ALFRED P. SLOAN FOUNDATION
Industry Studies
2008
Annual Conference | May 1 - 2, 2008 | Boston, MA
http://web.mit.edu/is08/program

The Labor Process Revisited: Institutional Polymorphism and Organizational Political Economy in the Manufacturing Field[1]

- Matt Vidal
  Institute for Research on Labor
  and Employment
  University of California, Los Angeles

  Email: mvidal@irle.ucla.edu

[1] The research for this paper was made possible by a grant from the Alfred P. Sloan Foundation. I received extremely detailed and useful written feedback from Paul Adler, Josh Whitford and Steven Vallas. I also helpful comments on this paper from Michael Mann, Ruth Milkman, Lynne Zucker and the participants of the Comparative Social Analysis seminar at UCLA.

The Labor Process Revisited: Institutional Polymorphism and Organizational Political Economy in the Manufacturing Field[1]

Matt Vidal
Institute for Research on Labor and Employment
UCLA

May 2008

Keywords
Lean production, institutional theory, Marxism, manufacturing, postfordism, work organization

Abstract

Lean production has been demonstrated to be highly technically efficient, widely adopted by leading manufacturing firms, and established as the normative organizational model within American management discourse and practice. As such, both economic theory and institutional sociology predict lean should be adopted widely throughout the manufacturing sector. Based on qualitative analysis of 31 manufacturing firms in the U.S., I find lean implemented in a variety of forms, many of which are partial and relatively inefficient compared with the leanest factories. Explaining the polymorphic diffusion of lean production requires unpacking the processes through which organizations interpret environmental pressures and implement organizational strategy. The manufacturing environment is constituted by multiple, intertwined technical and institutional pressures, as well as embedded organizational relations that generate institutional space for variation in organizational performance. Inside the factory, managers, who must interpret and balance multiple environmental pressures, seek to alter workforce routines in pursuit of operational goals and to extract sufficient labor effort to achieve a satisfactory profit rate.

[1] The research for this paper was made possible by a grant from the Alfred P. Sloan Foundation. I received extremely detailed and useful written feedback from Paul Adler, Josh Whitford and Steven Vallas. I also helpful comments on this paper from Michael Mann, Ruth Milkman, Lynne Zucker and the participants of the Comparative Social Analysis seminar at UCLA.

Something of a paradox exists in the scholarly literature on organizations. Some literatures, primarily neoinstitutional sociology and economics, highlight and find strong isomorphic forces generating tendencies toward organizational homogeneity. Other approaches, such as industrial relations, human resource management and strategy, theorize and empirically demonstrate organizational diversity. These differences are due in part to different methods and levels of analysis; the former literatures are generally quantitative and focused more on industries or organizational fields (e.g., Galaskiewicz and Wasserman 1989; Mezias 1990), while the latter tend to be qualitative and more micro-organizational (e.g., Appelbaum and Batt 1994; Levinthal 1995; Cappelli et al. 1997). Accounting for the different analytical approaches may help make sense of the apparent paradox, but it does not make the disconnect vanish. Research on internal organizational dynamics has identified sources of differentiation, and research on organizational environments isomorphic mechanisms, but there is little understanding of how they interact, particularly in competitive environments where formal organizational structure and actual practice remain tightly coupled. In other words, other than at the most general level, we have a limited understanding of how isomorphic forces are experienced and *processed* by organizations, whose managers must interpret and balance multiple environmental pressures to formulate and implement operational strategy.

Drawing on qualitative research conducted in 31 U.S. manufacturing firms, this study begins to address the disconnect in organizational research by examining the institutionalization of lean production in the manufacturing field and its implementation inside factories. Lean production has been demonstrated to be highly technically efficient (MacDuffie 1995a; Oliver et al. 1996) and has been widely adopted by leading

manufacturing firms. I will show here that it has also been established as the normative organizational model within American management discourse and practice. While one prominent vein of neoinstitutional theory has focused on ceremonial legitimacy, arguing that institutionalized practices may be adopted formally but without serious technical intent (Meyer and Rowan 1977), the other main approach to neoinstitutional analysis focuses on the role of institutional pressures such as norms, networks and coercion in facilitating organizational rationalization (DiMaggio and Powell 1983). The normative model of lean, remarkably specific in terms of organizational goals and practices, is argued to be general enough to apply to a wide range of organizational contexts, even outside of manufacturing (Womack and Roos 2003). As such, both economic theory (Nelson 1991) and institutional sociology (DiMaggio and Powell 1983) predict lean practices associated with the normative model should be adopted widely throughout the manufacturing sector.

My qualitative research finds that although managers approach lean with serious technical intent, it gets implemented in a variety of forms, many of which are partial and relatively inefficient compared with the leanest factories. In short, lean production has been institutionalized in the manufacturing field, but its implementation polymorphic. The manufacturing environment is constituted by interwoven technical and institutional pressures, as well as embedded organizational relations that generate institutional space for variation in organizational performance. Inside the factory, managers, who must strategically interpret and react to multiple environmental pressures, seek to alter workforce routines in pursuit of operational goals and ultimately to extract labor effort sufficient to achieve a satisfactory profit rate.

The article begins by reviewing neoinstitutional theory, focusing on different forms of institutionalization and the relationship between technical and institutional pressures. I then develop a labor process theory emphasizing managerial interpretation of environmental pressures – including the pressures for valorization (effective extraction and realization of surplus value) – and the problems of implementation. The analysis first highlights the institutionalization of lean production as a multilevel, contested process and analyzes the institutional sources of competitive strategy in manufacturing supplier plants. I then present a typology of approaches to lean and an analysis of the heterogeneous implementation of key lean practices, both of which are used to explore the interaction between internal organizational dynamics and external organizational pressures. The article concludes by discussing the implications for organization theory, neoinstitutional sociology and Marxian political economy.

FROM INSTITUTIONALIZED ORGANIZATIONS TO ORGANIZATIONAL POLITICAL ECONOMY

Neoinstitutional Analysis of Organizations

A central argument of neoinstitutional theory is that "institutionalization tends to reduce variety, operating *across organizations* to override diversity in local environments" (DiMaggio and Powell 1991: 14, emphasis added). The neoinstitutional research program therefore locates the action outside of organizations. Neoinstitutional scholars study organizational fields and institutional pressures, either emphasizing their legitimating properties or their isomorphic effects. It took more than a decade of research for

neoinstitutional scholars to begin focusing on strategic reactions to, or interpretations of, organizational environments. Perhaps the first to focus on strategic reactions was Oliver (1991), who theorized a typology of strategic responses, modeling organizations as unitary rational actors. With a few exceptions (e.g., Fligstein 1991) internal organizational processes have been seen as orderly and unproblematic, and diversity theorized as an outcome of strategic or unconscious deviation from institutional norms (Kondra and Hinings 1998). Existing neoinstitutional approaches that focus on the implementation of actual practice have taken a translation perspective: a new management vision entering an organization immediately confronts existing organizational visions, subcultures and power networks (Doorewaard and van Bijstervald 2001; Saka 2004).

I seek to contribute to this recent empirical research on strategic reactions to environmental pressures and, in doing so, to take neoinstitutional theory in a new direction in two ways. First, the neoinstitutional analysis of organizations has taken on a managerialist cast – organizational analysis from the perspective of managers – broadening the focus of the management literature from efficiency and leadership to include legitimacy. Three of the four foundational works of neoinstitutional theory were published major sociology journals (Meyer and Rowan 1977; Zucker 1977; DiMaggio and Powell 1983), and one in a management journal (Rowan 1982). I compiled an extensive, if not comprehensive, list of 52 major articles adopting a neoinstitutional framework following the publication of these four works, between 1983 and 2004.[2] Of

[2] The journals are all majors in sociology, management and organization studies, respectively: *American Sociological Review, American Journal of Sociology, Social Forces* and *Theory and Society; Academy of Management Review, Academy of Management Journal, Strategic Management Journal, Administrative*

these, sixty-nine percent (36) were published in management journals, less than a quarter (12) in sociology journals, and eight percent (4) in organization studies journals. Labor process theory, with its focus on the social aspects of work organization – crucially, the need to get workers to enact the routines designed by managers – provides a rich foundation on which to reconstruct institutional theory. Second, neoinstitutional theory has been dominated by the Weberian themes of rationalization and legitimation (Fligstein 1985; Baron et al. 1986; Galaskiewicz and Wasserman 1989; Eldeman 1990; D'Aunno et al. 1991; Orrú et al. 1991; Haveman 1993; Dacin 1997; Haunschild and Miner 1997; Guler et al. 2002; Frumkin and Galaskiewicz 2004). Here I add the Marxian theme of valorization. As I argue in the following subsection, a key process underlying the institutionalization of competitive environments is the drive to extract surplus value and realize profit in the market. But first I briefly review the neoinstitutional views on technical and institutional pressures.

The potential discrepancies between findings of homogeneity and heterogeneity in the organization literatures has been buffered by the insight that organizations may be loosely coupled, that is, actual practice may diverge from formal structure (Meyer and Rowan 1977). Seeing efficiency and legitimacy as distinct pressures affecting different levels of the organization (Baron et al. 1986; Westphal et al. 1997), researchers working in the legitimation vein have focused largely on institutionalization and institutional pressures at the level of formal structure or rhetoric, to the neglect of technical pressures and competitive environments. What originated as a focus on different types of *pressures*, technical or institutional (Meyer and Rowan 1977), evolved into an emphasis on different

---

Science Quarterly, and *Journal of Public Administration Research and Theory;* and *Organization Studies and Organization Science.*

environments (Scott and Meyer 1991). In technical environments organizational survival depends on efficient control of a production system, while survival in institutional environments depends on conformity to rules and requirements. The hypothesis that as a practice is institutionalized it becomes more about legitimacy than efficiency has generally been supported by the research (Westphal et al. 1997; Guler et al. 2002).

These important insights notwithstanding, the question of how institutional and technical pressures develop in any given field is an empirical one and, in theoretical terms, depending on the particular environmental context, institutionalization may be far more complex than the simple replacement of technical value with symbolic value. As the rationalization vein of neoinstitutional theory has shown, institutionalization also includes social mechanisms that may *increase* organizational rationalization; coercion, normative pressures from professional networks, and pressures for imitation due to uncertainty all generate tendencies toward organizational homogeneity (DiMaggio and Powell 1983). A more general lesson from the literature may be that that processes of institutionalization are dynamic and multiplex. Thus, total quality management (TQM) has been found to have both developed into a *coherent* normative model (Westphal et al. 1997) and a *diffuse* set of practices united by a common rhetoric (Zbaracki 1998). A plausible interpretation for the apparent discrepancy is that TQM may be used for formal legitimacy by some (Westphal et al. 1997) but with serious technical intent by others (Zbaracki 1998) because it has been institutionalized in multiple, contradictory ways.

Consistent with this interpretation, the data presented below on lean production indicates that processes of institutionalization may be contested and multilayered, and that managers in organizations may intend to implement an institutionalized practice with

serious technical intent, in ways closely linked to formal rhetoric. The institutional and technical aspects of particular practices are not necessarily inversely related, leaving open the possibility that certain managers may adopt a given practice (largely) ceremonially while others may by (largely) technically-driven. There are a range of technical and institutional pressures that may drive adoption and implementation of given practices – efficiency, legitimation, coercion, norms, valorization – and these may blend together in unique ways for particular practices and models. This suggests that important questions concern *how* – not whether – practices and fields become institutionalized and how organizational managers respond. In the private sector, as I will show in the empirical analysis below, managers face multiple, intertwined competitive and institutional pressures. In the highly competitive manufacturing sector, technical pressures may become institutionally infused as given management practices and models become institutionalized in the field. However, manufacturing organizations are generally tightly coupled, and their managers generally attempt to implement institutionalized practices with serious technical intent. Thus, the multiple competitive and institutional pressures they face need to be interpreted, balanced and translated into operational goals.

The Labor Process and the Valorization Process

All operational goals involve establishing or changing routines within the workforce. A central managerial preoccupation regarding the workforce is with labor effort. As Marx (Marx 1990 [1867]: Ch. 7) argued, the managerial concern with labor is twofold, regarding both qualitative character and content – issues of job design, appropriate skills for particular jobs, and the context of work – and quantitative output (including product

quality). The institutionally-infused competitive pressures to get lean, that is, to adopt teamwork, just-in-time and demand-driven production techniques, therefore have a strong qualitative character, in addition to their quantitative goals of achieving efficiency, quality and flexibility.[3] The qualitative elements of production refer to the labor process as such, the object and design of work and the issues of control that arise from the capital-management-labor relationship. The quantitative aspects are what Marx referred to as the valorization process and Burawoy (1987) described as the pressures managers face to secure (and obscure) the extraction of labor effort. The distinction between labor process and valorization process is analytical; in practice they blend together for managers.

The central issues for managers seeking to interpret and balance operational goals concern altering and establishing new routines, which can be highly problematic (Nelson and Winter 1982; Becker 2004). At the level of operational routine, it is arguable that the most constant and noticeable pressure managers face is for valorization. Whatever else they do, managers must keep the workers engaged in productive labor as much as possible. Pressures for valorization are felt as an obligation to manage the labor process so that each and every worker expends labor effort of sufficiently-high quantity and quality. The problem for managers, then, is how to use labor to most effectively realize surplus value in the production process. Specifically, the pressure is not simply to ensure the workers expend sufficient effort, but that each worker expends a sufficient amount of

[3] Quality and flexibility may be considered quantitative to the extent that they concern output; flexibility, for instance, refers to the ability to respond to demand to produce the correct *amount* of output – no more, no less than demanded – at the right time. It is, of course, a function of the qualitative organization of the labor process.

productive labor to generate surplus value in addition to her necessary labor, as indicated by her hourly wage.

Within this labor process/valorization framework, then, I specify the key mechanisms shaping the organization of work, with special attention to how factory managers interpret environmental pressures and implement strategy. My analysis highlights three key sets of mechanisms: strategic orientation of management (Milkman 1997; Taplin 2001; Vallas 2003); conflict over (mental) work effort; and workplace culture embedded in organizational routines. I adopt a satisficing model of strategic orientation (March and Simon 1993). Two aspects of satisficing are pivotal: vision, or how strategy is conceived, and aspiration level, or the will to realize one's vision. Vision refers to imagination and perception (broadly understood to include information search subject to psychological constraints such as bias and attention), together defining what is on the agenda. Aspiration level refers to the thoroughness of information search and the criteria of satisfactoriness.

Managerial vision cannot be implemented as such; it must be operationalized as organizational routine and enacted by workers. Organizational routine, which may be defined as a regular behavioral pattern within a workplace, forms the basis of organizational capability (Nelson and Winter 1982). The implementation of routine has both political and cultural aspects. Culturally, existing organizational routines may give rise to shared understandings and expectations within the workforce. Further, individual habits may become embedded in particular routines. Workplace transformation may therefore be complicated by the durability of existing routines. More generally, the establishment of new organizational routines, which are collective in nature, is

problematic because complex routines involve tacit knowledge and may be context-dependent (Becker 2004).

Politically, managerial strategic orientation is shaped by the problems of extracting labor effort and the attendant problems of control. Labor process research has typically focused on how and why managerial strategy is shaped by the need to control labor (Braverman 1974; Edwards 1979; Bowles and Gintis 1990). Critical analyses of lean production have seen it either as a managerial strategy to intensify work (Dohse et al. 1985; Lewchuk and Robertson 1997; Parker and Slaughter 1995) or as a new form of ideological or cultural control (Grenier 1988; Graham 1995). But my research on lean production in the US Midwest finds lean used neither to intensify physical work effort nor for ideological domination (Vidal 2007b; Vidal 2007a).[4] As Marx argued concerning the organization of the capitalist production process in general, although work intensification is an important method in practice, it is not a necessary element in terms of the economic logic of the capitalist labor process (1990 [1867]: 431).

More generally for Marxist theory, the central problem for managers is not control as such, but the extraction of labor effort (Burawoy 1987; Cohen 1987). Although the problem of labor control is an empirical question, existing routines and the implementation of new routines do generate ideological effects (Burawoy 1982) and may provoke a range of actives responses by workers (Hodson 1991). The key question, then, is what types of worker responses generate problems for managers in their attempts to

[4] Parker and Slaughter (1995) are correct that a thoroughly implemented system of lean production can increase worker stress by creating a highly interdependent and fragile production process. Indeed, Taiichi Ohno (1988), the primary architect of the Toyota Production System, which forms the basis of lean production, explicitly designed the system as such, arguing that keeping the system taught and fragile will generate creativity among front-line workers. But Parker and Slaughter err in condemning lean production as a primarily and necessarily a management model for coercing more effort from workers. Whether the lean is used for empowerment, discipline or domination is a function of the labor market context and the associated goals, emphases and approach of management.

transform organizational routines and valorize surplus labor. Under the Fordist regime the issue is rather straightforward: it is a question of physical effort, and of properly training workers so that each particular type of job is, in general, staffed by appropriately skilled workers expending "the average amount of exertion and the usual degree of intensity (Marx 1990 [1867]: 303). The only problem that remains here is one of monitoring (Edwards 1979). But postfordist regimes, which include varying levels of employee involvement in problem solving and decision making, are more complex; the question of which activities make labor most productive becomes more ambiguous. The central question for managers thus becomes, under what circumstances, if any, is the mental effort of workers productive enough to justify taking them off the line (to engage in problem solving and/or decision making) or allowing or even encouraging them to engage in intellectual work on the line. Here problems of monitoring and labor control are much more intractable then where physical output is the sole criterion. Furthermore, to the extent that workers are supposed to work to customer demand rather than a forecast – as with lean production, to produce only what there are orders for rather than to maximize output – there emerge new problems of monitoring and controlling physical effort (beyond measuring output and quality).

Managers must implement operational strategy in organizations staffed by workers with competing and potentially antagonistic interests. By focusing exclusively on problems of managerial control *inside* the workplace, labor process theory has neglected the external pressures shaping managerial behavior. Valorization is a central organizational process in the private sector that links the internal and the external, in a sense, mediating technical and institutional pressures. Managers need to effectively

extract sufficient surplus labor from the workforce and to realize this surplus value as profitable commodities in the market. The competitive environment is fundamentally structured by pressures for valorization; how managers internalize and strategically interpret complex environmental conditions – from norms to pressures for technical efficiency – is in part a function of how they view the valorization problem. That is, a key characteristic distinguishing types of managerial strategic orientation is how managers view the question of how to most effectively deploy labor in view of actual output. Is labor primarily a source of physical effort, also a potential source of mental effort, or is labor capable of self-management? What are the motivations and political dispositions in the workforce? To be sure, managerial view toward labor by no means explains all the variation in how lean production is implemented, but it does play a central role. The view toward labor and valorization is part of a broader managerial strategic orientation, variation in which, along with variation in factory culture and politics, generates a polymorphic set of responses to isomorphic environmental pressures.

DATA AND METHOD

The data presented here are based on semi-structured interviews with 109 individuals in 31 firms and additional ethnographic observation. The firms compete in the durable-goods sector in the US Midwest. Seven of the firms are multinational prime contractors that do over a billion in sales per year, 23 are small and mid-sized supplier firms, and one is a large firm that is a supplier of plastic parts but also produces a line of brand-name products. The multinational prime contractors sell trucks, engines, air conditioners, and agricultural, lawn, recreational, and industrial equipment. The suppliers sell a variety of

metal forgings and fabrications, plastics, and subassemblies to industrial customers across a wide range of durable goods industries, from cars to computers.[5] The management interviews were typically around two hours each, with some going as long as three hours (and some in multiple sessions), and the worker interviews were typically half an hour, with some extending to an hour. I received plant tours in almost all cases. With a few exceptions, the interviews were recorded and transcribed. The transcriptions were then coded into N6 qualitative software for analysis. I also spent additional time in the field doing ethnographic observation on 54 distinct occasions. This ethnographic work includes observation of meetings, training sessions, and so forth.

It is important to note that the 31 firms were not picked based on their manufacturing strategy – that is, whether they adopted lean production – but were picked based on industry and location in the supply chain, using cold calling and snowballing techniques. My goal in picking the cases was to get a reasonably broad cross section of factories in what may be considered the components subsector of durable goods manufacturing, that is, the generally small to mid-sized firms that supply components to end-user, prime contracting firms, which are brand-name companies such as Motorola or Caterpillar. My interviews with the prime contractors focused largely on subcontracting and supply chain management, while my interviews with the suppliers mostly concerned work organization. The focus of this article is work organization in the 24 supplier plants, which, as can be seen in Table 3, specialize in one or more of the following processes:

[5] The distinction between prime contractors and subcontractors plays an important role in my analysis. In particular, primes are brand-name companies that are generally very large, while subs are the generally smaller plants that do most of the actual manufacturing, supplying parts to primes, who are the final assemblers. Prime contractors are generally known within the industries studied here as Original Equipment Manufacturers (OEMs). However, I avoid this terminology because while OEM refers to prime contractors in most of durable goods manufacturing, it refers – exactly the opposite and therefore quite confusingly – to subcontractors in the electronics industry. I use interchangeably the terms prime contractor or industrial customer, and the terms subcontractor or supplier.

subassembly, machining, metal fabrication, metal casting and plastics (along with one painting shop). These component suppliers may supply a broad range of end-user industries, from electronics to farm equipment, and generally compete for and may share the same customers, both domestic and foreign.

Analytically, I work in the tradition of Burawoy's extended case method (Burawoy 1998), seeking to better understand broad economic and social processes by examining their operation and effects in a historically- and geographically-specific case study. This approach begins from particular social contexts, aiming to highlight broad social processes by examining in depth and comparing specific causal contexts. The case is not seen as a sample that forms the basis for generalization, but as a concrete example of the complex interaction of the particular and the general, which provides an empirical basis for interrogating and reconstructing existing theoretical frameworks. My case is the manufacturing sector in the U.S. Midwest under neoliberal globalization. I use interviews and observations with people in specific contexts – workplaces, training sessions, meetings of cross-functional teams, meetings of representatives from multiple organizations – to illuminate (a) how these managers, engineers and workers understand and negotiate their environments and (b) the structural constraints and tendencies they experience. I have documented worker reactions and outcomes elsewhere (Vidal 2007b; Vidal 2007a); the focus of the current paper is on managerial orientation and practice.

INSTITUTIONALIZATION OF LEAN PRODUCTION IN THE U.S. MANUFACTURING SECTOR

Lean production has become highly institutionalized in the intensely competitive, global environment of the U.S. manufacturing sector. As such, it offers a rich case for

developing neoinstitutional theory, for which empirical research has been largely focused on nonprofits (e.g., DiMaggio and Powell 1983; Westphal et al. 1997), the public sector (e.g., Rowan 1982; Frumkin and Galaskiewicz 2004), or highly-regulated sectors such as banking (e.g., Deephouse 1996; Deephouse 1999). My analysis of the implementation of lean production indicates that the institutionalization of management models and practices can be a contested and highly uneven process. In the case of lean, it is contested because struggles over implementation on the shop floor extend into scientific debate and stereotypical rhetoric, and uneven because processes of institutionalization are partial and multiple.

The basic principles of lean manufacturing date back to the early twentieth century, particularly, Taylor's emphasis on work standardization and Ford's emphasis on waste reduction and continuous improvement in his River Rouge plant. But these principles were not systematized until the late twentieth century by Toyota, and particularly, Taiichi Ohno, into the Toyota Production System (Ohno 1988). The Toyota Production System was named lean production by MIT researcher John Krafcik (1988) and popularized as such in the U.S. and elsewhere by the MIT book *The Machine that Changed the World* (Womack et al. 1990). The term "lean" is often used loosely, referring variously to a manufacturing and supply chain strategy (just-in-time), an overall management system, a toolbox of discrete practices for reducing waste, a new way of viewing organizations or simply the general idea of doing more with less. As a management system, it is contested by academics, both in terms of its core properties and its performance effects vis-à-vis other management systems. Despite all this, lean has become the dominant, normative management model among American management.

Further, this normative model refers to a well-defined package of complementary practices used with the broad goal of a demand-driven system of production based on short runs, achieving efficiency through continuous improvement and optimized work flow with minimal buffers and some degree of worker participation.

Below I will argue that the normative model of lean exhibits a remarkable degree of coherency and, rather than being used formally for ceremonial legitimacy (Meyer and Rowan 1977; Westphal et al. 1997), it is used by engineers, consultants and managers with serious technical intent. Yet, manufacturing managers face a competitive environment that is institutionalized in contested and ambiguous ways. In short, the competitive environment of U.S. manufacturing firms is institutionally multiplex – structured by institutional relations and processes at many levels – and managers must interpret and process institutionally-infused competitive pressures.

Multiple Institutional Levels in a Competitive Environment

The environment in which manufacturing supplier plants compete is institutionalized at many levels. Institutions are defined here as formal and informal rules, shared understandings and expectations, giving rise to and becoming embedded in stable patterns of interaction. Institutionalization, then, is the process by which rules, understandings and expectations come to be imposed on or shared by groups of people. Here I highlight three institutional levels: lean production as a multilayered institutional myth; lean as a relatively coherent normative American management model; and the structure of inter-organizational relations, particularly, customer-supplier relations. The

different forms of institutionalization relevant to lean production are represented in Table 1.

[TABLE 1 ABOUT HERE]

As shown in the middle section of Table 1, lean production has diffused through the U.S. manufacturing sector. Beginning with the majors in auto, it has spread to a diverse range of high-profile companies such as Harley-Davidson, John Deere, Boeing, Dell Computers, Pella Windows, New Balance and Allen Edmonds Shoe Corporation. Along the lines suggested by DiMaggio and Powell (DiMaggio and Powell 1983), lean has diffused through the supply chains of these prime contractors and their competitors by essentially coercive means: get lean or lose the business. In a closely related process of institutionalization, lean has been established as the normative management model in the manufacturing field. But these processes of institutional rationalization (DiMaggio and Powell 1983) are only partial, as lean continues to exist at another level, so to speak, in what Meyer and Rowan call a rational institutional myth (Meyer and Rowan 1977). I examine this institutional mythology before turning to discuss the normative model of lean, and their interrelationship, in more detail.

Institutional myths are interpretations, understandings or stories that are shared by groups of people, either being taken for granted or supported by public opinion, formal rules, law or, I may add, scientific research (Meyer and Rowan 1977).[6] Institutional

[6] Without accepting the postmodern position of relativism, we may include (social) scientific debate as a basis for institutional mythology to the extent that social scientific interpretations are contested, merely falsifiable (i.e., necessarily inconclusive) and routinely oversimplified and distorted in the public sphere.

myths are rational to the extent that they specify technical prescriptions in a rulelike way or, more generally, propose a causal interpretation. As it has diffused throughout the US manufacturing field, lean production has developed into an institutional myth, at once multilayered and highly contested. For heuristic purposes, as portrayed in the top section of Table 1, this multilayered institutional myth may be conceived in terms of an onion metaphor. At center is real-life conflict: shop-floor struggles over the implementation of lean production and its effects (in addition to the competitive struggle between capitalist firms). The competing political positions thus developed permeate outward; as lean diffuses more widely, layers of an institutional myth take shape. Surrounding the center of lived experience is a rational core of academic debate over lean production: is it the one best way to organize production (Womack et al. 1990), an overhyped management fad on par with self-help books (Williams et al. 1992; Williams et al. 1995), or just one of a variety of equifinal approaches to high performance, postfordist production (Berggren 1992; Berggren 1993; Appelbaum and Batt 1994; Turner and Auer 1994; Appelbaum et al. 2000)? Is lean production most effective as a package of complementary practices (MacDuffie 1995a; Oliver et al. 1996) or simply as a toolbox of discrete practices (Delery and Doty 1996; Cappelli and Neumark 2001); and do its performance effects stem from employee involvement (Adler 1995; MacDuffie 1995b) or largely from better process control (Lewchuk and Robertson 1997; Rinehart et al. 1997; Vidal 2007b)?

These mostly technical, scientific debates are closely related to another layer of the institutional myth of lean production, that of more explicitly political, yet still academic debate. This debate, particularly visible within the labor community, is still to a

---

This notion is neither meant to preclude the existence of objective truth nor, indeed, to suggest that some institutional myths are not better supported by the empirical evidence than others.

large extent evidence-based, but it is more explicitly partisan. Is lean production a system for empowering workers (MacDuffie 1995b), work intensification (Green and Yanarella 1996; Slaughter 2007), managerial hegemony (Dassbach 1996; Yanarella 1996; Green 1999), or simply a management system that can be used in both ways (Luria et al. 2005)? This political debate over the effects of lean production on labor has important institutional effects on how unions and union workers react to lean production. If unions and union workers are taught that the necessary outcome of lean is that "Jobs are more regimented, more stressful, with longer hours" (Slaughter 2007), then resistance will begin at the outset of, if not before, managerial attempts to implement lean. Indeed, the "lean is always bad for workers" view has given rise to highly-simplified critical positions at a more general level of stereotypical rhetoric.[7]

A final layer of the institutional myth of lean production, then, is the outer layer of stereotypical political rhetoric. On the critical side, a highly oversimplified view of lean production has emerged: "Lean Production judges everything and everyone on the basis of speed and productivity. If anything or anyone does not fit the needs of speed and productivity, they are disposable" (Post and Slaughter 2000; see also Socialist Worker 2007). In fact, lean has emerged as a symbol for all that is bad with "lean and mean" corporate America (Harrison 1994) and neoliberal globalization as such (Moody 1997).

On the side of lean advocates, one-sided emphasis and hyperbolic rhetoric are also common. Such hyperbole was present in the original management bible of lean: "it is in everyone's interest to introduce lean production everywhere as soon as possible"

[7] I do not, by any means, intend to imply that lean production methods and rhetoric cannot be used as method of work intensification or managerial hegemony – far from it. Rather, my point is to try to present a broader understanding of the role of lean production in postfordist capitalist development. Certainly lean methods can be used for work intensification and lean rhetoric for managerial hegemony; but these characteristics are neither specific to nor essential for lean production.

(Womack, 1990 #182, quoted in Williams et al. 1995). Twelve years later, lean is still hailed as “the World's Most Powerful Production System” (Dennis 2002). Lean is thus simultaneously used as a symbol for best manufacturing practice (Schifferes 2007) and as a symbol for low-road manufacturing practice (Post and Slaughter 2000; Moody 1997). Although lean production has been institutionalized as such, symbolizing different things to different groups, within managerial discourse lean exists not simply as a symbol of best practice but also as a normative model that retains technical value.

As indicated in the middle section of Table 1, lean has become the dominant, normative model of management in U.S. manufacturing. In addition to being widely adopted by high-profile firms throughout the field, lean manufacturing has been endorsed by major business and occupational associations, including the National Association of Manufacturers, the Society of Manufacturing Engineers, the National Association for Job Shops and Small Manufacturers, the Institute of Industrial Engineers, and the Association for Manufacturing Excellence. It has also been adopted as the main strategy for manufacturing modernization by the Manufacturing Extension Partnership, the only government funded program to help small and mid-sized manufacturers in the U.S.

As an institutional symbol, lean can become divorced from technical complexity. For example, I attended a meeting convened by an influential group of large Wisconsin manufacturers to give feedback to National Institutes of Standards and Technology on the Manufacturing Extension Partnership program. The general template of the MEP is to help small manufacturers in large part by implementing lean manufacturing techniques. At the meeting, a NIST MEP representative suggested to the group that lean production is now an “off-the-shelf technology.” In other words, from NIST’s perspective

implementing lean production is an unproblematic process, a ready capability that can easily be diffused from the MEP centers to firms in the private sector. As shown in the next section, this is an institutional understanding that has little relation to the complexities and problems of actual practice.

Yet, in a sense outside, or perhaps underneath the contested institutional mythology of lean production, the normative model of lean has achieved a remarkable degree of coherence, in large part because of a growing network of lean consultants and organic lean gurus (production managers and engineers, both in large prime contractors and subcontractors). Most importantly, this normative model retains a high level of technical specificity. Based on the Toyota Production System, lean is widely understood as a set of methods for reducing waste, conceived in terms of the "seven wastes": defects, overproduction, transportation, waiting, inventory, motion, and processing. A range of templates exist that specify lean as a system of *complementary* practices. A simple internet search for "House of Lean" yields over a dozen lean templates very similar to that in Figure 1.[8] These are created by MEP centers, a range of consultants and government agencies.

[FIGURE 1 ABOUT HERE]

In brief, both the rationalization and the legitimation veins within the neoinstitutional approach to organizations help illuminate the environmental pressures facing component suppliers in the U.S. manufacturing field. In line with the arguments

[8] A search of Google Images conducted on May 20, 2008 yielded 16 distinct, but closely similar templates for the "House of Lean."

regarding institutional rationalization (DiMaggio and Powell 1983), lean has been spread throughout the field by means of coercion, norms and professional networks. Similarly, the work of Meyer and Rowan (Meyer and Rowan 1977) highlights the issues of whether, as lean production becomes institutionalized, its technical value comes to be replaced with symbolic value. Regarding lean production in the manufacturing sector, the answer is complex; its institutionalization is contested and uneven, as lean is associated with competing symbolic meanings, yet also retains technical value. As my analysis of implementation reveals, manufacturing organizations remain tightly coupled and pursue lean with serious technical intent. Institutionalization can be a multiplex process, with lean production being institutionalized in different, sometimes contradictory ways. As I will show throughout the rest of the article, managers continue to face multiple pressures, including intense technical pressures regarding cost, quality and delivery. In effect, these technical pressures become institutionally infused as lean practices become institutionalized in the field. Before turning to the institutional sources of competitive strategy, however, I discuss a third way in which the manufacturing field becomes institutionalized – embedded relations among organizations – that has important implications for the implementation of lean production.

The bottom section of Table 3 highlights the key aspects of organizational embeddedness regarding the environmental pressures facing organizations. Specifically, customer-supplier relations are institutionalized in a manner permitting diversity in the organizational form and performance of supplier plants. I was told stories, both from managers in prime contractors and in subcontractors, about how purchasing agents are often concerned only with getting parts of sufficient cost, quality and delivery, with little

concern for how these targets are achieved. It is true that supplier management engineers in prime contractors do focus on lean supplier organization, which may be experienced by suppliers as a coercive face of lean production. Purchasing agents also encourage suppliers to be lean, if often a branded version such as the Deere Production System or the Autoliv Production System; but at the end of the day, purchasing agents are there to get parts of sufficient quality at the right price and the right time, and it is beyond their departmental purview how exactly these targets are met. From the perspective of a manager in one supplier: “You’ve got purchasing people doing the buying, they’re not really looking at processes and what can they do to shave 50 cents off here or 50 cents off this part. They’re just ordering parts.” A manager in a different supplier concurs: “Once a part is being made and there’s no problems with it, and it’s going through, you know, they’re getting their parts on time and it's working fine, I think there's little incentive for them to say, ‘How can we improve the process?’”

This situation is not simply an issue of individual-level satisficing of purchasing agents. Rather, it is also function of the structure of large prime contractors, which are often plagued by departmental conflict and misaligned incentives (Whitford 2005). Satisficing by purchasing agents and departmental disjunction – with purchasing agents and supplier management personnel often housed in different departments – creates space for variation in organizational strategy and performance among suppliers. Another institutional mechanism creating space for variation is long-term customer-supplier relations. What in industry are referred to as commodity products, like screws or simple metal fabrications, are typically subject to spot market-type competition. But as a

manager in a supplier firm explained, purchasing departments may offer some wiggle room for existing suppliers of highly-engineered products:

> if you are truly making a commodity, I mean the price pressure has got to be absolutely huge. If you're making an engineered product of one sort of another, you know, I think there is less of it … So, in some ways, once you've won the business, unless you just absolutely falter because of quality or delivery or whatever, you're married to that particular design or that particular engine, because it's a huge investment.

Even on price, embedded relations can shield suppliers to a certain degree. There is no such thing as a price increase in modern manufacturing. But suppliers can sometimes resist price reduction pressures, for example, being able to push back a bit where it is hard for customers to resource a particular product. In many other cases it's hard for customers to easily switch suppliers. For example, the plant manager at an iron casting plant explained to me that it is difficult for customers to switch suppliers because it takes so long for them to qualify casters for the specific part his plant supplies and, moreover, their tooling is expensive and their volumes are low. Tooling for an automotive block can cost up to $200,000 and most prime contractors "don't have the capability of taking the tooling out of here and taking it to somebody else that they don't have qualified and spending five, six months bringing them up to speed."

Now, it is certainly true that there are industrial customers with high organizational expectations across the board, and purchasing managers with high aspiration levels in terms of supplier performance. But the environment is neither hypercompetitive nor uniform in competitive pressures. Competition can be intense, but it is structured in various ways by highly complex and differentiated organizations staffed by satisficing

managers, embedded organizational relations and normative understandings. Ultimately, despite the institutionally-infused technical pressures to improve cost, quality and delivery by getting lean, the signals that managers in supplier plants receive are often mixed. For example, the pressure to do just-in-time delivery may be intense, but managers may get mixed signals regarding whether their industrial customers want them to hold inventory to be responsive or to actually lean out their own operations. Likewise, plant managers may get mixed signals from upper management regarding whether they should focus on short-term performance or long-term capability. In the end, especially when business is good, plant managers may opt for the short term, for satisfying current, major customers in any way they can. But when managers do engage in long-term, strategic planning for operations, where do they turn?

Institutional Sources of Competitive Strategy

Organizational learning in contemporary industrial markets is deeply embedded (Herrigel 2004), as boundedly rational information search takes place in an environment governed by a variety of institutional mechanisms. For most small to mid-sized supplier plants, the decision to adopt lean practices is generally not based on a hyper-rational, systematic evaluation of available alternatives. Rather, while not entirely an article of faith, the decision to adopt lean is driven by competitive concerns with efficiency yet at the same time, particularly with smaller suppliers, often involves a healthy dose of institutional imitation, normative behavior and coercion, perhaps verified anecdotally by personal/local experience.

While market mechanisms such as hiring consultants or purchasing books on lean are clearly important in diffusing lean in the U.S. context (Helper and Kiehl 2004), these market mechanisms have a distinct institutional flavor. Decisions to restructure manufacturing operations take place in an institutional environment where lean is normatively dominant and adopted by leading manufacturers, associations and intermediaries; organizational decisions to "modernize" are heavily influenced by institutional forces. In some cases, such decisions are the result of coercion by customers or parent firms. Even where managers attempt competitive information search, however, the search immediately confronts an environment where lean is highly institutionalized adopted by leading customers and competitors and pushed by associations and consultants. Yet, rather than symbolic value and ceremonial conformity becoming more important than technical value and productivity concerns (Westphal et al. 1997), as institutionalization proceeds the technical and the institutional become increasingly intertwined and unable to be separated; what is considered technically most efficient is also normative and often pushed by organizations with coercive power.

[TABLE 2 ABOUT HERE]

Of the 24 supplier plants I observed, 22 of them have adopted lean manufacturing. The major sources leading them to lean are listed in Table 2. Fifteen of the suppliers I visited were pushed by key industrial customers to get lean, though with varying degrees of compulsion; in most cases the suppliers had some desire to restructure to improve efficiency and flexibility. In 12 of these 15 cases, the supplier used a technical college,

MEP center or consultant for technical assistance. Five of the suppliers who used a MEP center were nominated by industrial customers, through the Wisconsin Manufacturer's Development Consortium, for subsidized training through the Wisconsin Manufacturing Extension Partnership.[9] Two of the 15 suppliers also received direct assistance from the industrial customer. In seven suppliers the parent firm was an important source of lean strategy; three of these suppliers received their main impetus from a parent firm, and the remaining four were among the 15 that were (also) pushed by industrial customers.

Thus, for 18 of the 22 lean suppliers, a key impetus for adopting lean production came from major industrial customers or the parent company. Even where firms ostensibly pursue a rational information search for new organizational strategy, this search is conducted in an environment where lean is thoroughly institutionalized. Each of the four suppliers I observed that were *not* pushed by customers or parent firms to become lean were more-or-less immediately faced with an environment dominated by the discourse of lean, from trade magazines to consultants to their own industry associations. If they did take into account the strategy of leading competitors and customers, even as part of a rational search process rather than simply imitating because of uncertainty, they would see lean everywhere. And each of them did ultimately turn to lean. Three of these received training from a technical college and/or MEP center and the fourth received training from an industry association. The two plants that did not adopt lean (not shown in Table 2) are largely constrained by their technology; one is a painter with a continuous-process technology and the other a high volume shop making simple parts

[9] The Wisconsin Manufacturers' Development Consortium is a consortium of large, multinational prime contractors with assembly operations in Wisconsin that have gotten together to help build a framework, based around subsidized training provided by the Wisconsin Manufacturing Extension Partnership and the Wisconsin Technical College System, to help upgrade their Wisconsin supply base. For more on the WMDC, see Vidal et al. (2003) and Whitford (2005).

that can be produced in single stamping operation. I address these cases in more detail in my discussion of the relationship between lean and technical/organizational characteristics in the following section. One final thing to note is that only one of the plants I observed implemented lean in a truly innovative way. While the remaining plants largely implemented lean production in attempt to imitate best practice, one casting plant took lean concepts, particularly demand-driven production and continuous flow, and applied them in truly novel ways, using highly sophisticated technology and creativity to link a set of distinct processes into a continuous flow sequence, getting lead time down to three days (while the lead times of their competitors remain between six to 12 weeks). I now turn to examine the implementation of lean production in the supplier plants.

POLYMORPHIC IMPLEMENTATION OF LEAN PRODUCTION

My interviews with managers, engineers and workers did not uncover any managerial preoccupation with designing work to increase physical effort. Workers came to work prepared to work hard, turning out sufficient, if not maximal, quantities of output. In the factories that I visited work appears to be sufficiently depoliticized within the workforce that the coercion of physical effort is not an important consideration for managers and engineers in the design of work. However, the issue of labor effort remains nonetheless central to understanding both managerial strategic orientation and problems of implementation more broadly. In the context of postfordist production in the United States, the key issues regarding labor effort revolve around the problem of mental effort, specifically, does management view labor as mainly a source of physical labor or also a source of intellectual labor, potentially capable of self-management? The issue of

intellectual effort for postfordist management is a special problem of capitalist control. It is not simply that management gives the opportunity for intellectual and/or managerial labor and workers take. Intellectual effort cannot be coerced, and it is hard to incent, particularly in the factory context, where the bulk of the job, in content, definition and historical norm, remains physical. This is why management cannot simply declare workers empowered, nor can it, as I will show, even necessarily do so with sufficient training. Getting workers to take ownership is hard, and can be particularly hard in the adversarial context of a factory, where workers know that management is breathing down their throat for seconds on every minute.[10]

In brief, pressures and problems of valorization shape managerial strategic orientation regarding work organization in ways central to postfordist work practices and models, ways that have important implications for strategic reactions to the institutionally-infused competitive pressures to adopt such practices. In the following subsection on "System-Level Differences" I present three types of lean system, focusing on the different managerial orientations behind each type of lean. In the next subsection on "Heterogeneity in Common Lean Practices" I turn examine particular lean practices, focusing on the cultural and political aspects of organizational routine.

System-Level Differences

[10] The Toyota standard is to have assembly-line workers working for 57 seconds of every minute. In this regard, and in the intense environment of an auto assembly plant (particularly where local unions were formerly powerful and had institutionalized a different norm of work pace), lean production may indeed be used for and experienced as work intensification. At the same time, however, lean is ideally driven by the pace of customer demand ("takt time"), not output maximization, and can certainly be used as a system aimed at "working smarter, not harder." Although work speedup is a contingent outcome of lean, a more direct and systematic outcome of lean is to increase the fragility of the work process, hence, increasing stress for some workers (Vidal 2007a).

Lean production is widely seen by managers in the field as an organizational strategy *necessary* for competing in the postfordist manufacturing economy. In the words of one manager, echoing a common sentiment among the plant managers I interviewed, "Everybody's going to a just-in-time lean situation." Another plant manager, referring to the intense competition and quickly changing demand in the globalizing economy, indicated that "If we had not been into lean manufacturing in the last two to three years with the economy the way it was, we'd have been a real hurting company." But what, exactly, to these managers mean when they refer to lean manufacturing? Do they have the same practices in mind?

Because lean production has become institutionalized as a technically-valuable organizational model in American manufacturing, managers do have similar general conceptions of and specific goals for lean (see Figure 1). With the exception of two factories, all of the managers I spoke with use the rhetoric of lean to describe their manufacturing practice. Although they use lean with serious technical intent, however, managers vary in exactly how they envision what lean will look like in their plant and in their aspiration level. I begin with some illustrations of how key lean practices impact organizational efficiency in the suppliers I observed.

A core lean practice is *kaizen* or continuous improvement. A common focus of *kaizen* is the cleanup and standardization of a work station. In one plant I visited, a group of workers found that a work area had seven Craftsman toolboxes, each with a full set of metric and English wrenches, yet they did not need *any* wrenches to build the pumps they make. An engineer and the plant manager explained to me the implication for efficiency:

Engineer: Three guys working the area, seven toolboxes!

> Manager: Seven toolboxes. And every time a guy had to, if you'd go up and you'd ask a guy for a torque wrench, he'd go through three drawers, or four drawers.
>
> Engineer: Unlock the drawer, look, no. Unlock the drawer, "There's the case. There's no torque wrench. [In fact, we] found out that you don't even need a wrench to build the pumps they built. So seven sets of wrenches went on the auction block.

Another common *kaizen* activity is setup reduction, also known as quick changeover, which is a set of disciplines for reducing the time it takes to change over the molding or dies on metal stamping presses, plastic injection molding machines and so forth. Setup times can often be dramatically reduced, from hours to minutes, in very simple ways. For example, a regular nut on a die fixture can be replaced with a wing nut, therefore eliminating the need to search for a wrench every time a die needs to be changed. This may sound quite obvious, but in highly complex and demanding manufacturing environments such simple solutions are often easily overlooked. A typical setup reduction event would involve videotaping a machine changeover, which may reveal wasted effort like workers searching for half an hour to find a properly sized wrench. In addition to increasing efficiency by reducing wasted effort, setup reductions also increase organizational flexibility. The longer the setup time, the larger the efficient batch size; if a setup takes two hours, an engineer may want to run a large lot that takes eight hours. If that same setup can be reduced to just half an hour, the batch size can also be quartered and three or four different products can be run through in an eight hour shift rather than just one product. As the plant manager emphasizing setup reduction explains, with shorter setups times, "instead of running 10,000 of these tubes monthly and using up

two days of vendor time during that week and you can't react to anything else, let's run 2500 weekly, use five hours of vendor time."

One of the central goals of lean continuous improvement is supposed to be lead time reduction.[11] The general approach is to reduce lead time by rationalizing the product routing or work flow, typically by creating a process map or "value stream map" to guide the reduction of setup times and, just as importantly, the queue times between operations. Traditional Fordist plants were organized on a functional basis, with similar operations grouped together in specific departments (e.g., stamping, welding, machining, assembly) and separated by large inventories and long queue times. A first step to reducing lead times, then, is to move from a functional layout to a product-focused layout, in which dissimilar machines are grouped together based on product family, so that all of the operations needed to make a complete product are physically located next to each other. Product-focused organization is often achieved by implementing cellular production, in which work cells include all the operations needed to make a part arranged together in sequence. The ideal is to implement a highly interdependent, demand-driven ("pull") system.

I now turn to present a typology of approaches to lean. A premise of my analysis is that such variation in organizational form has important effects on organizational performance. While I cannot provide primary quantitative evidence here to support that premise, a large body of quantitative research demonstrates clearly that distinct structures and practices generate differences in organizational performance and that more

[11] How lead time is delineated varies, but one common definition is the amount of time it takes to go from a purchase order to product shipment. Lead time reduction is a central goal for continuous improvement in the bricks for "Pull/Kanban" and "Cellular Flow" in Figure 1.

comprehensive and internally-consistent configurations produce better performance (Arthur 1994; MacDuffie 1995a; Ichniowski et al. 1996; Luria 1996; Pil and MacDuffie 1996; Youndt et al. 1996; Appelbaum et al. 2000). What is more, the normative model of lean is one of a complementary package of lean practices, and a number of key templates sharing a core set of practices are widely available. Thus, there is convergence with the technical and the institutional models of lean, both of which suggest lean be implemented as a package of complementary practices.

A typology of approaches to lean production.—Table 3 presents basic characteristics of the 24 supplier plants along with three dimensions on which the plants vary in system-level leanness. Based on these dimension of system leanness, I have developed three types of lean, along with category of largely traditional plants that have not adopted lean production. One type, which I call lean enough, refers to plants that have adopted lean practices in a limited and selective way. These plants adopt basic lean practices such as inventory and batch size reduction, do a one-off plant re-layout, and sporadically apply other lean tools. An intermediate type, referred to as lean standardization, adopts an approach to lean that is more concerned with the complementarity of practices. Lean standardization plants focus on using lean tools to standardize processes throughout the plant; in addition to having more concern with practice complementarity, these plants are differentiated from lean enough plants by having more systematically-improved product routing and work flow. Finally, the leanest plants, referred to as learning lean, are plants that approximate the lean ideal of implementing a highly-interdependent production system with a regime of substantive employee involvement that is conducive to truly

continuous improvement. Learning lean plants are distinguished from lean standardization plants not only in that the former take a comprehensive view of lean as a system of complementary practices but, crucially, that these plants move beyond systematically-improved flow to implement demand-driven production with truly continuous flow and, as a result, generally try to do so with substantive employee participation in intellectual and managerial labor. I attempt to flesh out these differences in the rest of the paper, beginning with each of the three dimensions of lean on the right side of Table 3. But first I briefly discuss some likely firm-level sources of variation in lean that appear to provide minimal leverage in explaining variation among types of lean.

[TABLE 3 ABOUT HERE]

One likely source of differentiation in types of lean is organizational technology and product. However, product and technology do not appear to be important in my qualitative sample. Looking at the right side of Table 3, within each type of lean can be found metal fabricators, machining job shops, stamping operations, and metal casting operations. There is as much variation within these categories as between them. There does appear to be one pattern, however, that emerges in regard to product and technology. My qualitative data, admittedly only suggestive regarding actual correlation, appear to indicate a positive relationship between leanness and product complexity. Specifically, factories where the primary products can be produced in a single operation are clustered among the category of plants where lean is viewed more as a package of discrete practices, rather than being viewed more as a complementary package of practices.

Product complexity appears also to have a relationship to technology; many of the plants where a product can be produced in a single step are plastics producers or metal castors. Such plants appear to have less room or need for a comprehensive package of complementary lean practices. However, the relationship has more to do with product complexity than with technology as such; many of the leanest plants use these technologies, but integrate them into more complex products requiring multiple operations to complete. Further, my observations of lean gurus and my reading of the lean literature suggests that even many of these lean enough plastics producers or metal castors could approach lean in a more complementary way, including a focus on improved standardization, employee involvement and continuous improvement. Part of the issue here is that even though there may be room for marginal to moderate improvements in efficiency and flexibility with more complementary lean practices, these appear to be unnecessary for effective valorization, which is mostly an issue of sufficient *individual* effort on individual machines. At the extreme of the relationship between product complexity/technology and leanness, the two largely traditional plants seem to be unlikely candidates for lean, each in their own regard. In one plant simple parts are produced in single stamping operations, while the other is a painting concern where the painting is completed in a single, continuous-process operation.

Firm size also appears to be unrelated to leanness. Both small and large plants are found to be learning lean or lean enough. Ownership structure appears to have some relationship to leanness although, again, this appears to be an important but not decisive factor. Among the learning lean plants are all combinations of ownership type. However, privately-held, independent plants appear to be overrepresented in the category of lean

enough. This is consistent with the broader story that emerged from my analysis: outside resources, such as that of a parent company or customer or consultant, appear to play a very important role in disseminating both knowledge and capability.

The relationship between the organizational environment and variation in lean is more complex. Because these are subcontractor firms that supply to a wide range of end-user industries, the character of the industrial structure is similarly variable for nearly all of these suppliers. The most important aspects seem to be location in the supply chain and the competitiveness of the particular product market. On competitiveness, it appears from Table 3 that the least lean plants are in the most competitive product markets. This is consistent with the story on product complexity; the most competitive product markets are for commodity products, generally the simplest products, which can often be produced in a single operation (such as a single press or injection molding machine). Location in the supply chain seems to affect supplier leanness primarily as a function of the coercive power of mega-prime contractors and the knowledge they can offer. Thus, many of the systems producers are overrepresented in the leanest plants in part because of the more intense pressure, and better knowledge, they receive from the mega prime contractors. Those further upstream appear to receive less direct pressure, presumably as a function of their distance from the mega primes. A final important part of the story is the embeddedness of customer-supplier relations, which creates space for variation in organizational form and performance, at least for non-commodity suppliers.

Ultimately, the sources of variation that appear to be most important have to do with managerial strategic orientation, workplace culture and politics. The following section shows that competitive pressures are rather blunt at the level of particular

organizational routines, around which cultural and political issues revolve. In the remainder of present section, I focus on strategic orientation and satisficing. Variation in this regard is partly individual, having to do with the distribution of managerial skill – including vision and aspiration – but there is also a structural aspect, namely, as argued in the previous sections, that there is institutional space for variation in the form and performance of suppliers.[12] The argument of the concept of lean enough is twofold: these factories are lean enough for both internal plant management and for their industrial customers. Although far from having the capabilities of a learning lean plant, the lean enough factories are surviving and profiting. The main pressures in their competitive environment are not for world-class technical efficiency but simply for valorization sufficient to a satisfactory cost, quality and delivery performance. The institutionally-infused competitive pressures to adopt the normative model of lean are conditioned by the more direct pressure – felt on the shop floor – for valorization. Managers do have serious technical intent, but valorization remains their guiding principle, so normative, coercive and mimetic pressures for rationalization are refracted by the micro-institutions of organizational life. Overall managerial vision and aspiration are central and, as I now turn to show, learning lean production control and continuous improvement require workers engaged in intellectual and managerial work; some managers do not feel the need or desire to devolve responsibility or deal with the associated labor issues.

[12] The implication of variation in managerial labor and institutional space for variation is that the typical firm, likely to be beset with organizational problems, is indeed middling. If anything, my sample is probably biased toward the better firms, as the most low-road or problematic firms are probably less likely to allow researchers access.

Managerial vision of lean: Comprehensive, complementary or selective.—Nearly all of the managers I spoke with had a good understanding of the normative model of lean production, including the specific goals and practices associate with it. However, many managers had a particular vision of how lean would look in *their* factory. The sources of such variation in managerial orientation are many and may often be of a personal, psychological or stylistic nature. In some cases a vision that falls short of the normative model of learning lean may be a sophisticated understanding of a particularly delicate organizational equilibrium, but in my observations it was often some combination of experience with the problems of widespread change and a moderate aspiration level.

The learning lean approach is exemplified by Mini Metalfab, a small job shop. Mini Metalfab, a factory with an ambitious management team emerging as lean gurus, has implemented a comprehensive system of complementary lean practices. After sending the entire workforce to "Lean 101" training, they have instituted lean methods throughout the shop, including standardization and quality-at-the-source disciplines. Having implemented truly continuous flow throughout the factory, their inventory and production control has come a long way from what management described as the "chicken coop" method, where workers were able to do whatever they wanted in whatever order. A hallmark of a learning lean factory characterizes Mini Metalfab: ongoing, system-wide use of value stream mapping to see continuous improvement in work flow on the shop floor. Indeed, Mini Metalfab has begun to apply value steam mapping to their office procedures.

Management at Mini Metalfab has embraced and implemented the full array of lean practices. Only eight of the 24 supplier plants either had a similarly comprehensive

lean system or a vision of such they were actively working to implement. Nine of the factories approached lean as a toolbox from which practices can be selectively drawn. One such plant, Tubefab, has implemented some cellular-type structures along with inventory and batch size reduction. They have done some isolated value stream mapping, leading them to implement some quasi-cells (e.g., welding behind a bender), but they still retain a press department and a fabrication department. Like other lean enough plants, Tubefab did a major one-off plant reorganization, but does not have plans to continually use value stream mapping as an ongoing tool for continuous improvement.

At Tubefab, the technical obstacles to completely transforming into a product-focused organization with dedicated cells – the size of the presses, different efficient batch sizes, etc. – are enough to convince management to not pursue re-layout further. Because of lack of true work cells they have had trouble envisioning teams and, unlike most of the learning lean plants, they have not even considered complementary HR practices such as contingent compensation systems such as pay for knowledge or pay for performance. Management at Tubefab began implementing lean practices because of pressures from industrial customers and from their parent company. Their primary emphasis has been on setup reductions to aid with reduced batch sizes, quality at the source, and marginally-improved workflow. Their approach to lean is to adopt discrete practices and integrate them into their existing system. Rather than brining in consultants or conducting an extensive information search, as some managers do, management at Tubefab appears satisfied with their existing practice in many areas. And why shouldn't they? With the changes they have made, quality, delivery and organizational flexibility have all been improved. They are satisfying the requirements of their industrial customers,

so they do not face any serious external pressures for radical change. Tubefab is lean enough for plant management and for its industrial customers. Even with this limited and selective approach, lean enough factories are able – through varying combinations of selective lean practices, technological sophistication, and dedication from workers, engineers and managers – to satisfy the requirements of their customers in terms of price, quality and delivery, and so the pressures for them to get leaner will remain largely internal.

The intermediate type, lean standardization, is exemplified by Hydraulic Systems. Hydraulic is distinguished from the lean enough Tubefab in virtue of its more complementary approach to lean practices. Although Hydraulic does not have formal work teams, they do have informal work teams in the work cells, as well as offline teams that are periodically engaged in a range of lean disciplines for standardization and quality, including all of those in Figure 1, with the important exception of pull/*kanban*. Hydraulic also has a multiskilled and engaged workforce that is systematically improving its work flow. However, Hydraulic is differentiated from the learning lean Mini Metalfab in that it has not implemented, and does not have plans to implement, truly continuous flow. Work is organized into cells, but the operations in the cells are still scheduled independently based on a bill-of-materials system and there is little communication between the work cells. It's push-pull hybrid, where the customer order triggers production, but the work is still pushed through the shop (albeit in small batches with highly rationalized production flow). Further, employee involvement at Hydraulic is periodic and informal, versus regular and substantive at the learning lean plants.

To be clear, it is not that managers taking a lean enough or lean standardization approach are lazy or stupid. The issue is that they are real human beings working in a highly complex, high pressure, often ambiguous context. Settling for good enough in such a context is certainly understandable; managers seeking radical change must contend with forces of organizational inertia (Hannan and Freeman 1984), including embedded organizational routines and conflict over individual and organizational goals, both of which are addressed in the following section. To overcome these obstacles requires an above-average aspiration level and a high level of tenacity.

Product routing and production control: continuous flow versus improved flow.—A core ideal of lean production is often stated as "one piece flow," referring to a situation in which a customer order triggers production, leading to the manufacturing and/or assembly of a product in batches of one. The idea is to completely eliminate batch processing, with all its buffers that can hide defects and obscure their source, and instead make each product by completing the entire set of operations required for it in sequence – in contrast to the traditional method of running large batches, with all operations isolated in time (by inventory) and space (by department) from each other. In practice, manufacturers generally aim for continuous flow in small batches.

Ideally, continuous flow is controlled through what the Japanese call *kanban*, a system of inventory and production control. Where it is properly implemented, a product-focused sequence of operations, usually in a cell, can be scheduled at a single point, with all operations connected by simple visual signals – *kanban* – rather than being scheduled independently based on a forecast. The signals may be a card with part numbers and lot

sizes or other visual signals such as a bin. When customer demand triggers production, the assembly station sends a card or bin to the upstream operation indicating what types of parts are needed and how many. That station then finds out what it needs to complete its operation and sends a card or bin to its upstream operation, and so on.

True continuous flow – where a closed sequence operations is controlled via *kanban* – is very difficult to implement and maintain. True continuous flow is what lean advocates, and critics, have in mind when they discuss the independence and fragility of the system, which can generate continuous improvement by immediately exposing problems in the system – and can also be a source of frustration and stress for workers that are under-trained, under-resourced and/or not interested in intellectual labor. Eight of the factories I observed are actively working toward implementing continuous flow controlled by *kanban*, and only a few of these have successfully done so throughout their shop. One of these is Second Tier Specialist, a maker of industrial cylinders. After more than two years of continuous value stream mapping, Second Tier converted their entire plant – a job shop, no less – into three work cells. Second Tier got help with its cells and continuous flow from its parent company. This help was crucial but far from sufficient to guarantee the successful implementation of continuous flow controlled via *kanban*. Plant management faced serious resistance from the workforce, who initially viewed lean production, small batches in particular, as an assault on their own efforts to work efficiently, which were focused on maximizing output on a single machine. The *kanban* part was perhaps a bit easier for these workers than others, because they were used to working to customer demand (rather than to forecast). But the small batch sizes were problematic. The plant manager, however, is highly ambitious and persistent. He took a

very methodical and long-term approach, working with union-friendly consultants, slowly trying to bring the workforce on board.

A sharp contrast to Second Tier Specialist is Metalfab Plus. Despite beginning a major restructuring around the same time as Second Tier, Metalfab Plus has not come along nearly as far as Second Tier. Upper management at Metalfab Plus sought to transform their factory into a lean organization, and they hired new plant manager to guide the transformation. He was faced with a daunting task: the business had historically grown in phases, with physical capacity added in chunks, resulting in an extremely disjointed layout; often the machines were not even placed in the correct department. As the plant manager explained, "when you're busy and your growth is quite substantial, you just put the piece of equipment in wherever you can get it in." The plant contained hundreds of machines, had haphazard product routings and relied heavily on individual knowledge to coordinate production and get products out the door.

With such a situation, initial attempts at rationalizing the layout would yield large performance improvements. A cross-functional team was put together to improve the workflow, and after a couple of months of value stream mapping they came up with a new plan and began to implement it. When I first visited this plant, the president of the company told me that their major re-layout was "90% complete." They had moved to point of use storage, implemented some cellular-type structures – lasers feeding to press brakes and then to welders – and were doing some occasional setup reduction events. In short, Metalfab Plus had improved their flow, but they were far from implementing continuous flow. It was not as though continuous flow was off their radar; indeed, they had implemented some *kanban* inventory and production control in a few isolated areas.

The plant manager estimated that about five to ten percent of their products were on a *kanban* system. But the rest of the plant was quite far from even approximating any sort of continuous flow and the plant manager explicitly indicated that he didn't think they would be able to implement *kanban* inventory and production control in much of the factory. There are two primary reasons why Metalfab Plus has decided to not push forward toward continuous flow controlled by *kanban*. First, *kanban*-controlled continuous flow requires that workers be engaged not simply in intellectual labor – problem solving – on the line, but that workers are actually capable of regular decision-making, that is, of managerial labor. This manager had experience problems in the past, and viewed the prospects dimly of having most of the workforce involved in intellectual and managerial labor on the line. Second and closely related, with the marginal improvements to flow that had been made, and a dedicated workforce good at executing their physical responsibilities, the manager perceived little need to forge ahead; his factory is lean enough. Why make the effort of extensive training in problem-solving and decision-making, and take the risk of devolving managerial authority, for an uncertain outcome? Moving toward more systematic or truly continuous flow was a road full of potholes and perhaps a crater or two. Management considered their plant re-layout more or less complete and was not actively considering additional – let alone, regular and ongoing – use of the value stream mapping tool. The strategic orientation of upper management was focused on marketing and accounting, while plant management had already seen dramatic performance improvements, creating a situation in which change takes an incremental form.

LV Gaskets, which exemplifies the lean standardization approach, is more similar to Second Tier in that its management views value stream mapping as an ongoing process. When I first visited Gaskets, they had identified five value streams for the year and were working through their first one. What distinguishes this approach to product routing/work flow from the lean enough cases is not simply regular use of value stream mapping, but that LV Gaskets uses the mapping tool in a much more sophisticated way. In this more systematic approach, management collects data – on part numbers, product families, production volumes and so on – and analyzes this data to pinpoint bottlenecks and problematic areas for cycle time and queue time. This contrasts with the more intuitive approach taken by lean enough managers, where marginal improvements to flow are made based on experience, hunches, and so on.

The lean standardization approach, however, falls short of the learning lean approach to work flow in that while systematically improving work flow, it does not take the final, fundamentally-different step of implementing continuous flow (cellular) production controlled by *kanban*. Now, LV Gaskets is unique among the five lean standardization plants in that its workforce is organized into highly autonomous work teams. The other four lean standardization plants have a determined focus on standardization that is consistent with viewing the workforce largely as a source of physical labor, which can give ideas for process improvement but otherwise need not be involved in intellectual or managerial labor.[13] In contrast, Gaskets adheres to a rather progressive personnel policy of the parent corporation in which workers are allowed to do things their own way. The reasoning is that so long as they are comfortable with their

[13] As is often the case, there are often exceptions to this general statement, such as with the case of Hydraulic Systems, where the union workforce does engage in occasional, informal substantive employee involvement.

own routine and paid well, most workers will try to do things as well as they can. Thus, there is some tension between this autonomy and the extreme standardization inherent in many lean methods, including setup reductions and the *kanban* system. Gaskets has a well-functioning system of autonomous teams in "focused factories" with systematically improved flow, but work is still scheduled based on forecasts and each operation is controlled based on a traditional work order and bill-of-materials system.

But ambivalence toward fully-fledged continuous flow also stems from having to deal with a range of technical complexities in the high pressure factory environment. As the plant manager explains

> one-piece flow, to a large extent here, is a dream. Primarily because we're in a situation where – oh, I'm going to guess – let's say I've got 8,000 pieces of tooling, okay? I've got presses that were purchased anywhere from 1945 to 2004. … So as a result, you could only do so much with single-minute exchange of dies and things like that. So, a one-piece flow isn't practical for us.

I asked about aiming for continuous flow rather than one-piece flow, but the plant manager still thought it was simply too complex to put the effort it, given the good performance of the existing push-pull hybrid system. After considering the balance of organizational pressures and needs, as well as organizational and personal costs, this manager decided against further standardization and *kanban* control.

Continuous flow controlled via *kanban* is perhaps the defining characteristic of a world-class lean organization. My research indicates that continuous flow with *kanban* control, necessary for a truly demand-driven, pull system, is the most complicated of the lean methods and hardest to institutionalize in the organization. It is, in a sense, the final

step of lean. But because the highly-fragile continuous flow system requires intellectual and managerial labor on the line, the majority of the factories I visited had not made any serious efforts in this regard. A lean guru would argue there is no “final step” in lean because it is, as self-described “leanies” like to say, a journey. But “continuous improvement” is not always continuous.

Continuous improvement: systematic versus incremental.—Continuous improvement is a core lean goal. Indeed, setup reduction, work standardization, value stream mapping and so on are supposed to be used regularly as tools for continuous improvement. But, again, how continuous improvement is interpreted varies. Lean is envisioned by some as a process of what I will call systematic continuous improvement – the regular, ongoing use of lean tools to continuously uncover problems – where as for others continuous improvement is incremental – occasional use of lean tools to deal with specific problems as they arise.

Designer Railings is a learning lean plant engaged in systematic continuous improvement. Management at Railings has given the workforce extensive training in basic lean concepts and offers multiple opportunities for participation in decision-making and problem-solving. Workers are organized into online teams in their work cells or departments. Like other learning lean plants, the key reason why management at Railings has implemented systematic continuous improvement is not only that envisions lean production as system of complementary practices for continuous improvement, but also that it views workers as capable of intellectual and managerial labor. Management initiated lean restructuring with the view that workers are a potential source of tacit

information and creative ideas and this view was verified as restructuring continued apace. In contrast, management at Deep Stampings views lean as set of complementary practices, but with a very technical emphasis.

For Deep Stampings, a lean standardization plant, lean is a set of methods for improving work flow and standardizing work. Management does not view workers as particularly important to the process of continuous improvement. Regular operators are involved in standardization efforts focused on keeping their work area clean and orderly, but they are not involved in things like setup reduction. Efforts to improve work flow have not altered job content, so there has not been much change for workers. Indeed, their toolmakers, who still spend a lot of time on the floor helping with setups, are the primary source of continuous improvement. Toolmakers engage in continuous improvement in two ways. As journeymen they are involved in designing tools. And as apprentices they circulate widely through the different processes in the plant to get new perspectives on old routines. To the extent that the circulation of apprentices is a regular activity, it may be somewhat more than incremental continuous improvement. But it is not systematic in the same sense of regularly convening cross-functional teams into offline meetings to do brainstorming and problem-solving.

Spindles & Machining, a small nonunion supplier, illustrates the lean enough approach. The owner/manager of Spindles sees lean primarily in terms of reduced batch sizes and product-focused work organization, although its work flow has been leaned up by intuitive, informal means. The factory does not have any formal work teams, cross training or continuous improvement events, but the manager said that all of this does take place at an informal level. He indicated that his plant was small enough, and operating

effectively enough that he did not see the need to formalize these things. But this ensures that continuous improvement at Spindles is incremental. Workers are encouraged to make suggestions for improved work, but this will happen only if there is an apparent problem. Likewise, the skilled machinists do informal continuous improvement activities, but again primarily when a problem presents itself and, fundamentally, problems are less likely to surface – for both lean enough and lean standardization plants – than in learning lean plants that have implemented highly interdependent and fragile continuous flow.

Heterogeneity in Common Lean Practices

The foregoing placed heavy emphasis on managerial orientation, variation in which stuck out in my field work as of elemental importance. Managerial satisficing is a fact of organizational life. In the previous section I highlighted one aspect of satisficing, differences in framing and vision. In this section I want to add a second aspect of satisficing, aspiration level. Turning here from viewing lean as a system to examining specific lean practices, I aim to highlight the broader causal context of implementation – the cultural and political issues revolving around workforce routines – in order to further examine the sources of polymorphic implementation. The previous focus on managerial orientation highlighted aspects of the structural context that allow, and sometimes generate, organizational heterogeneity: institutional space for variation, different managerial visions, and environmental complexity and uncertainty, including mixed signals. These structural characteristics of the environment are related to the problems of implementation that I turn to discuss now in the following way: the institutionally-infused technical pressures that managers face do not penetrate down to the level of

organizational routine. At this level, the most immediate pressure that managers feel is for labor valorization. Beyond using labor in the most productive way – as conceived by each particular manager – and getting the organizational routines to be functional, there are no direct pressures forcing managers to continually improve any particular routine.

[TABLE 4 ABOUT HERE]

Table 4 presents different outcomes and causal contexts regarding three lean practices: The design of work cells, teamwork and staffing practices, and employee involvement. Looking at the top section of Table 4, the implementation of work cells was impeded in each of the three cases largely by cultural issues associated with existing routines. Industrial Pumps is forging ahead to implement continuous flow, while the other two plants remain satisfied with improved flow. At Industrial Pumps, the central issue was conventional understandings that have developed within the workforce. As the plant manager explains

> We do want to get to the one-part flow in time. Something that makes it more difficult for us is the shared equipment, shared resources. We still struggle with the mental aspect of it too, that we could pull things through the shop. Everybody still gets really stuck on the fact that we don't make maybe more than two of the exact same part number in any one day. And people just feel that, because we're not making 50 identical lawnmowers all day … there's a little bit of difference to everything that we do and a lot of shared resources. We have that mental hurdle to get over.

What this manager refers to as “mental hurdles” are referred to by other managers as “mindsets” or, in the words of the plant manager at Designer Railings, the “cultural issues we are impaling ourselves on right now.” Conventional understandings can become very durable. Even where workers appear to understand the abstract principles of lean continuous flow – after a “Lean 101” training, for instance – in practice the conceptual frameworks they use to interpret their work experience can be rather rigid. A related problem at the other two plants was that workforce habits had become embedded in existing routines. While closely related cultural issues, these are distinct: conventional understanding is mostly conceptual and may more easily turn political; habit is more unconscious.

It both cases, overcoming conventional understandings or embedded habits, to transform old routines and establish new ones, takes managerial commitment and persistence. High levels of managerial aspiration are part of the reason that Industrial Pumps is still actively working toward continuous flow while the other two plants are satisfied with improved flow. Closely related to aspiration level is managerial view of workers. Management at Industrial views workers as able to self-manage, and this view is a central reason why management is forging ahead. Management at the other two plants, in contrast, views the workforce as mainly a source of physical labor, and so it does not have the motivation to methodically work to overcome the embedded habits and push toward more systematically improved flow. What at first appears to be a simple issue of understanding a new set of technical procedures – building according to *kanban* ticket rather than work order – turns out to involve a broader set of interrelated understandings

and dispositions, and it requires workers to be trained and given resources to engage in self management.

Turning to staffing practices, the middle section in Table 4 displays three different outcomes. Second Tier specialist is working toward self-directed teams, but is having problems with cross training, while Hydraulic Systems has effectively implemented self-directed teams. A central difference in these two cases is that the union workforce in the latter has been quite collaborative, while in the former the union workforce has mobilized a political resistance around their conventional understandings of how the work should be organized. Part of the resistance management has faced is due to a history of antagonistic labor-management relations in this union shop. Where managers and management scholars see an opportunity for participation in decision-making and problem-solving, workers in this plant see another management fad and/or an attempt to manipulate the workforce. As in other plants I observed with a history of acrimonious labor-management relations, these workers feel that management's profit drive often comes at the expense of product quality, something important to the workforce. In plants without such histories, workers often see mainly an opportunity for increased stress and responsibility without additional pay.

Struggling with the issue of cross-training, the existing 50 plus job classifications proved to be a major stumbling block for Second Tier management. Many of the older operators prefer to run only one machine, as they have always done. There are also problems with workers still thinking in terms of machine-level efficiency – part of the Fordist institution of functional, large-batch production – rather than in terms of product-focused cells and overall flow. This situation contrasts greatly with Hydraulic Systems.

Systems is also a union shop with highly detailed job classifications, but they get "very few issues … about everybody wears three hats. People on our machines can run three different machines; people that build systems can also do maintenance, they can also go run a test scan; you know, they can in some cases run a machine." The difference between Specialist and Systems, a difference that is leading to distinct formal structures and informal practices, stems largely from differences in the history of labor management relations and managerial practice: Systems management has a good relationship with the union, in contrast to Specialist, which has a history of acrimonious labor-management relations, including previous management initiatives that have left a sour taste in the mouths of many in the rank-and-file. Two important mechanisms determining levels of resistance and reticence among the workforce, then, are *managerial approach* – careless or cautious, rushed or deliberate – and *how workers frame or assign meaning* to new practices.

The problems with cross training at Second Tier are matters of normative understanding obstructing the implementation of what are ostensibly straightforward operational routines. In many of the plants I visited, the Fordist understanding of efficiency, being a worker responsible for maximizing output on a single machine, has settled over many years into a durable routine. Divisions of labor solidify into expectations of whose work it is and how it should be done, making work reorganization highly problematic. The Fordist understanding contrasts with the lean model of working in small batches based on customer demand, rather than making large batches from forecast. In contrast to these two plants, Metalfab Plus has retained largely traditional staffing practices. Management at Metalfab Plus has been unable to expand the job

responsibilities of the workforce, not because of resistance or reticence, nor because new concepts are incompatible with current understandings, but because workers fail to take ownership and thus slip back into old routines. As the plant manager explains, workers have done some cross training, but without formal requirements this has not translated into the voluntary job rotation he hoped for:

> When you have 180 people, how do you maintain it? That's where you come into the difficulty with cross training. You have to almost – I hate doing it – document things to make sure they do what they're supposed to. Because otherwise it's six months and then they forgot about what they got trained on.

In this case, the managerial view of labor again plays a key role. Here the issue is not simply that management thinks labor is incapable of intellectual work or self management, but rather than getting from here to that point would take an enormous amount of training and effort, all of which is unnecessary given that the plant is lean enough. Documentation is part of the broader lean emphasis on standardization, but it is inconsistent with this manager's implicit view of workers as able individuals who generally want to do a good job, but who are most productive in their traditional roles.

Finally, the bottom section in Table 4 shows three different outcomes regarding employee involvement. Employee involvement at Second Tier is regular, whereas it is occasional at Industrial Pumps and dysfunctional at Custom Seats. Here all the management teams have high ambition and view workers as able and motivated to self manage. The key source of differentiation in this case is the workforce orientation. In the case of Second Tier Specialist, with a high level of craft pride in the union workforce, management has been able to see regular employee involvement in continuous

improvement, driven by workers. While Industrial Pumps has taken the same approach, they have not been able to see worker-driven employee involvement because of their very reticent, non-union workforce. As the plant manager explains, these workers

> will basically do what you tell them to do. You know … they're not going to go stick their necks out and give you a bunch of good ideas. And, you know, that's unfortunate, it's the nature of manufacturing sometimes; you've got people that just want to be told what to do. … you get an occasional idea from them … But not, you know, they're not going to come out and offer you five or six different ways to improve.

An engineer from Industrial responds, posing the problem more bluntly: "They're not going to come out and say, 'Can we tear my work area up and move stuff around because I think it would be better this way.' They'll just be like, 'When are they going to come fix my area?' And wait, and wait, and wait." And this reticence, of course, is exactly what management does *not* want.

Such reticence can be a source of serious frustration for management, particularly where they attempt to implement a learning lean system. Even though the much of union workforce at Specialist has been quite resistant to, or at least reticent toward the lean restructuring, the workers have a high degree of craft pride in their work and as a result are showing a high level of interest in participating in problem-solving teams. Continuous improvement events at Specialist are very regular through the shop. In contrast, Industrial Pumps has had only few major continuous improvement events that were driven by upper management. At Specialist, continuous improvement events are increasingly driven by cell leads – a union position – on a regular basis, in part as a function of, and complement to, informal work teams that are beginning to form in the cells. In contrast, at Industrial

there have been a few high-profile events focused on setup reductions and standardization but, beyond this there has been little in the way of regular use of problem-solving teams. At Industrial, substantive participation has been limited to two enthusiastic employees and management has not been able to bring more workers on board.

Finally, management at Custom Seats has worked very hard to engage the workers in decision making and problem solving. Workers have been given ample training, and management has hired a very expensive, union-friendly consultant who has the clout of having worked with the Harley-Davidson plants in Milwaukee, well known for their high degree of union and employee involvement. Custom Seats has a management team with high aspiration levels but has simply been unable, after nearly five years, to get workers in certain parts of the plant to accept new responsibilities associated with new work roles and continuous improvement activities. While some areas are highly successful others remain dysfunctional. Despite management having given repeated training and authority to communicate with any experts in the plant, one worker in a dysfunctional area complains that:

> have these brainstorms, where everything looks good on paper. And then they'll set it up that way and then they'll just leave. And then they'll expect the people that are in that cell to make it work, but it's like, you just give us half the stuff, you're not there to see it all the way through to the end.

The new responsibilities for problem-solving and decision-making are seen by the workers as managerial responsibilities. Much of the workforce has simply not been able to get past this understanding, and with the problems they have encountered during

managements early attempts to implement change, these conventional understandings have solidified into political positions. At first, management at Custom tried to make the changes on paper and did not pay close attention to workforce concerns and dispositions. Now, despite having learned and taken a more methodical approach to training, management continues to face serious resistance from a considerable portion of the workforce.

DISCUSSION

Lean production has been institutionalized in American manufacturing as the normative management model, being widely adopted by high-profile multinational corporations, business associations, and manufacturing consultants. It has diffused widely throughout the sector, being adopted by manufacturers large and small, at all levels of the supply chain in a wide range of industries. The competitive environment of U.S. manufacturing, however, is institutionalized in complex and uneven ways. Consistent with the rationalization vein of neoinstitutional theory, (DiMaggio and Powell 1983), lean has been spread throughout the field by means of coercion, norms and professional networks. The legitimation vein of neoinstitutional theory has highlighted the issue of whether an institutionalized practice looses technical value as it gains symbolic value (Meyer and Rowan 1977; Westphal et al. 1997). In the U.S. case, institutionalized lean production has retained technical value, and manufacturing organizations remain tightly coupled despite the institutionalization of the field. I highlighted three distinct levels, so to speak, of institutionalization. Lean has been institutionalized as the normative model among American management. At the same time, the broader field is also characterized by

competing institutional myths – lean exists as a panacea for some and, for others, an enemy of labor. Finally, customer-supplier relationships are embedded in a variety of ways allowing institutional space for variation in the form and, indeed, performance, of supplier factories.

Technical pressures for cost, quality and delivery remain strong, but have become institutionally-infused; everywhere they turn, manufacturers see lean production as the best way to achieve their technical goals. Yet, supplier factories often receive ambiguous and mixed signals – for instance, to focus on outcomes or process, or on short-term performance or long-term capability. As such, managers must interpret and process institutionally-infused competitive pressures.

Turning to implementation, I find that lean is implemented in a variety of forms. What are experienced as strong isomorphic pressures are filtered through the micro-institutional organizational context to result in polymorphic implementation. Twenty-two of the 24 supplier plants I observed consider themselves lean, but they vary systematically in how lean has been approached and implemented. The key micro-institutional processes generating this organizational heterogeneity are variation in managerial strategic orientation and the political and cultural issues associated with transforming old routines and establishing new ones. At the level of organizational routine, which is the basis of organizational capability, the institutionally-infused competitive pressures to adopt the normative model of lean are rather blunt. Satisficing managers, who vary in both vision and aspiration, have room to selectively alter and upgrade routines. Ultimately, with limited and selective adoption of lean practices, managers can see considerable performance improvements. By implementing marginal to

moderate improvements selectively using lean methods, managers can get their organizations lean enough – for both their own organizational aspirations and for the performance expectations of their industrial customers.

When managers do attempt to make significant changes in organizational routines, they may face cultural and political resistance from the workforce. Culturally, managers may face conventional, durable understandings associated with existing practices and also habits embedded in existing routines. Politically, they may fact overt resistance or, more common in the cases presented here, reticence from the workforce. The central issues with the workforce did not include work intensification or managerial control as such, but the broader issue of labor effort. Specifically, managers in postfordist organizations face a valorization problem, namely, whether labor is used most productively for physical output, intellectual contributions, or self-management on the line. Managers varied in how they view the best role for labor and, in turn, labor varies in how it reacts to new responsibilities and opportunities for intellectual or managerial labor. Some managers do not feel the need or desire to devolve responsibility or deal with the associated labor issues.

Organizational Political Economy: Labor Process, Institutional Environment, Valorization

I have sought to provide an explanation for the polymorphic implementation of lean production in American manufacturing – variation in managerial strategic orientation, including the view of labor, and the social context of implementation. This immediately begs two questions: why does heterogeneity matter, and why lean production?

Organizational heterogeneity matters for two reasons. First, it shows that organizations are neither efficient, automatic processors of technical demands nor passive manipulators of symbols. Rather, they are staffed by ordinary humans, many of whom try their hardest but few of whom even attempt to approximate the heroic, relentless, systematic information processing assumed in mainstream economic models. From the perspective of economic theory, most firms are likely very technically inefficient (see Vidal 2008). But my research suggests this inefficiency, an outcome of random variation in managerial vision and the *social* context of implementation, may be the natural state of things. All the management theorists and consultants in the world cannot reduce this variation and ratchet up the ambition levels of the tens of thousands of managers operating the tens of thousands of manufacturing plants in the U.S. manufacturing field.

Second, and closely related, examining environmental pressures, interpretation and implementation of strategy highlights theoretical issues central to understanding not only the labor process as such, but also markets and institutionalization. It shows that markets are not necessarily highly-disciplinary mechanisms, that institutionalization is constitutive of stable market interactions, and that information and organizational capability have characteristics of a public good. Organizational learning in the manufacturing field is a thoroughly embedded process (Herrigel 2004). For most small to mid-sized supplier plants, the decision to adopt lean practices is generally not based on a hyper-rational, systematic evaluation of available alternatives. In addition to the central role of institutions in diffusing lean production, the institutional environment – in the form of external sources of capability and expertise, such as with industrial customers or consultants – plays a central role effective organizational upgrading, particularly for the

small to mid-sized organizations in the supplier sector, which more closely approximate the neoclassical model than the multinational behemoths, like Toyota, that provide het institutional basis for so many important innovations. In Schumpeterian fashion, innovation comes from individuals and groups in organizations –and other spaces sheltered from competition (Lester and Piore 2004) – not from organizations in competition. Market discipline is not a panacea.

But why lean production in the first place? The story here seems to be one of technical practices, as they evolve over time, being bundled into an institutionalized model. Lean production consists of a package of best practices that have been developed over time, diffused and marketed by through institutional mechanisms from coercion to networks to norms. In this way, lean can be defined as a demand-driven production system that bundles a complementary set of technical disciplines for flexibility, quality, and learning, within a common framework. There are powerful structural and technical forces which have required a system of demand-driven production that achieves efficiency with flexibility (e.g., internationalization and fragmentation of product markets, technical growth). Lean production is an institutionalized model that has united, and helped to develop and diffuse, a set of technically-effective practices.

In uniting the analysis of institutionalization and implementation, I have sought to reconstruct institutional theory on a foundation of a reconstructed labor process framework. The reconstruction of labor process theory has three aspects. First, rather than focusing on managerial control, I have highlighted the broader environmental context, with the process of valorization being seen as central to linking the internal organizational context with the external environment. Second, I have elaborated and

operationalized a satisficing model of managerial orientation, focused on vision and aspiration, within the labor process framework. Finally, I have articulated the problems labor effort and workplace politics and cultural using the concept of organizational routine. This framework has provided analytical leverage into the problems of implementation, including the question of whether labor will be used for intellectual or managerial work, and the problems of conventional understandings and habits embedded in existing routines.

The valorization model provides an alternative view of the capitalist market economy, which focuses analytical attention on market competition, rather than market efficiency, and makes central the analysis of short-term effects rather than long-term tendency. Most neoinstitutional theory adopts an implicit model of markets that is basically neoclassical, seeing technical environments as based in the imperatives of efficiency. Neoinstitutioanl theory and Marxian theory have a lot to learn from each other. The Marxian research program began with a specification of the abstract structural tendencies of capitalism. But the positive research program is to understand how these tendencies play out in particular social formations. Thus, institutions are seen in the Marxian model as central – constitutive of market competition – rather than as some sort of interference.

Valorization is a central organizational process, along with rationalization, legitimation and efficiency. In many, perhaps most, cases, market competition is not strong enough to overcome the forces of inertia (e.g., workplace culture, institutionalization). The pressures that managers feel most directly at the level of operational routine are simply to effectively realize surplus labor. The source of innovation is often individual and organizational, that is, leadership and organizational

resources. The capitalist market economy is a competitive struggle structured by political and cultural institutions, respectively, power and a complex social architecture of ways of thinking, doing and acting, including ideology, conceptual frames, routine, habit, and disposition. In the individualized, power-free language economists, the incentives of oligopolistic and imperfect product markets in the real world are set up to encourage a type of mediocre, good-enough satisficing, in all but the relatively rare cases where there exists atypically high aspiration and far-ranging vision. There is presumably a normal distribution of ambition in the general population and the incentives of institutional markets are not particularly strong for the modal firms.

Ultimately, the organizational political economy of lean production is polymorphic because valorization is the primary process shaping managerial strategy in competitive environments. Managers do not attempt to increase efficiency or legitimacy for their own sake. Rather, managers seek a satisfactory profit rate, which is a function of their effective extraction of surplus labor and realization of exchange value on the market. The competitive struggle is shaped in the short- and mid-term by processes of institutionalization; but institutionalization in competitive sectors remains constrained by the forces of competition, driven not by efficiency but by profit. This constraining property of the valorization process is made possible in part by the fact that institutional forces are experienced as strong but resistible pressures, not as overwhelming and totalizing forces. The Fordist model, for instance, became institutionalized and persisted for decades despite many systematically inefficient elements – such as managerial incentives for quantity over quality (Dohse et al. 1985; Forrant 2000) – yet was undercut

by Japanese producers who developed lean production as an alternative to Fordist mass production.

Just as competitive environments are institutionalized at a variety of levels, organizational environments formerly without serious competitive pressures may experience creeping valorization, such as with prisons or schools. Even in a "highly institutionalized" sector like education, there are still competitive pressures. Specifically, there are political pressures for commodification of more and more sectors – drives to privatize – as well as structural pressures, as can be seen in the commodification of water. Just as all sectors are institutionalized, they are all potentially open to creeping or rapidly-penetrating capitalist market pressures. Even if not driven by profit or competing in a cutthroat environment, organizations outside the private sector may face a peculiarly capitalist from of competitive pressure. In Marxist terms, there can be capitalist competitive pressure even on organizations not seeking profit, as organizations are forced to consider their labor process and take a quasi-surplus value approach to their wage workers. By forcing organizations composed of wage laborers into competition, the valorization process operates on ostensibly public and nonprofit sectors.

The foregoing suggests three issues for future research. First, how do managers in different fields experience and interpret environmental pressures, and how does the social context of implementation shape organizational outcomes? In this regard, issues ripe for further research revolve around the valorization problem, including how valorization pressures interact with other pressures, and how the upgrading of organizational routines are shaped by managerial approach to valorization as well as labor's understandings and reactions to attempts to transform routines. Second, more research is needed on the

specific mechanisms shaping institutionalization in competitive fields. How are technical pressures altered as they coevolve with institutional pressures? Finally, to the extent that researchers are interested in the transformation of fields rather than particular practices, future research should focus on the qualitative configuration of an organizational field. An important question in this regard is not simply what practices are institutionalized and in what ways, but to what extent and how are competitive and institutional pressures entwined (Orrú et al. 1991)? Are these pressures shaped in further ways by the structure of inter-organizational relations?

Concerns and Limitations

My analysis raises two major concerns. First is the issue of whether the diversity I find is simply a function of the finer level of analysis. My answer is that the theses of isomorphism and polymorphism are complementary. Fully understanding the outcomes of institutionalization requires examining how institutionalized practices are interpreted and implemented. Had I not examined implementation, I would not have uncovered the serious technical intent with which managers approach institutionalized practices.

A second and closely related concern is whether such diversity is durable. Will it not erode in the face of competitive pressure? My argument is that the diversity of forms of lean has important consequences for organizational performance, but my evidence for this is only anecdotal and theoretical. Qualitative analysis was necessary for uncovering important processes. But the lack of quantitative data on organizational performance is a serious limitation and will be an important task for future research. On the question of the durability of the forms, my essentially cross-sectional data are again of limited use.

However, the processes uncovered in my analysis – satisficing in supplier plants and industrial customers, extreme complexity and ambiguity of the environment, embedded customer-supplier relations shielding suppliers from intense competition – provide a considerable degree of support for my argument. Further support is provided by the fact that relatively inefficient forms, most notably Ford, GM and Chrysler compared with Toyota, have been able to exist as such for decades. Indeed, the assumption that markets are highly disciplinary is a theoretical bias, one that is inconsistent with my analysis. Sociologists should take up the charge to examine market efficiency as a hypothesis rather than an assumption.

REFERENCES

Adler, Paul. 1995. "'Democratic Taylorism': The Toyota Production System at NUMMI." Pp. 207-219 in *Lean Work: Empowerment and Exploitation in the Global Auto Industry*, edited by S. Babson. Detroit: Wayne State University Press.

Appelbaum, Eileen, Thomas Bailey, Peter Berg, and Arne Kalleberg. 2000. *Manufacturing Advantage*. Ithaca: Cornell University Press.

Appelbaum, Eileen and Rosemary Batt. 1994. *The New American Workplace: Transforming Work Systems in the United States*. Ithaca, NY: ILR Press.

Arthur, Jeffrey B. 1994. "Effects of Human Resource Systems on Manufacturing Performance and Turnover." *Academy of Management Journal* 37:670-687.

Baron, James N., Frank R. Dobbin, and P. Devereaux Jennings. 1986. "War and Peace: The Evolution of Modern Personnel Administration in U.S. Industry." *American Journal of Sociology* 92:350-383.

Becker, Markus C. 2004. "Organizational routines: a review of the literature." *Ind Corp Change* 13:643-678.

Berggren, Christian. 1992. *Alternatives to Lean Production: Work Organization in the Swedish Auto Industry*. Ithaca, NY: Cornell University Press.

—. 1993. ""Lean Production - The End of History?" *Work, Employment & Society* 7:163-188.

Bowles, Samuel and Herbert Gintis. 1990. "Contested Exchange: New Microfoundations for the Political Economy of Capitalism." *Politics and Society* June:165-222.

Braverman, Harry. 1974. *Labor and Monopoly Capital: The Degradation of Work in the Twentieth Century*. New York: Monthly Review Press.

Burawoy, Michael. 1982. *Manufacturing Consent: Changes in the Labor Process under Monopoly Capitalism*. Chicago: University of Chicago Press.

—. 1987. *The Politics of Production*. New York: Verso.

—. 1998. "The Extended Case Method." *Sociological Theory* 16:4-33.

Cappelli, Peter, Laurie Bassi, Harry Katz, David Knoke, Paul Osterman, and Michael Useem. 1997. *Change at Work*. Oxford: Oxford University Press.

Cappelli, Peter and David Neumark. 2001. "Do 'High-Performance' Work Practices Improve Establishment-Level Outcomes?" *Industrial and Labor Relations Review* 54:737-775.

Cohen, Sheila. 1987. "A Labour Process to Nowhere." *New Left Review* 165:34-50.

D'Aunno, Thomas, Robert I. Sutton, and Richard H. Price. 1991. "Isomorphism and External Support in Conflicting Institutional Environments: A Study of Drug Abuse Treatment Units." *The Academy of Management Journal* 34:636-661.

Dacin, M. Tina. 1997. "Isomorphism in Context: The Power and Prescription of Institutional Norms." *The Academy of Management Journal* 40:46-81.

Dassbach, Carl H. A. 1996. "Lean Production, Labor Control, and Post-Fordism in the Japanese Autombile Industry." in *North American Auto Unions in Crisis: Lean Production as Contested Terrain* edited by W. C. Green and E. J. Yanarella. Albany, NY: State University of New York Press.

Deephouse, David L. 1996. "Does Isomorphism Legitimate?" *The Academy of Management Journal* 39:1024-1039.

—. 1999. "To Be Different, or to Be the Same? It's a Question (And Theory) of Strategic Balance." *Strategic Management Journal* 20:147-166.

Delery, John E. and D. Harold Doty. 1996. "Modes of Theorizing in Strategic Human Resource Management: Tests of Universalistic, Contingency, and Configurational Performance Predictions." *Academy of Management Journal* 39:802-835.

Dennis, Pascal 2002. *Lean Production Simplified: A Plain-Language Guide to the World's Most Powerful Production System*. University Park, IL: Productivity Press.

DiMaggio, Paul J. and Walter W. Powell. 1983. "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields." *American Sociological Review* 48:147-160.

—. 1991. "Introduction." Pp. 1-38 in *The New Institutionalism in Organizational Analysis*, edited by W. W. Powell and P. J. DiMaggio. Chicago: The University of Chicago Press.

Dohse, Knuth, Ulrich Jugens, and Thomas Malsch. 1985. "From 'Fordism' to 'Toyotism'? The Social Organization of the Labor Process in the Japanese Automobile Industry." *Politics and Society* 14:115-145.

Doorewaard, Hans and Mark van Bijstervald. 2001. "The Osmosis of Ideas: An Analysis of the Integrated Approach to IT Management from a Translation Theory Perspective." *Organization* 8:55-76.

Edwards, R. 1979. *Contested Terrain: The Transformation of the Workplace in the Twentieth Century*. London: Heinemann.

Eldeman, Lauren B. 1990. "Legal Environments and Organizational Governance: The Expansion of Due Process in the American Workplace." *American Journal of Sociology* 95:1401-1440.

Fligstein, Neil. 1985. "The Spread of the Multidivisional Form among Large Firms, 1919-1979." *American Sociological Review* 50:377-391.

—. 1991. "The Structural Transformation of American Industry: An Institutional Account of the Causes of Diversification in the Largest Firms, 1919-1979." Pp. 311-336 in *The New Institutionalism in Organizational Analysis*, edited by W. W. Powell and P. J. DiMaggio. Chicago: The University of Chicago Press.

Forrant, Robert. 2000. "Between a Rock and a Hard Place: US Industrial Unions, Shop-Floor Participation and the Lean, Mean Global Economy." *Cambridge Journal of Economics* 24:751-769.

Frumkin, Peter and Joseph Galaskiewicz. 2004. "Institutional Isomorphism and Public Sector Organizations." *Journal of Public Administration Research and Theory* 14:283-307.

Galaskiewicz, Joseph and Stanley Wasserman. 1989. "Mimetic Processes Within an Interorganizational Field: An Empirical Test." *Administrative Science Quarterly* 34:454-479.

Graham, Laurie. 1995. *On the Line at Subaru-Isuzu: The Japanese Model and the American Worker*. Ithaca, NY: Cornell University Press.

Green, Stuart D. 1999. "The Dark Side of Lean Construction: Exploitatoin and Ideology " paper presented at the Seventh Annual Conference of the International Group for Lean Construction, Berkeley, CA.

Green, William C. and Ernest J. Yanarella. 1996. "North American Auto Unions in Crisis: Lean Production as Contested Terrain." Albany, NY: State University of New York Press.

Grenier, Guillermo J. 1988. *Inhuman Relations: Quality Circles and Anti-Unionism in American Industry*. Philadelphia: Temple University Press.

Guler, Isin, Mauro F. Guillen, and John Muir Macpherson. 2002. "Global Competition, Institutions, and the Diffusion of Organizational Practices: The International Spread of ISO 9000 Quality Certificates." *Administrative Science Quarterly* 47:207-232.

Hannan, Michael T. and John Freeman. 1984. "Structural Inertia and Organizational Change." *American Sociological Review* 49:149-164.

Harrison, Bennett. 1994. *Lean and Mean: The Changing Landscape of Corporate Power in the Age of Flexibility*. New York: Basic Books.

Haunschild, Pamela R. and Anne S. Miner. 1997. "Modes of Interorganizational Imitation: The Effects of Outcome Salience and Uncertainty." *Administrative Science Quarterly* 42:472-500.

Haveman, Heather A. 1993. "Follow the Leader: Mimetic Isomorphism and Entry Into New Markets." *Administrative Science Quarterly* 38:593-627.

Helper, Susan and Janet Kiehl. 2004. "Developing Supplier Capabilities: Market and Non-market Approaches." *Industry and Innovation* 11:89-107.

Herrigel, Gary. 2004. "Emerging Strategies and Forms of Governance in the Components Industry in High Wage Regions." *Industry and Innovation* 11.

Hodson, Randy. 1991. "The Active Worker: Compliance and Autonomy at the Workplace." *Journal of Contemporary Ethnography* 20:47-78.

Ichniowski, Casey, Thomas A. Kochan, David Levine, Craig Olson, and George Strauss. 1996. "What Works at Work: Overview and Assessment." *Industrial Relations* 35:299-333.

Kondra, Alex Z. and C. R. Hinings. 1998. "Organizational Diversity and Change in Institutional Theory." *Organization Studies* 19:743-767.

Krafcik, John F. 1988. "Triumph of the Lean Production System." *Sloan Management Review* 30:41-52.

Lester, Richard K. and Michael J. Piore. 2004. *Innovation: The Missing Dimension*. Cambridge, MA: Harvard University Press.

Levinthal, Daniel A. 1995. "Strategic Management and the Exploration of Diversity." in *Resource-Based and Evolutionary Theories of the Firm: Towards a Synthesis*, edited by C. A. Montgomery. Boston: Kluwer Academic Publishers.

Lewchuk, Wayne and David Robertson. 1997. "Production Without Empowerment: Work Reorganization from the Perspective of Motor Vehicle Workers." *Capital and Class* 63:37-64.

Luria, Dan, Matt Vidal, Howard Wial, with Joel Rogers, in collaboration with Sue Helper, Gary Herrigel, Josh Whitford, Edith Wiarda, and Jonathan Zeitlin. 2005. *'Full-Utilization Learning Lean' in Component Manufacturing: A New Industrial Model for Mature Regions, & Labor's Stake in Its Success*: Sloan Industry Studies Working Paper WP-2006-03, Alfred P. Sloan Foundation.

Luria, Daniel. 1996. "Why Markets Tolerate Mediocre Manufacturing." *Challenge* July-August:11-16.

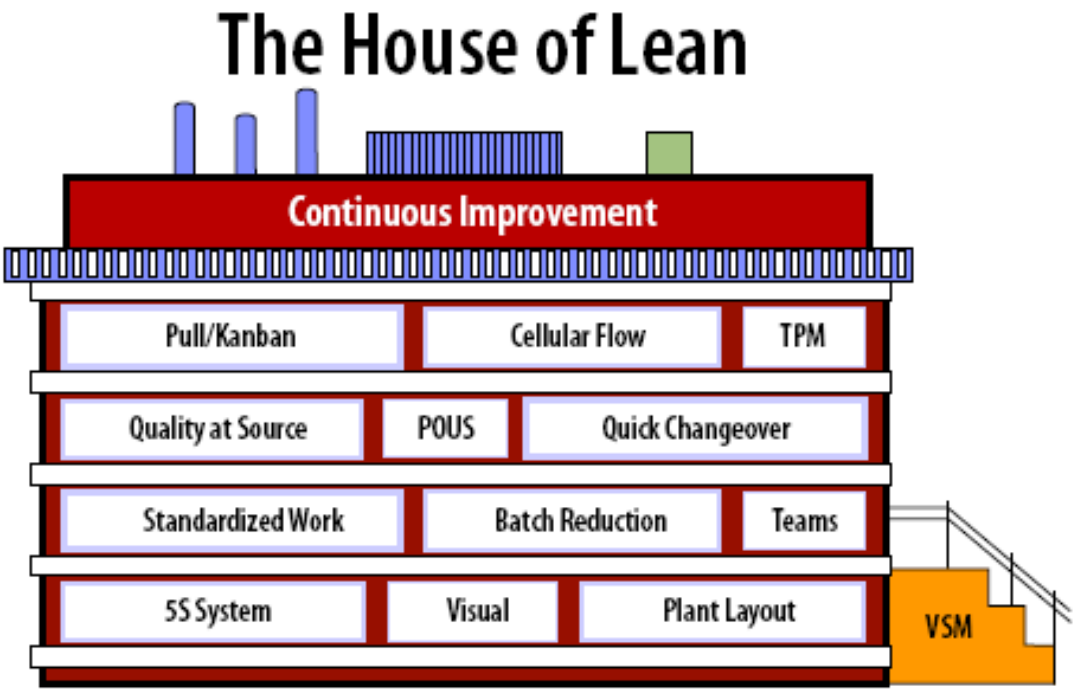
MacDuffie, John Paul. 1995a. "Human Resource Bundles and Manufacturing Performance: Organizational Logic and Flexible Production Systems in the World Auto Industry." *Industrial and Labor Relations Review* 48:197-221.

—. 1995b. "Workers' Roles in Lean Production: The Implications for Worker Representation." in *Lean Work: Empowerment and Exploitation in the Global Auto Industry*, edited by S. Babson. Detroit: Wayne State University Press.
March, James G. and Herbert A. Simon. 1993. *Organizations*. Cambridge, MA: Blackwell.
Marx, Karl. 1990 [1867]. *Capital*, vol. 1. Translated by B. Fowkes. London: Penguin.
Meyer, John W. and Brian Rowan. 1977. "Institutionalized Organizations: Formal Structure as Myth and Ceremony." *American Journal of Sociology* 83:340-363.
Mezias, Stephen J. 1990. "An Institutional Model of Organizational Practice: Financial Reporting at the Fortune 200." *Administrative Science Quarterly* 35:431-457.
Milkman, Ruth. 1997. *Farewell to the Factory: Auto Workers in the Late Twentieth Century*. Berkeley: University of California Press.
Moody, Kim. 1997. *Workers in Lean World: Unions in the International Economy*. London: Verso.
Nelson, Richard R. 1991. "Why do Firms Differ, and How Does it Matter?" *Strategic Management Journal* 12:61-74.
Nelson, Richard R. and Sidney G. Winter. 1982. *An Evolutionary Theory of Economic Change*. Cambridge, MA: Harvard University Press.
Ohno, Taiichi. 1988. *Toyota Production System: Beyond Large-Scale Production*. New York: Productivity Press.
Oliver, Christine. 1991. "Strategic Response to Institutional Processes." *Academy of Management Review* 16:145-179.
Oliver, Nick , Rick Delbridge, and James Lowe. 1996. "Lean Production Practices: International Comparisons in the Auto Components Industry." *British Journal of Management* 7:S29-S44.
Orrú, Marco, Nicole Woolsey Biggart, and Gary G. Hamilton. 1991. "Organizational Isomorphism in East Asia." Pp. 361-389 in *The New Institutionalism in Organizational Analyasis*, edited by W. W. Powell and P. J. DiMaggio. Chicago: The University of Chicago Press.
Parker, Mike and Jane Slaughter. 1995. "Unions and Management by Stress." in *Lean Work: Empowerment and Exploitation in the Global Auto Industry*, edited by S. Babson. Detroit: Wayne State University Press.
Pil, Fritz K. and John Paul MacDuffie. 1996. "The Adoption of High-Involvement Work Practices." *Industrial Relations* 35:423-455.
Post, Charlie and Jane Slaughter. 2000. "Lean Production: Why Work is Worse Than Ever, and What's the Alternative?" A *Solidarity* Working Paper.
Rinehart, James, Christopher Huxley, and David Robertson. 1997. *Just Another Car Factory? Lean Production and Its Discontents*. Ithaca, NY: Cornell University Press.
Rowan, Brian. 1982. "Organizational Structure and the Institutional Environment: The Case of Public Schools." *Administrative Science Quarterly* 27:259-279.
Saka, Ayse. 2004. "The Cross-National Diffusion of Work Systems: Translation of Japanese Operations in the UK." *Organization Studies* 25:209-228.
Schifferes, Steve 2007. "The Triumph of Lean Production." in *Globalisation Series*: BBC News.

Scott, Richard W. and John W. Meyer. 1991. "The Organization of Societal Sectors: Propositions and Early Evidence." Pp. 108-140, edited by W. W. Powell and P. J. DiMaggio. Chicago: University of Chicago Press.
Slaughter, Jane 2007. "Endorsing the Lean Machine." *New Politics* 7.
Socialist Worker. 2007. "Management by stress." *Socialist Worker online*.
Taplin, Ian M. 2001. "Managerial Resistance to High Performance Workplace Practices." *Research in the Sociology of Work* 10:1-24.
Turner, Lowell and Peter Auer. 1994. "A Diversity of New Work Organization: Human-Centered, Lean, and In-Between." *Industrielle Beziehungen* 1:39-61.
Vallas, Steven P. 2003. "Why Teamwork Fails: Obstacles to Workplace Change in Four Manufacturing Plants." *American Sociological Review* 68:223-250.
Vidal, Matt. 2007a. "Lean Production, Worker Empowerment, and Job Satisfaction: A Qualitative Analysis and Critique." *Critical Sociology* 33:247-278.
—. 2007b. "Manufacturing Empowerment? 'Employee Involvement' in the Labour Process after Fordism." *Socio-Economic Review* 5:197-232.
—. 2008. "Routine Inefficiency: Profit-Rate Satisficing in Really Existing Markets." UCLA Institute for Research on Labor and Employment.
Vidal, Matt, Josh Whitford, Joel Rogers, and Jonathan Zeitlin. 2003. *Challenges and Options for Wisconsin Component Manufacturing: Final AMP Report to the Wisconsin Manufacturing Extension Partnership*. Madison, WI: Center on Wisconsin Strategy.
Westphal, James D., Ranjay Gulati, and Stephen M. Shortell. 1997. "Customization or Conformity? An Institutional and Network Perspective on the Content and Consequences of TQM Adoption." *Administrative Science Quarterly* 42:366-394.
Whitford, Josh. 2005. *The New Old Economy: Networks, Institutions, and the Organizational Transformation of American Manufacturing*. Oxford, UK: Oxford University Press.
Williams, Karel, Tony Cutler, Colin Haslam, John Williams, Andy Adcroft, and Sukhdev Johal. 1992. "Against Lean Production." *Economy and Society* 21.
Williams, Karel, Colin Haslam, Sukhdev Johal, John Williams, and Andy Adcroft. 1995. "Beyond Management: Problems of the Average Car Company." in *Lean Work: Empowerment and Exploitation in the Global Auto Industry*, edited by S. Babson. Detroit: Wayne State University Press.
Wisconsin Manufacturing Extension Partnership 2005. "House of Lean." *Manufacturing Matters! Newsletter*, January.
Womack, James, Daniel Jones, and Daniel Roos. 1990. *The Machine that Changed the World*. New York: Rawson Associates.
Womack, James P. and Daniel T. Roos. 2003. *Lean Thinking : Banish Waste and Create Wealth in Your Corporation*. New York: Free Press.
Yanarella, Ernest J. 1996. "Worker Training at Toyota and Saturn: Hegemony Begins in the Training Center Classroom." in *North American Auto Unions in Crisis: Lean Production as Contested Terrain*, edited by W. C. Green and E. J. Yanarella. Albany, NY: State University of New York Press.
Youndt, Mark A., Scott A. Snell, Jr. Dean, James W., and David P. Lepak. 1996. "Human Resource Management, Manufacturing Strategy, and Firm Performance." *Academy of Management Journal* 39.

Zbaracki, Mark J. 1998. "The Rhetoric and Reality of Total Quality Management." *Administrative Science Quarterly* 43:602-636.
Zucker, Lynne G. 1977. "The Role of Institutionalization in Cultural Persistence." *American Sociological Review* 42:726-743.

FIGURE 1



Source: Wisconsin Manufacturing Extension Partnership (2005)

TABLE 1
INSTITUTIONALIZATION OF LEAN PRODUCTION IN THE U.S. MANUFACTURING FIELD

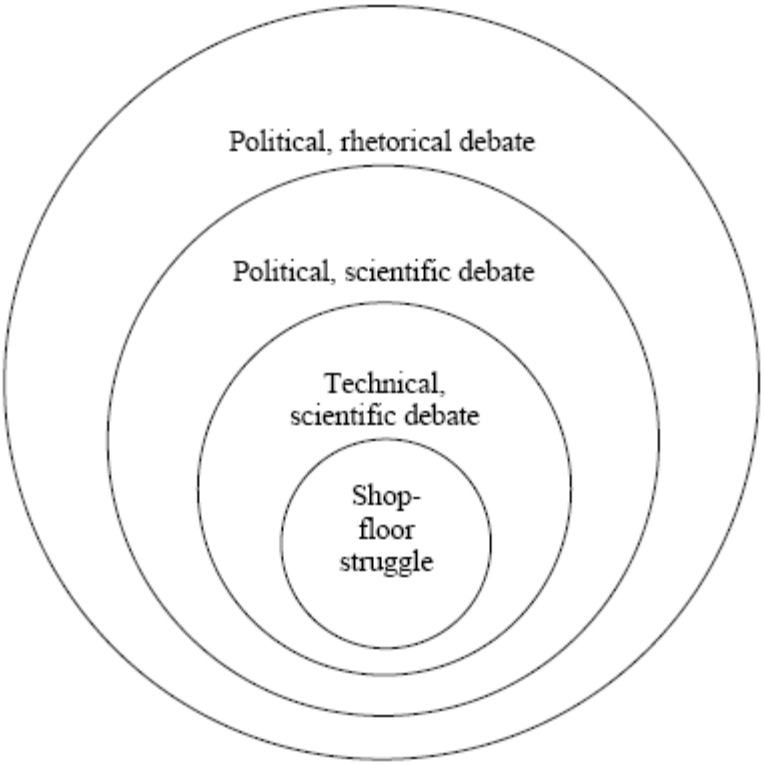
Level	Characteristics
Rational institutional myth of lean production	 Scientific debate and stereotypical rhetoric develop in relation to struggles over implementation on the shop floor. <u>Shared, contested understandings</u> Technical, scientific: One best way, one possible way, or fad? Political, scientific: Empowerment or intensification? Political, rhetorical: Panacea or enemy of labor?
Lean as normative management model	Adopted leading firms, from Toyota and John Deere to Dell and Pella Windows to New Balance and Allen Edmonds Shoe Corporation Endorsed by National Association of Manufacturers, the Society of Manufacturing Engineers, the National Association for Job Shops and Small Manufacturers, the Institute of Industrial Engineers, the Association for Manufacturing Excellence and the Manufacturing Extension Partnership Cottage industry of lean consultants
Inter-organizational relations	Embedded customer-supplier relations allow institutional space for diversity in supplier performance. Coercion from industrial customers, but mixed signals concerning outcome or process (e.g., with just-in-time subcontracting).

TABLE 2

INSTITUTIONAL SOURCES OF COMPETITIVE STRATEGY

Plants	Industrial customer	Parent company	Technical college and/or MEP	Industry association	Outside hire of lean expert	Consultants	Rational information search
1. Complex Iron Castings	X		X				
2. Custom Blinds		X				X	
3. Custom Seats	X					X	
4.Deep Stampings	X	X					
5. Designer Railings	X		X	X			
6. Hydraulic Systems	X		X				
7. Industrial Pumps			X				X
8. Inspired Castings	X		X				X
9. Lost-Foam Castings	X	X		X			
10. Major Castings	X	X	X				
11. Metalfab Plus	X		X		X		
12. Mini Metalfab	X		X				
13. LV Gaskets	X	X	X				
14. Mini OE		X			X	X	
15. Performance Brakes	X					X	
16. Plastic Containers				X			X
17. Precision Metalfab	X		X				X
18. Second Tier Specialist		X			X		
19. Spindles & Machining			X				
20. Tiny Plastic Parts			X				X
21. Tubefab	X					X	
22. Zing Castings	X					X	

Note: An X indicates a source that was highlighted by managers in my interviews; lack of an X does not necessarily mean that a plant did not also use or get pressure from a given source. MEP is the Manufacturing Extension Partnership, a publicly subsidized program providing technical assistance to small and mid-sized organizations. All plant names are pseudonyms.

TABLE 3

SYSTEM-LEVEL DIFFERENCES IN ORGANIZATIONAL LEANNESS

PLANTS	PLANT CHARACTERISTICS					SYSTEM-LEVEL DIMENSIONS OF LEAN		
	MAIN PRODUCTS	PROCESSES	OWNERSHIP	EMPL.	UNION	MANAGERIAL VISION OF LEAN	PRODUCT ROUTING AND PRODUCTION CONTROL	CONTINUOUS IMPROVEMENT
LEARNING LEAN								
1. Custom Seats	Leather and vinyl seats	Sewing and upholstery, assembly	Public, branch plant	220	Yes	Complementary package of practices – Comprehensive view	Continuous flow - Entire plant	Regular, systematic – Substantive EI with problems
2. Designer Railings	Handrail systems and parts	Stamping, machining, assembly	Private, branch	140	No	Complementary package of practices – Comprehensive view	Continuous flow - Within departments	Regular, systematic – Substantive EI
3. Industrial Pumps	Industrial pumps	Machining, assembly	German parent	82	No	Complementary package of practices – Comprehensive view	Continuous flow – Assembly; working toward entire plant	Regular, systematic – Substantive EI but low participation
4. Inspired Castings	Steel castings	Investment casting operations	Private, branch plant	650	No	Complementary package of practices – Comprehensive view	Continuous flow - Entire plant	Regular, informal – Limited substantive EI
5. Mini Metalfab	Metal fabrications	Cutting, forming assembly	Private, independent	27	No	Complementary package of practices – Comprehensive view	Continuous flow - Entire plant	Regular, systematic – Substantive EI
6. Mini OE	Wire wheels/ brushes	Assembly	German parent	105	Yes	Complementary package of practices – Comprehensive view	Continuous flow - Entire plant	Planned systematic – Substantive EI but low participation
7. Performance Brakes	Hydraulic disc brakes	Machining, assembly	Private, branch plant	350	Yes	Complementary package of practices – Comprehensive view	Continuous flow - Entire plant	Regular, systematic – Substantive EI
8. Second Tier Specialist	Industrial cylinders	Machining, assembly	Public, branch plant	100	Yes	Complementary package of practices – Comprehensive view	Continuous flow - Entire plant	Regular, systematic – Substantive EI
LEAN STANDARDIZATION								
1. Hydraulic Systems	Hydraulic systems	Machining, fabrication, assembly	Private, branch plant	200	Yes	Complementary package of practices – Mid-range view	Systematically-improved flow	Periodic – Informal EI with some substantive
2. Lost-Foam	Aluminum	Die and	Public,	180	Yes	Complementary package	Systematically-	Periodic –

Castings	engine castings	investment casting operations	branch plant			of practices – Mid-range view	improved flow	Consultative EI
3. LV Gaskets	Engine Gaskets	Blanking, closing, coating	Public, branch plant	350	No	Complementary package of practices – Mid-range view	Systematically-improved flow	Beginning systematic – Consultative EI
4. Custom Blinds	Blinds, parts	Injection molding, extrusion, stamping, assembly	Private, branch	1000	No	Complementary package of practices – Idiosyncratic view	Systematically-improved flow	Periodic – Consultative EI
5. Deep Stampings	Deep draw stampings	Stamping	Public, branch plant	300	No	Complementary package of practices – Idiosyncratic view	Systematically-improved flow	Isolated - Informal EI with limited substantive
LEAN ENOUGH								
1. Major Castings	Aluminum castings	Die casting operations	Public, branch plant	650	No	Limited and selective use; Lean as toolbox	Marginally-improved flow	Isolated – Consultative EI
2. Complex Iron Castings	Iron castings	Die casting operations	Private, independent	120	Yes	Limited and selective use; Lean as toolbox	Marginally-improved flow	Isolated – Consultative, informal EI
3. Metalfab Plus	Metal fabrications	Cutting, forming assembly	ESOP, independent	450	No	Limited and selective use; Lean as toolbox	Marginally-improved flow	Isolated – Consultative EI
4. Plastic Containers	Plastic containers	Thermoforming	Private, independent	220	No	Limited and selective use; Lean as toolbox	Marginally-improved flow	Little, informal
5. Precision Metalfab	Metal fabrications	Cutting, forming assembly	Private, independent	135	No	Limited and selective use; Lean as toolbox	Marginally-improved flow	Isolated, management driven
6. Spindles & Machining	Spindles, hubs	Machining, assembly	Private, independent	30	No	Limited and selective use; Lean as toolbox	Marginally-improved flow	Little, informal – Consultative, informal EI
7. Tiny Plastic Parts	Plastic parts	Injection Molding	Private, branch plant	400	No	Limited and selective use; Lean as toolbox	Marginally-improved flow	Isolated – Consultative EI
8. Tubefab	Mufflers, air filters	Stamping, bending, painting,	Public, branch plant	150	No	Limited and selective use; Lean as toolbox	Marginally-improved flow	Isolated – Consultative EI

		assembly						
9. Zing Castings	Zinc castings	Die casting operations	Private, branch plant	32	Yes	Limited and selective use; Lean as toolbox	Marginally-improved flow	Isolated – Consultative EI
LARGELY TRADITIONAL								
1. Discrete Stampings	Stampings	Stamping, some machining	Private, independent	100	No	Considering lean for plant layout	Traditional	Isolated, management driven
2. Powder Coaters	Painting	Painting	Private, independent	60	No	Lean mostly not applicable because of continuous-process technology	Not applicable	No

Note: EI stands for employee involvement.

TABLE 4

MICROINSTITUTIONAL SOURCES OF HETEROGENEITY IN LEAN PRACTICES

	DESIGN OF WORK CELLS		
Plant	Industrial Pumps	Metalfab Plus	Tubefab
Outcome	Actively working toward demand-driven continuous flow	Improved flow, with isolated continuous flow	Improved flow, no continuous flow
Causal Context	*Workforce orientation:* Conventional understandings w/ reticence *Mgt. view of workforce:* Able and motivated to self-manage *Mgt. ambition*: High	*Workforce orientation:* Habit embedded in existing routines *Mgt. view of workforce:* Physical labor, some mental *Mgt. ambition*: Moderate	*Workforce orientation:* Habit embedded in existing routines w/ reticence *Mgt. view of workforce:* Physical labor *Mgt. ambition*: Moderate
	TEAMWORK AND STAFFING PRACTICES		
Plant	Second Tier Specialist	Hydraulic Systems	Metalfab Plus
Outcome	Actively working toward self-directed teams, problems with cross training (with standardization and continuous flow in place)	Self-directed teams (but without standardization or continuous flow)	Traditional staffing, problems with cross training
Causal Context	WORKFORCE ORIENTATION: Conventional understandings w/ resistance MGT. VIEW OF WORKFORCE: Able and motivated to self-manage MGT. AMBITION: High	WORKFORCE ORIENTATION: Collaborative workforce MGT. VIEW OF WORKFORCE: Able and motivated to self-manage MGT. AMBITION: Moderate	WORKFORCE ORIENTATION: Habit embedded in existing routines MGT. VIEW OF WORKFORCE: Physical labor, some mental MGT. AMBITION: Moderate
	EMPLOYEE INVOLVEMENT		
Plant	Second Tier Specialist	Industrial Pumps	Custom Seats
Outcome	Regular EI in CI, driven by workers	Occasional EI in CI, driven by management	Dysfunctional devolution of responsibilities
Causal Context	WORKFORCE ORIENTATION: Craft pride MGT. VIEW OF WORKFORCE: Able and motivated to self-manage MGT. AMBITION: High	WORKFORCE ORIENTATION: Reticent MGT. VIEW OF WORKFORCE: Able and motivated to self-manage MGT. AMBITION: High	WORKFORCE ORIENTATION: Resistant and hostile MGT. VIEW OF WORKFORCE: Able and motivated to self-manage MGT. AMBITION: High

Note: EI stands for employee involvement; CI for continuous improvement. Workforce orientation refers to the specific practice in question.