 committing the union and the company to employee involvement. To provide leadership, a National Joint Committee on Employee Involvement was established (Banas, 1988, pp.389–390). Ford managers and UAW leaders visited Hiroshima to learn from the Mazda system of lean production. (Ford owns 24.5% of the Matsuda shares.)

Discussions and practices in the early 1980s gave rise to a statement of Mission, Values, and Guiding Principles, adopted in November 1984. The six Guiding Principles clearly anticipated lean production: (1) “Quality comes first”, (2) “Customers are the focus of everything we do”, (3) “Continuous improvement is essential to our success”, (4) “Employee involvement is our way of life”, (5) “Dealers and suppliers are our partners”, and (6) “Integrity is never compromised” (emphasising social responsibility and equal employment opportunity) (Banas, 1988, p.404).

The following passage (Banas, 1988, pp.412–413) illustrates that in a substantive sense, Ford had become a lean producer:

> Face-to-face communication between employees and supervisors has improved... Communication among departments, between facilities, and with staffs has improved. Teams have tackled numerous efficiency problems, making improvements that have saved money and made jobs easier to perform. Employees have participated in advance reviews of products and have made suggestions to improve design and manufacturing processes; they have participated in rearranging lines and machines; they have taken action to eliminate scrap and rework; they have visited suppliers to seek improved quality; and they have proposed ways to prevent problems from happening... Teams have also made contributions to community relations...
At the time of writing this article, the author, Paul A. Banas, PhD in industrial–organisational psychology, was manager of Corporate Employee Development Strategy and Planning at the Ford Motor Company and well-known for his contribution to the UAW–Ford employee involvement movement. The union side also gives a favourable rating to Ford's progress towards lean production (Bluestone & Bluestone, 1992). (Irving Bluestone is a retired UAW vice-president. Barry Bluestone is his son and a university professor.)

In sizing up the Big Three with reference to lean production, Womack, Jones, and Roos conclude that Ford is most advanced, but offer a nuanced appraisal (Womack et al., 1990, p.244): “So the company has traveled only part of the way down the path to leanness... Nevertheless, Ford has made a bold start and has bought time to perfect its own version of lean production.” The MIT group apparently uses a more stringent standard for rating Ford than Banas or the Bluestones. The success of the Ford Taurus in more recent years would also revise Ford’s performance rating upwards (Bowles & Hammond, 1991, pp.50–53).

It is ironic that the inventor of mass production has been the first US automobile manufacturer to convert to lean production. Another irony in this connection is that Ford's teacher, Mazda, has failed to transplant its practices in its Detroit factory by mismanaging industrial relations (Fucini & Fucini, 1990; Sakuma, 1993). In 1994, after two years of heavy losses, Mazda accepted Ford's leadership over its management, reversing the flow of advice which had been from Mazda to Ford. James P. Womack is quoted as calling it “a major event in world economic history” (Wall Street Journal, 21 November 1994, A1, p.4). Ford's takeover of Mazda at the global strategic level despite Mazda's workplace-level excellence with its lean production indicates that the “firm” is far more complex than the mode of production.

In the meantime, General Motors has achieved two successes: (1) winning the Baldrige Quality Award for its Cadillac division (Bowles & Hammond, 1991, pp.142–143), and (2) a new popular model, the Saturn (Bluestone & Bluestone, 1992, pp.191–201). The Saturn Corporation is a wholly owned GM subsidiary. It embodies lessons learned from the GM–Toyota joint venture, NUMMI, in California. Various reports on NUMMI and Saturn suggest that although the two plants are organisationally and technically similar, Saturn excels over NUMMI with respect to the extent of employee involvement in decision making and operation. NUMMI is widely acclaimed as a model of lean production, but Saturn has gone beyond the NUMMI model by innovations in the structure and process of “governance” (see later).

The Chrysler Corporation, which lags behind General Motors and Ford in workplace reforms and efficiency, has made a remarkable comeback through radical changes in product style and design. Nevertheless,
Chrysler's success still lies within the broader concept of lean production, which encompasses the whole gamut of processes from the conception of a product through its sales and after-sales services. Chrysler's winning strategy in product style and design has been supported by an extensive reorganisation and empowerment of the designers as may be expected from principles of lean production.

A DIGRESSION: THE EXTENT OF DIFFUSION OF LEAN PRODUCTION IN THE US

For the entire manufacturing sector of the United States, the extent of diffusion of lean production is hard to estimate. Two recent studies give overall pictures which indicate only a modest degree of diffusion.

(1) Appelbaum and Batt (1993, 1994) use “high-performance work system” to connote both lean production and team production. According to them, American-style lean production is driven by the strong commitment of top management to quality and is structurally “top down”. Competition for the Baldrige Award intensifies this hierarchical authoritarian aspect of lean production. Although this does not accord with the principles of HRM/IR under lean production formulated by Womack et al. (as previously mentioned), it is an efficient way of bringing in lean production, which after the initial dictatorial enforcement will move on as it should.

In contrast, the American-style team production empowers shop-floor workers and de-emphasises hierarchy, allowing a range of managerial functions and technical initiatives for kaizen to devolve on the shop floor. Covering these two types of workplace innovations under the rubric of “high-performance work systems”, Appelbaum and Batt conclude their review of the relevant literature thus (Appelbaum & Batt, 1993, p.44): “the surveys suggest that between 10 and 25 percent of workers are employed in firms that have made significant changes in work organization and have been affected by these changes.”

(2) On the basis of a national sample from a comprehensive establishment file, Osterman estimates the distribution and penetration of innovative workplace practices under four headings: self-directed work teams, job rotation, employee problem-solving groups (or quality circles), and Total Quality Management. Percentages of manufacturing establishments with these practices at any level of penetration among employees range from a low of 44.9% for Total Quality Management to a high of 55.6% for rotation (Osterman, 1994, p.177).

When the rate of penetration is restricted to 50% or more of employees, the percentages of manufacturing establishments with the relevant practices decrease and range from a low of 29.7% for Quality Circles to a high of 37.4% for rotation. When the condition is further tightened to the use of all
practices at a 50% or higher penetration rate, only 5% of manufacturing establishments qualify. If one assumes that all four of the suggested workplace practices are essential for lean production, one cannot be too sanguine about the diffusion of lean production in American manufacturing.

Nevertheless, at the minimum, the foregoing discussion of the American HRM/IR system indicates that under certain circumstances, firms, workers, and unions can agree on their common interests and work together to find ways to promote workplace innovations and practices conducive to lean production. Of course, it is difficult to say whether the American IR climate has clearly left its adversarial past behind for good. A most visible example of the traditional anti-union employer is Caterpillar Corporation in Illinois, where a bitter UAW strike is at present under way and shows no signs of ending soon. However, the autocratic HRM of Caterpillar, including illegal replacement of striking workers by new permanent hires, is making the firm more efficient and profitable.

THE AMERICAN TRAJECTORY, PHASE II: BEYOND COOPERATION TOWARDS JOINT GOVERNANCE

From a dialectical perspective, it is no paradox at all that an adversarial relationship under certain circumstances miraculously transforms itself into a cooperative one. The factor that mediates this transformation is either the expectation of greater gains from a larger pie or the fear of mutual destruction through an endless war of attrition (for example, see Bohlander & Campbell, 1993).

Numerous observations in many countries testify to the possibility of a dialectical transformation of conflict into cooperation. It is well-known that Japan's "harmonious" industrial relations were born of destructive post-war class struggles. Today, in the United States, many traditional adversaries, unions and managements, each powerful enough to destroy the other, are overcoming (or at least suspending) mutual suspicion and forging cooperative relationships that in some cases develop into co-management, partnership, or joint governance in the workplace or enterprise.

Efforts to rise to the challenge of some idealised version of Japanese HRM/IR often underlie many workplace innovations in the United States. Idealising experiences of foreign countries runs the risk of misunderstanding them to some extent. Japan idealised the West and, despite occasional misunderstandings of the real West, succeeded in generating a workable Japanese version of westernisation and modernisation. The outcome was a modification of traditional Japan by lessons from the West, blending what the Japanese thought were the best of the West and of themselves.

No country can import or transplant foreign institutions intact. The process and outcome of institutional borrowing are necessarily adaptations
of what is borrowed to the borrower's needs. In the 1920s, the Japanese firms “imported” Taylorism, Fordism, American Plan, etc. (Okuda, 1985; Taira, 1990). Japanese adaptations of Western lessons are now being exported to the West as lean production. When they undergo further adaptations and kaizen to fit the Western conditions, the outcome may go beyond Japanese lean production in terms of workplace efficiency and industrial democracy.

Evidence is growing that the unionised sector of the US economy is changing into a new HRM/IR system by adapting suitable Japanese practices (rejecting those that are contrary to American values and principles). Speaking of a 1987 US General Accounting Office finding that 70% of nearly 500 major corporations of the United States had “some kind of employee involvement program”, Bluestone and Bluestone (1992, p.147) reveal how they understand the “Japanese model” and how the model may have influenced American practices:

Some of these experiments were influenced by the Japanese model of motivating workers through lifetime employment security and organizing employees into ‘quality circles.’ In Japan, where about one third of the labor force is affiliated with a national union and about the same proportion benefits from lifetime employment security, union-management cooperation is fostered through a joint consultation system (rōshi kyōgisei). This approach provides union leaders with the opportunity to consult with management on the general direction of the enterprise and negotiate working conditions, wages, hours, and benefits. The customary issues of collective bargaining familiar in the American system are resolved through the joint consultation system. But on the shop floor, beyond these traditional Workplace Contract issues, union members work closely with management through quality circles, pursuing the mutual goal of improving organizational performance.

The Japanese practices are correctly understood here, if a little idealised. Many Japanese labour scholars of progressive persuasions would not rate the Japanese degree of employee/union participation as favourably as the Bluestones do (for example, Kawanishi, 1992). But this is precisely how countries learn from each other. When Japan was learning from America, an excessive idealisation of America was the rule.

Many American labour scholars and practitioners doubt that “consultation” ensures effective employee participation in decision making. They see in consultation only an “advisory” function and believe that adoption of its outcome is subject to management discretion. In Japanese practices, what appears to be “advisory” to Americans actually has binding effects on the parties involved. Values (honour, trust, empathy, etc.) bind the Japanese more than legality.

However, it cannot be denied that more formal arrangements would be necessary in the American context. In this respect, the role models for
American unions are German co-determination and works councils based on the law. However, in the United States, the “transaction costs” of efforts to come up with more legally enforceable safeguards may become a drag on the other objectives—efficiency and productivity.

The Bluestones suggest “co-managing” of the workplace and enterprise based on certain specific principles embodied in an “Enterprise Compact”. Another attractive suggestion is the concept of “joint governance” in the workplace and enterprise suggested by Verma and Cutcher-Gershenfeld (1993). Outstanding examples are the Saturn Corporation and UAW, and Xerox Corporation and the Amalgamated Clothing and Textile Workers' Union (ACTWU) (Verma & Cutcher-Gershenfeld, 1993, pp.210–211).

Joint governance grows out of traditional union–management collective bargaining. The evolution is accompanied by extensive organisational change, workforce restructuring, job redesign, compensation reform, and changes in many other aspects of the enterprise. Although joint governance theorists such as Verma and Cutcher-Gershenfeld have not yet related joint governance to lean production, it is clear that this highly developed system of employee/union participation in the firm's decision making begins with problem solving through collective bargaining with an explicit mutual interest in productivity enhancing. Incremental efforts for higher productivity under joint governance would replicate how lean production has emerged as a distinct mode of production in Japan.

“Joint governance” parallels Japanese enterprise unionism in that it is driven by “enterprise consciousness”. All the innovations that an enterprise undertakes through union–management joint governance in order to enhance its competitiveness are enterprise-specific. This means that the participating union considers the attainment of the enterprise goals as a top priority. If the union is an industrial union, joint governance requires it to discard industry-wide norms or patterns of collective bargaining and to work towards standards and practices specific to each enterprise. The local unit of an industrial union develops its own independent competency for co-managing the enterprise and relies less on the union headquarters, as has been happening at the Saturn local in relation to UAW (Rubinstein, Bennett, & Kochan, 1993, pp.352–357; Weiler, 1990, pp.222–223).

Greater autonomy of the local union as part of the governing body of an enterprise points to the union's metamorphosis into an enterprise union. In Japanese industrial relations terminology, “union sovereignty” shifts to the enterprise-level union, turning the industrial union into a federation of enterprise unions.

Further, “governance” implies the stability of the constituents or citizens. This means that employment security is a basic condition for the effectiveness of the governance structure. This recalls Japan's “lifetime employment”. In joint governance situations mentioned by Verma and
Cutcher-Gershenfeld, “no layoff” is a required condition in the labour-management agreements.

The concept of an employment contract also changes if the relationship is assumed from the outset to be permanent. Employment becomes a relationship of indefinite duration rather than one of uncertain duration contingent on the availability of a specific job or task. A “living agreement” between the union and management for joint governance, in contrast to the conventional collective bargaining agreement, defines the basic relational and procedural framework, expecting that specific rules and actions will evolve guided by the life forces of labour-management relations. The belief in the creative flexibility of a stable, long-term relationship is also very strong in Japanese HRM/IR.

However, the diffusion of joint governance is rather limited. The literature points to only 10 or fewer firms and unions that practise plant-wide—in rare cases, enterprise-wide—joint governance over a range of strategic and operational matters. The concept is also in flux.

THE JAPANESE FIRM IN THEORY

Eventually, the nature and extent of changes in the organisation of work and production depend on changes in the demand for the product. The distinguishing feature of Japanese lean production was precisely in this respect: it was a demand-pulled mode of production, while American mass production during its “glory days” was pushed by the market power of an oligopoly which could manipulate demand for its product to cover any level of production costs (cost-plus pricing, whatever the costs). The reversal in the forces that guide or determine business strategy makes Japanese lean production “fundamentally different” from American mass production. This brings us to a closer look at the characteristics of the Japanese firm.

The theory of the firm that has been generalised from American firms needs modifications for the understanding of Japanese firms. In the last decade or so, Masahiko Aoki has almost singlehandedly created a theory of the Japanese firm at a level of technical sophistication comparable to the intricacies of American micro-economics (for example, Aoki, 1990).


An important contribution of the Aoki theory of the firm is the evaluation of the relative efficiencies of the two modes of production under different
environments. First, the theory points to situations where the H-mode is relatively efficient (Aoki, 1990, pp.8–9):

When environments for planning (e.g., markets, engineering process, development opportunity) are stable, learning at the operational level may not add much value to prior planning, and the sacrifice of economies of specialization in operational activities may not be worthwhile. On the other hand, if environments are extremely volatile or uncertain, decentralized adaptation to environmental changes may yield highly unstable results. In both these two contrasting cases, the H-mode may be superior in achieving the organizational goal.

This said, a case is also made for the relative superiority of the J-mode over the H-mode (Aoki, 1990, p.9):

In the intermediate situation, however, where external environments are continually changing but not too drastically, the J-mode is superior. In this case, the information value created by learning and horizontal coordination at the operational level may more than compensate for the loss of efficiency due to the sacrifice of operational specialization.

Assuming that H- and J-modes correspond to mass production and lean production respectively, a point to be emphasised is that lean production is superior to mass production in the “intermediate situation” where the environments are neither too stable nor too volatile. Changes in the environment create uncertainties about the types and quantities of products that the firm should produce and about the kinds of work organisation and processes that would prove most efficient. Under these circumstances, the best way to cope with uncertainties would be to pool the wits and skills of all employees, cutting across functional specialities, to discover the nature of changes and to adapt organisation and processes to changing needs. Team work for fact finding, problem solving, work assignments, production scheduling, etc. is very much desired. But what is important is that the nature and extent of uncertainties to be overcome must be within the competences of the existing staff and workforce. The J-mode with the bottom-up HRM/IR of lean production should be effective under these “intermediate” circumstances.

On the other hand, there can be environmental changes and market uncertainties that are too great for the existing personnel to overcome no matter how they pool their knowledge and skills in team work. In this situation, the relationship between problems and capabilities to solve them can be considered as having come to an impasse or a stalemate. The impasse or stalemate has to be broken by strong leadership at the top and the
enforcement of the strategic initiatives throughout the organisation. The H-mode with its top-down HRM/IR should be effective under these volatile circumstances. The enigmatic top-down “American lean production” pointed out by Appelbaum and Batt (1993) makes sense, given the enormity of challenges that exceed the capabilities of the existing personnel to cope.

Another important point to note in this connection is the concept of “efficiency” as an ultimate arbiter of the mode of organisation. For economists, this is too obvious to need any special mention. However, it is not always pleasant for non-economists to hear that considerations for efficiency often discipline and limit the pursuit of other, otherwise desirable, objectives. It is instructive that the Swedish experiments to overcome the “inhuman” monotony of work and worker alienation under mass production reached a very high level of humanisation of work, as at the Uddevalla plant, but had to retreat from it for reasons of cost effectiveness.

**IMPLICATIONS FOR EUROPEAN RESPONSE TO LEAN PRODUCTION**

Historically, Europe has been on its own trajectory of HRM/IR and engineering, but recently has begun to take the Japanese challenge seriously. Lively comparative studies of American, European, and Japanese systems have arisen (for example, Adler, 1992; Berggren, 1992; Cole, 1989; Commissariat Général du Plan, 1990, 1992; Jürgens, Malsch, & Dohse, 1993; Kissler, 1994; Kogut, 1993; Roth, 1992; Sengenberger & Campbell, 1993; Thurman et al., 1993).

Europe earlier came under the sway of American mass production and selectively absorbed its influences (Kogut & Parkinson, 1993). Now Europe is faced with the challenge of lean production. In this connection, it may be suggested that a comparative study of earlier European and Japanese responses to American mass production would be useful for a comparative understanding of American and European responses to Japanese lean production. Good beginnings have been made for this approach. Cole (1979) devotes considerable space to prewar Japanese responses to Fordism and Taylorism. Kenney and Florida (1993) draw on the post-World War I diffusion of mass production in Europe for an understanding of the diffusion of lean production (which they redefine and enrich as “innovation-mediated production”) in America.

The European mode of production has resulted from responding to American mass production by “humanising” it. As a consequence, Europe has in place institutional infrastructure and processes for HRM/IR compatible with lean production: high union density, corporatist collective bargaining, co-determination, works councils, auto-gestion, extensive worker training, enterprise modernisation/rationalisation, industrial
democracy, social partnership, etc. In terms of the “American trajectory” away from mass production previously explored, Europe is surely way beyond America's Phase II. There may be inter-country differences in the extent and quality of these institutional factors within Europe. But as seen from America, Europe does appear to have a distinct identity and integrity as a whole.

Institutionally, Europe has gone beyond the types of HRM/IR expected under lean production. The several distinct practices of employee empowerment that make production lean can therefore be adopted with a minimum of disruption to the established rules and procedures which have already made employees social partners of management. For Europeans, lean production should only be a matter of technical adjustment rather than a traumatic overhauling of the entire HRM/IR system as in the United States. In America, even the basics of employee participation in management and labour–management cooperation, which are taken for granted in Europe, have to be worked out from the ground up.

How Europe may respond to lean production may be inferred from how it previously responded to mass production. European responses to American mass production have been on a different trajectory from that of Japan. At the apex of the European achievements is the Swedish human-centred socio-technical system which aspires to fit technology to human needs (Berggren, 1992). The Japanese system aims at adapting workers to technological changes by upgrading education and institutionalising lifelong learning and training. The Japanese have taken this path because they looked up to American mass production as a superior mode of production to learn and catch up with. Europeans have regarded it as a challenge to be faced and overcome. They would relate to lean production in a similar fashion.

Critics of lean production such as Berggren (1992) fault Japanese lean production as only an intensified mass production. This is an understandable view from Europe's moral high ground of ideals and practices of humanistic HRM/IR. Technically, however, the question is whether or not observed characteristics of Japanese production justify a different name for it, distinct from mass production. Although the Japanese mode of production still retains the assembly line as a central feature of its production process, numerous ergonomic improvements have been made on the type, use, and layout of the assembly line, and the line workers participate in the “de-bugging” of the line operations until a largely defect-free smooth flow of work is ensured. Furthermore, there are other distinct features that did not exist in the American mode of production such as built-in quality, kanban and “Just-in-Time”, teams and kaizen, and HRM to maximise employee involvement, communication, and information-sharing.
The Uddevalla system is certainly different from mass production or lean production in that its central feature is a team of workers assembling a whole car from start to finish at a pace of the team's own choosing. This may maximise product quality, job satisfaction, worker dignity, and team autonomy. From an economic point of view, however, Uddevalla appears too utopian or too revolutionary simply because costs and profits under competitive pressures from the global market are not factored in. Indeed, this “European icon” of alternatives to lean production was shut down in 1993 (Cressey, 1993; Sandberg, 1993), evoking a scepticism about the cost-effectiveness of an extensive humanisation of work, and forcing reflection on how far economics permits the pursuit of humanistic ideals in production. Issues of compatibility between humanistic/institutional innovations and economic/technical viability are implied in the Uddevalla experience.

CONCLUSION

The main part of this paper examines how the American system of human resource management and industrial relations that used to be tightly integrated with mass production has been changing into a system compatible with lean production in the last 15 years. The transition from one mode of production to another has accompanied extensive adjustments of principles, rules, and practices under the threat of insolvency. Technical change has had to be embedded in institutional and social change.

This transition has been forced on American firms by earlier successes of Japanese firms in generating competitive advantages from their numerous technological, organisational, and institutional innovations, which by the 1980s had cumulatively evolved into a distinct mode of production to which Americans, not the Japanese, gave the title “lean production”. The Japanese HRM/IR system has evolved in parallel with technical change towards lean production and exhibits many features that may be taken as norms of HRM/IR systems compatible with lean production.

The “institutional economics” of lean production should keep economists busy at remodelling the theory of the firm. The transaction cost approaches have been tried by many on parts of Japanese firms' practices in HRM/IR and inter-firm relations. Masahiko Aoki has produced an integrating theory of the Japanese firm that cogently accommodates results of many studies of the Japanese firm.

In light of the argument of this paper, Europe is endowed with the organisational and institutional infrastructure that can facilitate technical change in the direction of lean production. Once the advantages of this mode of production are recognised, Europe's transition to it is likely to be less traumatic than that of the United States. It is possible, however, that some
aspects of European HRM/IR institutions and processes are incompatible with lean production. Full justice to this doubt calls for more research and more careful analysis of findings.

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