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## **Organizational learning: Bringing the forces of production back in**

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### **Abstract**

Under the influence of the 'communities of practice' perspective, research on organizational learning has lost sight of the role of science and technology. As a result, theory development in this field too often takes archaic work forms as its starting point. Based on a structural and materialist interpretation of Marx, this paper proposes an alternative approach that theorizes organizational learning as an outcome of contradictory processes in which the productive forces are progressively socialized, albeit unevenly. This approach leads to a very different perspective on tacit/explicit knowledge, work formalization, identity formation and the roles of managers and engineers. This structural-Marxist theory of organizational learning offers a more fruitful account of learning in technologically advanced, competitive sectors such as the manufacturing and process industries. Increasingly, it also applies to private and public service provision.

### **Keywords**

organizational learning, communities of practice, Marxism, capitalist rationalization.

## Introduction

In 2000, Easterby-Smith, Crossan, and Nicolini (2000, p. 784) described the heightened interest in organizational learning as a 'volcanic eruption'. In the past decade organizational learning has remained one of the most important topics within organization studies. Argyris and Schön (1978, 1996) pioneered the idea that learning can be collective, opening up space for group- and organizational-level analysis of learning. Organizational learning, including the creation and management of knowledge, is widely considered to be pivotal for firms' survival in the 'knowledge economy' (Barney, Wright, & Ketchen, 2001; Nicolini, Gherardi, & Yanow, 2003; Nonaka & von Krogh, 2009). According to Argyris and Schön (1996), organizational learning transforms the organization's pattern of activity and people's assumptions implicit in the performance of that pattern of activity. Organizational learning thus indicates systemic changes; its 'parts' (individual and group learning) are seen in relation to the 'whole' (organizational transformation). The discourse of organizational learning addresses several interrelated issues: the nature of knowledge in organizations, the nature of work in organizations, how new knowledge is developed, and the role of management.

A widely popular perspective for understanding organizational learning is the theory of 'situated learning' or 'communities of practice' (in the following abbreviated CoP). Within this perspective, organizational learning is most often analysed at the level of the work group (Easterby-Smith et al., 2000). Work groups include formal work teams, but usually informal 'communities' of workers are the locus of attention. For the purpose of this paper, the CoP position on organizational learning can be summarized in four propositions:

- (1) Much of the knowledge relevant for work is tacit in nature. Tacit knowledge is difficult or impossible to codify explicitly.
- (2) Workers' actual methods of working and division of labour typically differ from those that are formally prescribed. Performance of work depends on context-specific improvisation, which cannot effectively be pre-specified in formalized work designs.
- (3) Workers acquire the tacit knowledge they need to perform their work through a process in which they are socialized into a 'community' of workers. These socialization processes transform the workers' self identities and reproduce the community. Knowledge creation and learning are products of the collective 'reflection in action' (Schön, 1983), which takes place within and between these communities (Gherardi, Nicolini, & Odella, 1998). This reflection in action produces new tacit knowledge, improves informal work methods and rearranges the division of labour between community members.
- (4) The most productive role for management is to support and 'cultivate' these communities: let the 'natural' learning processes unfold and harvest the results (Wenger & Snyder, 2000).

CoP theory was initially proposed as an explanation of learning in handicraft apprenticeships (Lave & Wenger, 1991), but later morphed into a general theory of organizational learning (Gherardi et al., 1998; Nicolini et al., 2003; Wenger, 1998; Wenger & Snyder, 2000). Its generalization is based on the notion that 'all types of organizations [...] increasingly depend on their capacity to effectively mobilize and manage knowledge' (Nicolini et al., 2003, p. 5). However, we are not offered any convincing argument as to why the particular mechanisms associated with CoPs are the most important mechanisms of organizational learning in settings beyond handicraft.

The core argument of this paper is that the CoP literature's generalization from handicrafts to modern capitalist organizations is largely unjustified. I will demonstrate that CoP theory explains only very poorly organizational learning in capital-intensive and rationalized sectors such as the modern manufacturing and process industries. In these sectors, CoP theory may have some applicability to certain forms of white-collar work, such as product design and development, but is largely irrelevant to the companies' core labour processes. This is because capitalism as a mode of production generates tendencies which make Propositions 1–4 increasingly implausible. Insofar as capitalist rationalization also penetrates the service economy (Suárez-Barraza, Smith, & Dahlgaard-Park, 2012; Vidal, 2011), CoP theory will also be of limited relevance here. To account for organizational learning in modern capitalist organizations, I offer an alternative theoretical model based on Adler's 'structural' reading of Marx (Adler, 2007). This interpretation of Marx emphasizes how the valorisation impetus of capitalism drives a process of socialization in which collective work activity is developed through the technical division of labour and the conscious application of science and technology. Based on structural Marxism, this paper argues in favour of four alternative propositions about organizational learning in its historical development:

(1\*) As capitalism develops, explicit knowledge becomes increasingly important. Explicit knowledge tends to replace tacit knowledge.

(2\*) Formally designed work systems tend to replace the more informal organization of work. Formalized work designs can support learning.

(3\*) Capitalist rationalization erodes traditional sources of identification. The fracturing of established identities may lead to alienation, but also to the emergence of new forms of work community.

(4\*) Centrally planned reorganization of work and introduction of new technology become increasingly important drivers of organizational learning. These changes are largely prescribed by managers and technical experts.

These propositions are statements of tendencies, which are likely to manifest only partially, because their realization is simultaneously promoted and frustrated by the valorisation process (Adler, 2007). The search for short-run profits may induce capitalists and managers to withhold investments, rely on peripheral workers and intensify work without refining the labour processes (Braverman, 1974; Thompson, 2003, 2007).

The alternative Propositions 1\*–4\* are not diametrically opposed to the original Propositions 1–4. Rather, they posit that the original ones tend to lose their pertinence as capitalist industry progresses. If 1\*–4\* are valid, much current organizational learning discourse misses the mark. A preoccupation with tacit knowledge, informal work practices and traditional sources of social identity will tend to obscure (and obscure increasingly over time) how new knowledge is created as people learn to master their material environment through the applications of science, technology and conscious planning.

The paper has the following structure. The first section outlines the theory of communities of practice. In the second section, I recapitulate Adler's 'structural' interpretation of Marx. The third section discusses the implications of structural Marxism for organizational learning, presents arguments in favour of Propositions 1\*–4\* and some illustrative material, and reviews these propositions' implications. In the fourth section, I identify the boundary conditions for the structural-Marxist theory of organizational learning, and suggest some implications for future research.

### **The communities of practice perspective**

Over the years since the publication of Lave and Wenger's (1991) *Situated learning: Legitimate peripheral participation*, CoP has become a widely popular concept and its original meaning has become somewhat diluted (Amin & Roberts, 2008; Cox, 2005; Handley, Sturdy, Fincham, & Clark, 2006). Today the concept is used to refer to a broad range of related but distinct forms of group-based learning. In this paper, the concept is used in a narrower sense, closer to its original meaning (Brown & Duguid, 1991; Lave & Wenger, 1991). This is what Amin and Roberts (2008) refer to as 'task/craft-based communities': it is this theory that I have summarized in Propositions 1–4.

My return to the more precise, but more restrictive understanding of the concept is necessary for two reasons. First, it is this theory of task/craft-based communities that has been generalized in the later works of Wenger and others. Although a less restrictive understanding of CoPs probably makes it easier to support claims for universality, Wenger's (1998; Wenger & Snyder, 2000) use of the concept has remained consistent. Second, as Amin and Roberts (2008, p. 365) convincingly argue, 'the dynamics of the task or craft-based communities studied by the originators of the term seem to be barely replicated in settings of high creativity, epistemic, professional, or virtual learning and knowledge formation'. Hence, other forms of 'CoPs', such as the professional, expert/epistemic or virtual communities, are distinct forms of group-based learning which would require a separate theoretical treatment.

CoP theory was initially proposed as an explanation of learning in handicraft apprenticeships. Lave and Wenger's (1991) main illustrative cases are midwives, tailors, quartermasters and butchers. In later expositions, CoP theory has been generalized and applied to a wide range of work settings (Gherardi et al., 1998; Nicolini et al., 2003; Wenger, 1998; Wenger & Snyder, 2000). Wenger (1998, p. 11) explicitly states his intention to construct a 'general theory of learning' based on the studies of apprenticeships. In a later article by Wenger, large, bureaucratic organizations are the focus of attention: 'During the past five years, we have seen [CoPs] improve organizational performance at

companies as diverse as an international bank, a major car manufacturer, and a U.S. government agency' (Wenger & Snyder, 2000, p. 140). While Wenger has shifted focus to large organizations, other theorists of the 'practice turn' (Gherardi, 2009) continue to focus on craft-like forms of work. For instance, in Nicolini et al.'s (2003) anthology we find chapters on flute-making, roofing, cooking, organic agriculture and nursing. Theoretically, however, proponents of the CoP perspective identify no boundary conditions. Rather, the relevance of practice-based learning and knowing are justified with reference to the notion that 'all types of organizations [...] increasingly depend on their capacity to effectively mobilize and manage knowledge' (Nicolini et al., 2003, p. 5).

The core references for the theory of communities of practice are Lave and Wenger's (1991) cases of apprenticeships and Brown and Duguid's (1991) 'unified theory of working, learning and innovation', which builds on Orr's (1996) ethnography of service technicians. As shown by Cox (2005), these two texts have different foci, but their core theoretical propositions are complementary. CoP theory is positioned against the cognitivism and individualism of much classical organization theory, and in particular against the idea that knowledge, reified as a property of the individual, can be transferred through formal training. Rather, it seeks to understand 'the process through which identities, artefacts, ideologies, rules, language, morality and interest are woven together and affect each other in the process of collective learning' (Easterby-Smith et al., 2000, p. 788). Knowing and learning are situated in this complex web of relationships. Lave and Wenger's (1991) concept of 'legitimate peripheral participation' links the mastery of skills and knowledge to the development of social identity:

A person's intentions to learn are engaged and the meaning of learning is configured through the process of becoming a full participant in a sociocultural practice. This social process includes, indeed it subsumes, the learning of knowledgeable skills. (Lave & Wenger, 1991, p. 29)

The novice, peripheral participant aspires to become a full member of a particular community of practice. A community of practice is defined as 'a set of relations among persons, activity, and world, over time and in relation with other tangential and overlapping communities of practice' (Lave & Wenger, 1991, p. 98). These communities are seen as the condition for knowledge and learning, by structuring interaction and sense-making and by reproducing and developing 'noncanonical practice'. Brown and Duguid (1991) explain the centrality of noncanonical practice, by arguing that canonical practice – that is, work routines described by formal standards and procedures – is insufficient for the practical task of conducting work. Because of the 'dilemmas, inconsistencies and unpredictability of everyday life' (Brown & Duguid, 1991, p. 42), formal standards and procedures must be complemented by noncanonical practice – the repertoire of tacit knowledge and practical know-how. Noncanonical practice develops from workers' real-life experience and reflections in action (Schön, 1983). It is transmitted through storytelling within the communities (Brown & Duguid, 1991).

The CoP literature draws primarily on micro perspectives on social interaction (Gherardi, 2009). The focus is on everyday, mundane processes, and formal organization structure and design are ignored or disparaged. CoP proponents argue that the communities of practice are fragile and easily undermined by managerial attempts at formalization, standardization and rationalization (Brown & Duguid, 1991; Gherardi et al., 1998; Wenger & Snyder, 2000). According to Brown and Duguid (1991, p. 53), these

communities 'must be allowed some latitude to shake themselves free of received wisdom'. Gherardi et al. (1998, p. 294) elaborate:

Any attempt to promote and foster learning in organizations requires account to be taken of the manner in which the 'natural' process unfolds. [...] Both the division of labour and the design of the task and work process must constantly take into account their effects on the communities of practice in general, and the situated curriculum in particular. Altering the integrity of the curriculum by modifying the patterns of socialization and the criteria of inclusion, or simply overly formalizing the novices' socialization path, can produce unintended and undesirable effects.

CoP theory has been criticized for ignoring issues of power (Contu & Willmott, 2003; Roberts, 2006). First, socialization and the negotiation of practice within the communities are laden with interests and power asymmetries. Second, the development of the communities is directed and restricted by wider corporate relations of power and elite decision-making. Accordingly, if communities of practice are socially situated, they are also situated in relations of power and domination (Contu & Willmott, 2003). CoP theory has also been criticized for harnessing positively connoted words such as 'community', 'participation' and even 'learning' to a managerialist agenda of increased control over learning processes (Contu, Grey, & Örténblad, 2003; Cox, 2005; Pemberton, Mavin, & Stalker, 2007).

The critique put forth in this paper acknowledges that a theory of organizational learning should incorporate the concepts of power and discourse, but extends the critique along Marxist lines. CoP theory is limited by ignoring not only power (relations of production) and discourse (ideology) but also science, technology and the technical division of labour (forces of production). In particular, CoP theory blinds us to the impact of the development of these forces of production on work and learning processes. Cox (2005, p. 533), briefly acknowledges a tension between CoP formation and capitalist rationalization: in the sections below, I develop the critique at greater length.

### **Structural Marxism<sup>1</sup>**

Modern industry never views or treats the existing form of a production process as the definitive one. Its technical basis is therefore revolutionary, whereas all earlier modes of production were essentially conservative (Marx, 1976, p. 617).

The term 'structural Marxism' is used by Adler (2007, 2012) to designate a reading of Marx that differs from the more common conflict-centred reading, and that differs too from both labour process theory (Knights & Willmott, 1990; Thompson & Smith, 2010) and the post-structuralism prevalent in critical management studies (Alvesson, Bridgman, & Willmott, 2009). In his presentation of structural Marxism, Adler (2007) draws on Cohen's (2000) defence of historical materialism. Following Marx (1976), Cohen argues that over long historical time frames the forces of production tend to develop towards higher productivity. The forces of production consist of human capabilities and the means of production (raw materials and technology). The rate of development of the forces of production is conditioned by the

prevailing relations of production. Relations of production characterize the ownership and control of the forces of production. Under capitalism, the means of production are owned and controlled by the capitalists and their agents. Workers control their labour-power (i.e. capacity to work), but must sell this labour-power to capitalists in order to take part in production, earn wages and thereby provide for their subsistence. In capitalist society, labour-power is thus a commodity, bought and sold on the labour market. The forces and relations of production together form society's 'base', as distinct from society's 'superstructure' of law, state politics and ideology. This reading of Marx is materialist insofar as in the overall historical process – over larger social aggregates and longer time periods – causality flows primarily (but not exclusively) upwards from the forces of production to the relations of production, and from the base to the superstructure<sup>2</sup>.

The key point for my argument is that the productive forces tend to develop under capitalism, and that this development takes a form that reflects the structure of capitalist relations of production. This form of development expresses the contradictory relationship between the processes of valorisation and socialization. The valorisation process is the process in which profit is created. Competition among capitalists pushes them continually to increase the profitability of their production activities by extending the working day, intensifying work or reorganizing the labour process (Marx, 1976). According to Adler (2007) this valorisation process both stimulates and undermines the progressive 'socialization' of the labour process. The stimulation aspect predominates over the longer term: as a result, the long-term trend in the labour process is not deskilling and the degradation of work (as described, for example, by Braverman, 1974), but rather a process of socialization in which workers' skills are upgraded and the individual worker is replaced by an interdependent 'collective worker'. As Marx (1976, p. 469) wrote, 'The one-sidedness and even the deficiencies of the specialized individual worker become perfections when he is part of the collective worker'. The division of labour is redesigned without respect for traditional values and status differentiations. Traditionalistic communities, built around inherited norms and a 'mechanical' division of labour, are eroded (Adler & Heckscher, 2006). The use of machinery is the hallmark of large-scale, capitalist industry. Machinery can automate simple labour tasks, and tremendously increase productivity. The socialization of the labour process is driven increasingly by the mobilization of science. Marx (1976, p. 508) wrote, 'As machinery, the instrument of labour assumes a material mode of existence which necessitates the replacement of human force by natural forces, and the replacement of the rule of thumb by the conscious application of natural science.' Machinery and its relation to raw materials are the classical concerns of mechanical and chemical science. Developments in cybernetics and computer science have further increased our ability to automate and control the operation of machines and of interconnected systems of machines. The less exact, but still important science of work design has developed in parallel. Taylor's (1967) principles of scientific management were a major breakthrough. Japanese manufacturing has taken scientific management further, by focusing on the synchronization of tasks under just-in-time manufacturing (Fujimoto, 1999). The science of organization is of course not politically and ethically neutral – this critique is well rehearsed (e.g. Braverman, 1974; Klein, 1989) – but its rational core cannot be ignored: humanity has developed a great store of knowledge about how to organize complex integrated processes.

While valorisation drives socialization, the search for profits also distorts that socialization and fetters the development of the productive forces (Adler, 2007). As shown by labour process theorists, capitalist rationalization sometimes leads to the degradation of work as competition induces employers to rely on low-skill, low-wage employment strategies (Braverman, 1974; Knights & Willmott, 1990). Financialized capitalism generates renewed pressure for wage-based competition and re-commodification of labour through externalized employment relations (Thompson, 2003; Vidal, 2011). Simultaneously, companies have sought to intensify work through new strategies of hegemonic or normative control (Barker, 1993; Barley & Kunda, 1992; Knights & McCabe, 2000; Vallas, 2003a), in which work is intensified independent of technological advances.

Hence, in a structural-Marxist interpretation, capitalist rationalization is a fundamentally contradictory process. Valorisation simultaneously drives and fetters socialization. As a corollary, capitalist rationalization will have contradictory outcomes for organizational learning.

### **Organizational learning as viewed through structural-Marxist lenses**

The implications of structural Marxism for organizational learning were summarized in the four alternative Propositions 1\*- 4\* presented in the Introduction. In this section, I explain and justify these propositions. These propositions designate tendencies whose effects may or may not be salient in any specific organization. As I see it, these tendencies reflect the 'causal power' of socialization, where the concept of causal power is one I take from critical realism (Bhaskar, 1978, 1979) as the 'philosophical underlabourer' to Marxism (Collier, 1998; Joseph, 1998):

Critical realism argues that the social world is structured in a certain way and that it contains dominant generative mechanisms which exert a powerful influence over the social formation. Critical realism can happily point out that society is founded on basic material relations and operates through material production, appropriations and labour. From here it is a short step to a Marxist analysis of the specific form of these basic relations. (Joseph, 1998, p. 84)

The asymmetrical interaction of society's base and superstructure generates tendencies that conjoin to create the flux of events we experience (Fleetwood, 2001; Reed, 2005). Different tendencies may influence or counteract each other, so there is no one-to-one correspondence between tendencies and empirical observations. Propositions 1\*-4\* summarize the socializing tendencies of the capitalist mode of production. Although dominant in the long run (Adler, 2007), they give only a partial account of the actual trajectory of capitalism. Theoretically, their realization is limited by counter-tendencies – in particular, by the ways in which socialization is fettered by valorisation pressures. The socializing tendencies can be undermined or distorted by short-run profit pressures, such as when productive work collectives are dismantled during economic and financial crises, or when work is outsourced to undermine unions rather than to benefit from the emergence of new competencies in specialized branches of industry, or when unproductive work systems are retained at the whim of despotic supervisors.



Moreover, as shown in the literature on comparative political economy (e.g. Deeg & Jackson, 2007; Smith & Meiksins, 1995), national and regional institutions influence how the fundamental tendencies of capitalism combine to manifest empirically. These effects further complicate the relationship between the underlying tendencies and actual historical trajectories. While acknowledging national and regional differences, this paper is concerned with the general tendencies of the capitalist mode of production which operate at a deeper layer of causality (Adler, 2007; Collier, 1998). Hence, the paper does not make strong claims about the short-run realization of those tendencies. Such claims would require extensive empirical enquiry and are therefore beyond the scope of this paper.

However, in the following paragraphs, alongside my theoretical exposition of Propositions 1\*-4\* I offer empirical examples to illustrate how these tendencies make themselves felt. The examples are drawn from the manufacturing and process industries. These are technologically advanced, capital-intensive business sectors producing commodities for a deregulated global market.

*Proposition 1\*:*        *As capitalism develops, explicit knowledge becomes increasingly important. Explicit knowledge tends to replace tacit knowledge.*

The forces of production develop through the application of science. Scientific knowledge is explicit and analytical; complex phenomena are reduced to simpler parts and explained by a set of logically related statements (Elster, 2007). Similarly, complex transformation processes can be analysed and optimized as sequences of less complex steps. This is the ‘science’ of scientific management (Taylor, 1967). Through careful time and motion studies, workers’ tacit knowledge is measured, analysed, refined and codified in explicit procedures. While practice theorists are right that accumulated experience and purposeful reflection in action (Schön, 1983) refine work routines in important ways, ‘externalization’ of this tacit knowledge in explicit, codified form makes it far more powerful as a productive force. First, explicitness allows for rational comprehension and improvement of work tasks. Second, explicit knowledge is far easier to transfer across different contexts. While direct transfer of tacit knowledge requires the ‘master’ and ‘apprentice’ to work closely together over time, externalization of knowledge in work routines and training manuals allows the knowledge to be transferred more rapidly and on a greater scale (Adler & Cole, 1993). Third, explicit knowledge can be synthetically combined to create new knowledge about more complex processes (Nonaka, 1994). Such combination is required for system-wide rationalization (see Proposition 2\*).

Even more important than rationalizing manual labour, science transforms the nature of work through machinery and automation. The tools used in the labour process are thereby socialized: they are no longer only the fruit of locally-accumulated tacit craft knowhow, but increasingly shaped by humanity’s accumulated body of explicit scientific knowledge. This ‘technization of work’ has been a megatrend in Western industries (Barley, 1996). The use of machinery and ICT put new demands on workers’ knowledge – drawing workers too away from reliance on tacit craft skills towards increasing reliance on scientific and engineering knowledge. This is one of the main results from Kern and Schumann’s (1984) study of German industry in the 1980s, and various more recent studies (see Adler,

2007; 1992, and the citations therein). Up-skilling does not mean the re-emergence of craft; rather, it means a new kind of professionalization, where theoretical knowledge is integrated with practical know-how:

The need for theoretical competence is rather high – too high, at least for getting trained on the job. What is necessary is professional training in the form of a modernized apprenticeship. [...] The high-skilled blue-collar workers we are looking at integrate different traditional areas of expertise. They are less material-oriented; the greater part of their qualifications concerns technical and organizational procedures. (Kern & Schumann, 1987, pp. 162-163)

Kern and Schumann (1987, p. 162) note that 'empirical knowledge, gained by working with machinery and materials, remains relevant', but their research clearly shows that the main tendency is the increased importance of theoretical knowledge. Barley (1996) makes a similar point: contextual knowledge and sensitivity to local idiosyncrasies remain important, but technical work requires increased knowledge of mathematics, science and technology; that is, a formalized body of knowledge. As such, Proposition 1\* does not imply that tacit knowledge is removed from the labour process altogether. Tacit knowledge and its direct refinement through individuals' hands-on experience continue to play a role as the raw material of scientific rationalization (Nonaka, 1994). Rather, Proposition 1\* states that the relative importance of explicit knowledge is increasing, as work is systematically analysed and transformation tasks are automated.

On the other hand, the valorisation impetus also tends to limit the scale and scope of the expansion of explicit knowledge. Machinery, training of workers and creating an infrastructure for managing knowledge require investments. Short-run cost pressures induce management to withhold those investments and rely instead on low-skill (and low-wage) labour even when productivity may suffer as a result (Bacon & Blyton, 2000; Thompson, 2003). In those cases, management might continue to rely on informal work organization and workers' tacit knowledge, and seek to maintain profits by intensifying work. This can be done coercively under threats of closure or off-shoring, or normatively, when workers internalize managerialist definitions and values (Barker, 1993; Vallas, 2003a), inducing them to work harder.

A likely result of these combined mechanisms is that the expansion of explicit knowledge takes an uneven form. Explicit knowledge about work processes may be monopolized by the few, and turned against workers as an alien and alienating force, for instance, when scientific management replaces craft work with simple operations, when machinery is designed for fool-proofing rather than to leverage workers' capabilities, or when the workforce is segmented into core (high-skill) and peripheral (low-skill) employees (Adler, 1992; Braverman, 1974). In all these cases, there is a real expansion of explicit knowledge, but this expansion is reserved for a limited number of employees (core employees, industrial engineers, machine designers, etc.).

One illustration of Proposition 1\* comes from the mechanical industries, where, over the last decades, manually-guided machine-tools have largely been replaced by CNC (computer numerical control) machining for the shaping of metal parts. When working with manually-guided machine-tools,

workers primarily rely on their tacit knowledge about the tools and materials. Their knowledge is embodied in their movements. In a CNC machine, the physical transformation of the raw material is automated. Machine operators interact with the machine – and, indirectly, the raw material – through a computerized interface. Thus, workers are confronted with an abstract and symbolic representation of the raw materials and the transformation process. The tacit knowledge required for the actual physical transformation of the material is now codified and embedded in the machine, based on the combined technical knowledge of machine designers, part programmers, and shop-floor workers. Shop-floor CNC workers enter commands, write and edit part programs and interpret the machine's physical and symbolic feedback. These are primarily cognitive and theoretical tasks, relying on the workers' considerably expanded repertoire of explicit knowledge (Bartel, Ichniowski, & Shaw, 2007).

A second illustration comes from my fieldwork in an aluminium-smelting plant. The modern smelting process (building on so-called 'prebake' technology) takes place in large, closed furnaces. Operators' main operational tasks are periodically to supply raw materials, remove finished products and monitor the process. Monitoring means measuring key process parameters and taking regulatory action when deviations occur. Regulation of the furnaces is complex for two reasons. First, key process parameters, such as temperature, pressure, voltage and volumes, are related in non-linear ways. This implies that there is no simple one-to-one relationship between a deviation and a regulatory action. Second, feedback loops following regulatory actions are often very slow to materialize. As one informant explained, an error in the placement of the anode may not be observed as a process deviation until 20 days after the misplacement occurred. It follows that operators, in order to interpret deviations and take regulatory action, must have an elaborate theoretical understanding of how the furnaces work and how they will respond to changes in control parameters, taking time lag into account. They must be able to run computer simulations in order to predict the consequences of possible actions. Conversely, the relatively minor role of tacit knowledge is no less striking: in this setting, it is impossible to rely on tacit knowledge or an intuitive 'feel' of how the furnaces will respond – explicit theoretical models relating to process parameters are required. According to the HR manager of the plant, the introduction of prebake technology was followed by a major training program for operators. General numerical and computer skills had been raised. About two-thirds of the workers now hold a formal, non-company-specific skill certificate. In addition, the company had invested heavily in e-learning. E-learning makes possible the transfer of de-contextualized, theoretical knowledge relating to the operation of furnace technology.

Both these illustrations show the increasingly important role of explicit knowledge in automated and semi-automated settings. In both cases, the operators' hands-on experience of tools and raw materials is progressively displaced by computerized, symbolic interfaces. Manipulation of these symbolic interfaces (programming, process controls) requires explicit theoretical models of the transformation process.

*Proposition 2\*:*            *Formally designed work systems tend to replace the more informal organization of work. Formalized work designs can support learning.*

In the early handicraft industries of the nineteenth century, work was organized informally and coordinated by traditional norms (Adler & Heckscher, 2006). The rise of the factory system, with its detailed technical division of labour and the use of machinery, created enormous challenges for coordinating different sub-processes. As described by Marx (1976), the capitalists' answer to this challenge is to take control of the labour process in order to ensure that efforts were more systematically directed towards the goal of profitable production. Herein lies the genesis of professional industrial administration and industrial bureaucracy. Critical sociologists have for long recognized the dual function of industrial bureaucracy (Adler, 2012; Gouldner, 1954). On the one hand, bureaucratic formalization and standardization are means to subordinate labour and reproduce capital's domination in the sphere of production; this is management by discipline. On the other hand, bureaucratic formalization and standardization are techniques for coordinating interdependent tasks; this is management by expertise. As such, bureaucracy is simultaneously an instrument of the class struggle and a productive force (Adler, 2012).

Labour process theory highlights the first of these functions and its inherent social antagonism. A large body of literature deals with managerial control strategies and workers' resistance responses – that is, how the labour process becomes a contested terrain (e.g. Ackroyd & Thompson, 1999; R. Edwards, 1979). Formalization, standardization and hierarchical authority are forced upon recalcitrant labour in order to intensify work and undermine craft workers' control of the labour process.

While acknowledging this social antagonism, structural Marxism departs from LPT by highlighting as equally important the socializing tendencies of bureaucratic rationalization. Most scholars, both critical and mainstream, agree that bureaucratic structures are good at harnessing the productive forces on a large scale<sup>3</sup>. As Weber noted, bureaucratic organizations are more predictable, reliable and efficient than their traditional counterparts. Although managerial techniques such as time studies and process standardization may be perceived as alien forces by the individual workman, they dramatically raise the productive power of labour as a collective activity. Despite contemporary tendencies for horizontal and vertical disintegration of large companies and conglomerates, bureaucracy remains the dominant organizational form for coordinating operations when they grow beyond the entrepreneurial scale (Adler, 2012; Walton, 2005).

The argument developed here is that bureaucratic rationalization, in addition to harnessing the existing forces of production, tends also to develop those forces. Organizational learning does not necessarily rely only on craft or more informal forms of work organization, as argued in CoP literature. Rather, organizational learning can also be stimulated, organized, given more scientific direction, assured more cumulative advances, and indeed routinized under bureaucratic administration. Organizational learning is fundamentally about developing the organization as an interdependent system (Argyris & Schön, 1996); but if learning is managed only informally and enacted only locally, important system-level improvement opportunities are typically lost. When local practices are systemically interrelated, improvements that seem locally optimal may not be optimal for the overall, compound process. The development of the collective labour process requires an equally collective learning process. As emphasized by Nonaka (1994), middle managers can orchestrate these collective

learning processes by structuring flows of information and aligning shop-floor activities with strategic priorities.

One example of the positive relationship between formalization and organizational learning is found in the better implementations of lean production (Adler & Cole, 1993; Fujimoto, 1999), where it has given rise to what can be described as a 'learning bureaucracy' (Adler, 1993) or an 'enabling bureaucracy' (Adler & Borys, 1996). In these systems, work is highly standardized, but the standards are objects of continuous refinement by a set of hierarchically organized improvement groups with broad participation from blue-collar workers, as well as active engagement from technical staff personnel.

Another example of bureaucratic learning mechanisms can be drawn from the smelting plant referred to above, where a version of lean production had been implemented. According to plant management, productivity and quality at the plant were fundamentally a function of 'process stability', meaning that the furnaces continuously produced output with sufficient quality. Machine breakdowns and quality deviations were the main threats to operating results. Management's approach to creating process stability was that of modern quality management (Dean & Bowen, 1994): 'what you do not control, you cannot improve'. Here 'control' does not mean 'control of labour' (P. K. Edwards, 1990), but rather control over the production system in a cybernetic sense (Achterbergh & Vriens, 2010), meaning that production plans could be realized without deviations. To achieve control and arrange for improvements, management had defined a company-specific production system. In a formal manner the production system defined: (a) the roles in each work team, including responsibilities for operations, maintenance and continuous improvement; (b) the interfaces between the different work teams (volumes, quality, and delivery times); (c) standard operating procedures; and (d) a toolbox for analysis and improvement of work flow. In interviews, managers, workers and engineers all described the new production system as more 'formal and bureaucratic' compared to earlier work practices at the plant. While some workers pointed to the constraining nature of the standard operating procedures, the general attitude was more positive: 'responsibilities had been clarified'; 'there were fewer production "crises"'; 'less re-work'; and 'fewer safety hazards'. Organizational learning at the plant tended to follow systematic procedures like 'value stream mapping' or 'network analysis'. Typically, a group of workers led by a process engineer or a 'continuous improvement champion' would analyse a sub-process with respect to material handling, processing time and waiting time. Based on experiments with different arrangements, 'best practice' would be codified as an operating procedure. Refinement of the standards was the responsibility of a hierarchy of improvement groups. Work-station standards were regularly revised by groups of blue-collar workers along with more skilled technicians. Compound processes, such as inter-departmental logistics, were the responsibility of permanent specialist groups. In these latter cases, calculations were made based on detailed knowledge about the sub-processes, as codified in the operating procedures.

This example illustrates the mechanism linking socialization, formalization and organizational learning. Process stability is achieved through process standardization, and that standardization is facilitated by the formalization of organizational roles and responsibilities. This formalization represents socialization insofar as it makes visible and public knowledge what was previously either absent or local and private; and when processes are formalized, system-wide improvement is accelerated. These results

run counter to the CoP thesis that learning is best facilitated when workers rely on tacit knowhow and enjoy extensive discretion and autonomy (e.g. Brown & Duguid, 1991; Gherardi et al., 1998).

Some commentators argued that the up-skilling and re-professionalization of work found by Kern and Schumann would obviate the need for formalization and standardization and would lead to greater worker autonomy (see Schumann, 1998). Consistent with the socialization argument, however, Springer (1999, p. 135) argues that:

Professionalism does not arise from self-organized improvisation when directly working on (assembling) the product, but from cooperating in creating process stability throughout the flow of production. Optimization of individual work stations is only part of a comprehensive system optimization by reducing system complexity, or at least, by making it controllable via standardization.

In a recent case study of manufacturing, Ingvaldsen and Rolfsen (2012) show how extensive individual and group autonomy tend to upset the organization's capacity to identify and implement system-wide improvements. Taken together, the re-professionalization of work implies neither a rejection of managerial techniques, nor a re-emergence of informal work organization.

Proposition 2\*'s focus on socialization does not deny the fettering effects of valorisation pressures. Citing numerous U.S. case studies, Vallas (2003b) and Vidal (2007) show that the 'learning bureaucracy' is seldom fully realized. Technocratic management rationalizes production systemically through formalization and calculation, but allows only very limited participation by the workforce. Hence, lean production tends to collapse into internally contradictory forms of neo-Taylorism, in which work continues to be a contested terrain. In Bacon and Blyton's (2006) case studies, workflow analysis and joint worker-management problem solving became a highly political issue when management used the results as the basis for layoffs. Shop-floor power struggles and emerging patterns of indulgency may lead to bureaucratic forms where rules and procedures are neither respected nor enforced (Ezzamel, Willmott, & Worthington, 2004; Gouldner, 1954). Theoretically, the realization of the 'learning bureaucracy' potential seems to be contingent on a social compromise of union-management partnership or other forms of participative governance (Adler & Cole, 1993; Vallas, 2003b), which may be harder to establish in the context of financialized capitalism and externalized employment relations (Thompson, 2003). On the other hand, since 'high road' forms of lean production have been shown to boost productivity more than its neo-Tayloristic counterpart (Bacon & Blyton, 2000; MacDuffie, 1995), we might expect their gradual, rational adoption.

The empirical evidence shows contradictory forms of bureaucratic rationalization. As predicted by Propositions 1\* and 2\*, organizational learning is supported by formalization and the development of explicit knowledge, but the broader professionalization of work is unevenly realized.

*Proposition 3\*:*            *Capitalist rationalization erodes traditional sources of identification. The fracturing of established identities may lead to alienation, but also to the emergence of new*

*forms of work community.*

Following Giddens (1991), we can understand identity as a reflexive narrative of self. Identity reduces existential anxiety by bridging past, present and future. As we have seen, Lave and Wenger's (1991) concept of legitimate peripheral participation intimately links learning with identity development. Indeed, the latter subsumes the former (p. 29), so the processes are inseparable. When individuals learn new skills and become members of communities of practice, they also secure existential continuity by becoming midwives, tailors, quartermasters, etc. Identity is linked to an established division of labour and established means of production.

Structural Marxism, in contrast, emphasizes the tendency of capitalism to continuously revolutionize the labour process. Changes in the labour process give rise to new tasks, new work roles and new skill requirements. Knowledge that was personal and local becomes externalized and universal. Under such conditions, how can work-related identity emerge? The answer of classical sociology is that it cannot: when traditional bases of identification (craft, profession, particular tools and skills) are destabilized, people cannot form stable identities and instead experience anomie (Durkheim) or alienation (Marx). Cohen (1974) argues that under pre-capitalist forms of work, there is an organic unity between the labourer and the instruments of labour. This provides people with readymade identities, handed down from previous generations. With the rise of capitalism, this unity is broken. Under the real subordination of labour, exchange-value takes precedence over use-value in fact and in consciousness. Confronting each other as buyers and sellers of labour power, 'it matters neither to the labourer nor to his employer what concrete labour is performed. Each cares only about how much exchange-value he will obtain from its performance' (Cohen, 1974, p. 246). While workers may be able to construct identities as consumers, wielding their purchasing power to assemble consumer goods in a way that expresses some kind of identity, their work-life affords no such opportunity for identity construction since the concrete labour they perform is rendered so contentless. Scholars of identity have called attention to the way that late capitalism renders identities more fluid and fractured (Giddens, 1991; Thomas, 2009). In some cases, management has attempted to exploit this insecurity by strategies of normative control or 'cultural engineering' (Barker, 1993; Casey, 1999; Kunda, 2006). In particular, notions of 'teamwork', 'participation' and 'quality' have been harnessed to serve ideological functions (Findlay, McKinlay, Marks, & Thompson, 2000; Vallas, 2003a). Empirical studies of normative control have highlighted workers' contradictory or resistant responses. Workers refuse to accept management's definitions of their work situation or point to the gap between rhetoric about participation and autocratic practice (Knights & McCabe, 2000; Vallas, 2003b).

While acknowledging this tendency for alienation and contested identities, Adler (2007) argues that the development of capitalism also generates a progressive tendency of 'subjective socialization'. As the forces of production become socialized in an objective, technical sense, workers come to see themselves as part of an interdependent labour process, part of the 'collective worker' (Adler, 2007, p. 1322). This subjective socialization enables the creation of labour process communities in which people consciously coordinate their collective effort (Adler & Heckscher, 2006; Adler, Kwon, & Heckscher, 2008). These communities are different from the traditionalistic, conservative, parochial communities of

the pre-capitalist workplace: capitalist development encourages the emergence of a distinctive, 'collaborative' kind of labour-process community. Marxists have traditionally argued that this new kind of community can come about only with the end of the capitalist mode of production (e.g. Cohen, 1974). Adler (2007), on the other hand, sees its development 'in the womb' of the current mode of production.

This development is not only driven by the valorisation impetus, but simultaneously fettered by it, in particular when rationalization creates new divisions of the workforce and new barriers to large-scale cooperation (Adler & Heckscher, 2006, pp. 64-65). At the shop-floor level, externalized employment relations and individual incentives plans undermine trust and promote individualistic behaviour. Furthermore, even when the forces of production are socialized in an objective sense, there is no direct path to subjective socialization. As with other workplace changes, objective socialization may trigger shop-floor politics and a renegotiation of power between groups of workers and managers (Vallas, 2003b; Vidal, 2007). Prerogatives of middle managers and specialists may be threatened, and these groups may as a result try to buttress their power by monopolizing the tools of advanced bureaucratic rationalization, as discussed in relation to Propositions 1\* and 2\*. Only in the long run, and under strong external pressure to perform (Adler & Borys, 1996), should we expect the collaborative form of community to be realized.

This complex relationship between socialization, learning and identity can be illustrated by the relationship between the machine operator and the maintenance worker in contemporary manufacturing. This example is drawn from my research in a Norwegian automotive supplier. Traditionally, maintenance and repair workers enjoyed special status due to their unique knowledge of the production machinery (see also Crozier, 1964, for a similar, much older case). The operational departments were highly dependent on their competence, and one production manager even described the maintenance manager as 'the strong man of the plant'. The status and power of the maintenance department were reflected in a proud 'maintenance worker' identity. The maintenance personnel perceived themselves to be somewhat superior to the 'ordinary production workers', who were just 'told what to do'. Correspondingly, machine operators would often refuse to have anything to do with machine maintenance, because their job was 'to produce parts, not to fix the equipment'. Even simple maintenance tasks such as oil replenishment were 'left to the reps', even though the machine operators were competent to perform them. Motivated by the need to increase the overall equipment efficiency (reduce downtime of machines), management decided to implement so-called 'total productive maintenance' (TPM). TPM meant that many of the simpler repair and maintenance tasks were transferred to the machine operators. In addition, workers became more directly involved in machine set-ups and changeovers. Through a participatory process involving machine operators, maintenance personnel and first-line managers, routines for maintenance and changeovers were developed for each work station. Finally, maintenance personnel such as electricians and skilled mechanics became permanently assigned to the operational departments, creating what management labelled 'multifunctional teams'.

These changes can be interpreted as socialization of the knowledge of the maintenance personnel and as an instance of organizational learning. However, this process did not reinforce established identities or reproduce existing communities. On the contrary, the distinction between



maintenance worker and machine operator – the basis of (dis)identification – was blurred. The machine operator now performs maintenance work without ever becoming a ‘maintenance worker’. The maintenance worker is likely to perceive these changes as an attack on his status and autonomy (see Ackroyd & Thompson, 1999). When knowledge is socialized, the power balance between the two groups is altered. At the plant, maintenance personnel voiced some resistance, but nevertheless recognized that something had to be done to improve equipment efficiency if the company hoped to remain a ‘preferred supplier’ to major European automotive companies. Some workers also complained about work intensification, since the ‘TPM tasks’ had been added to their ‘ordinary work’ without any extra compensation. On the other hand, new arenas for interaction between maintenance workers and machine operators may be the genesis of a new kind of collaborative community. While in the ‘old days’ machine operators were ordered to ‘clean the floor or do other tasks’ when the maintenance workers arrived, now the two groups collaborate to decide on maintenance standards and the appropriate division of labour between them. Although the new forms of ‘teamwork’ and ‘cooperation’ were imposed by management, they set in motion the subjective socialization of the two groups.

*Proposition 4\*:*            *Centrally planned reorganization of work and introduction of new technology become increasingly important drivers of organizational learning. These changes are largely prescribed by managers and technical experts.*

By now it should be obvious that structural Marxism attributes a much more active role to management and technologists than is acknowledged by CoP theory. Workers’ local reflection in and on practice (Schön, 1983) leads to learning, but these efforts rarely lead to revolutionary changes in production’s technical base; such learning processes cannot account for the extraordinary technological dynamism of advanced capitalism. To understand this dynamism, our theory needs to recognize the role of centralized planning. According to Nonaka (1994, p. 29), ‘the role of top and middle management for knowledge creation [...] has been almost neglected in traditional accounts of managerial structure’ – and, I would add, in CoP theory.

The critical role of central planning is visible, for example, in the introduction of just-in-time logistics. Such a systemic change does not come about through piecemeal adjustments at each workstation. Central planning is also critical in the design of machinery where engineering staffs play a pivotal role. In manufacturing, specialist functions such as production engineering and industrial engineering often have the main responsibility for preparing the organization for making new products. Their effort in turn drives local learning, since it dictates which new skills and what new knowledge operators are required to master.

My point here is not to make managers and industrial engineers the heroes of progress and development. Voluntarily and involuntarily their efforts promote socialization, but simultaneously they alienate labour and pursue their own sectional interests. The real contradiction between valorisation and socialization is reflected in the contradictory functions of management and technologists (Adler, 2012).

Given these contradictory functions of management, it is inevitable that workers' responses to the real process of technological and organizational change will also be contradictory. On the one hand, traditional patterns of solidarity and informal work-place community may promote more advanced forms of conscious interdependence (Bélanger, Edwards, & Wright, 2003; Vallas, 2003b). On the other hand, workers defending their vested interest in autonomy and craft-like arrangements (Ackroyd & Thompson, 1999) may impede socialization of the productive forces. Ezzamel et al. (2004) provide an example of workers' militant defence of their 'unplanned responsible autonomy'. Indeed, socialization under capitalist conditions often proceeds only by riding roughshod over workers' interests: 'For Marx the goods can be brought forth only in the train of the evils' (Cohen, 1974, p. 254). In the long run, centralized planning does not necessarily marginalize workers' initiative; but in the short run, some categories of workers do indeed suffer such marginalization.

Socialization of knowledge and the emergence of the collective worker prepare the ground for workers' participation in large-scale restructuring. Progressive learning does not happen only or mainly as workers discover loopholes in control systems or abandon canonical practice in favour of noncanonical (as argued by Brown & Duguid, 1991; see also Cox, 2005, p. 533). As capitalism develops, learning is increasingly a function of centralized structures and canonical practices that are redesigned to allow for the realization of the productive potential of collective labour.

This proposition can be illustrated with additional data from the automotive supplier discussed above. Over the course of its three-year implementation cycle, the TPM initiative substantially improved equipment efficiency and reduced machine set-up times, so it is clearly an instance of organizational learning. The TPM implementation was driven by management's concern to maintain productivity in the face of a broadening product mix (implying more frequent machine changeovers). TPM was chosen as the improvement methodology because it was considered to be 'best practice' within their industry, based on some well-known reference cases. Implementation was led by managers and maintenance experts. A consultant company specializing in TPM was contracted to assist management and train local 'TPM coordinators', who should in turn train and assist the workers. For the workers, the outcome of the process was somewhat contradictory. On the one hand, workers' knowledge and responsibility were broadened, as explained above. The local labour union, of which all blue-collar workers were members, approved of the changes and even participated in planning the implementation. Specifically, they decided who would be recruited as TPM coordinators, and together with management they defined a company-specific 'TPM ladder', which each department would have to 'climb' in order to become 'world class in maintenance'. (Note that the Norwegian system of industrial relations supports strong independent labour unions, rather than Japanese style 'company unionism' (Gustavsen, 2007)). The results were favourably assessed by worker, who cited 'improved quality', 'an orderly workshop' and 'improved cooperation'. On the other hand, workers also reported scepticism and resistance to TPM. Increased measurement of operational performance made workers report that they were kept under closer surveillance. Workers also complained that TPM standards were enforced too rigorously, and prevented them from 'doing their work in a simple, practical manner'. In particular, standards for work area 'order and tidiness' were by some perceived as insulting and counter-productive. Being accustomed to relatively high levels of individual autonomy, workers expected managers to continue to

rely on their experience and judgment and not interfere so much in the details of the labour process. As a result, one TPM coordinator described his mission as an 'uphill battle'. Some workers perceived his role as illegitimate. Over time, however, he gradually 'convinced' the workers of the benefits of working systematically and proactively with maintenance, using a mix of training, persuasion and straightforward enforcement of labour discipline through regular 'TPM revisions' on the shop floor.

This example illustrates the active role taken by management, supported by internal and external technical specialists, in system-wide organizational learning. It also demonstrates the tension between socialization and workers' interest in autonomy as a way to keep management's priorities at arm's length. Technical competence was socialized through its codification in procedures for maintenance and machine changeovers. Directly and indirectly through the labour union, workers actively supported the change process, but nevertheless resisted increased measurement and standardization. While acknowledging the productive powers of bureaucratic standardization, workers were simultaneously sensitive to how measurements could become a coercive tool in the hands of management (see also Adler, 2012). In sum, socialization of maintenance competence became contested, and involved a mix of consensus building, negotiation and top-down enforcement.

## **Discussion and conclusion**

The goal of the structural-Marxist theory of organizational learning is to clarify the relationship between technological change and learning processes in organizations. Learning, of course, happens when 'people come together' (Barton & Tusting, 2005, p. 1), but this coming together is structured by the level of the productive forces and the prevailing relations of production.

The premise of the arguments supporting Propositions 1\*–4\* is the causal powers of society's material base, specifically how the forces of production develop under capitalist relations of production. First, technological development leads to an expansion of explicit knowledge, which is required in order to exploit advancing science and to regulate advanced technology (1\*). Second, when technology is integrated with human labour in a complex socio-technical system, formalization is required to make the system controllable (2\*): unless formalized, the system cannot be made the object of conscious planning and refinement. Third, changes in the labour process mean that traditional, work-related sources of identification are eroded, but new sources emerge (3\*). Forth, under capitalist relations of production, conscious planning on an aggregated level is the domain of management (4\*), who aligns the sub-process towards the goal of valorising capital and sets the agenda for learning at the level of the work group and individual worker, and as a result, socialization often proceeds notwithstanding important worker opposition.

These results imply that the CoP theory's generalization from handicrafts to modern capitalist organizations misses some critical features of organizational learning in advanced capitalism. As the forces of production develop, work is increasingly formalized and less dependent on tacit knowledge. Only in extraordinary cases is organizational learning subsumed under the formation of stable identities. When management's active reorganization is dismissed as counterproductive (Gherardi et al., 1998;

Wenger & Snyder, 2000) and when traditional work-place communities are seen as the prime source of innovation (Brown & Duguid, 1991), the CoP literature turns into a celebration of tacit knowledge, noncanonical practice and traditional Gemeinschaft (Adler & Heckscher, 2006) – in summary, craft romanticism.

The structural-Marxist account highlights both socialization and the contradictory effect of valorisation, which both stimulates and fetters socialization. From this starting point, we expect to find only an uneven realization of 1\*–4\*. As a result, we should expect to find some instances where the CoP perspective is relevant after all, as a way of understanding at least some forms of learning that emerge in the turmoil created by the interaction of these contradictory forces. Task- or craft-based communities may continue to be relevant when an organized workforce succeeds in containing capitalist rationalization (Bélanger et al., 2003; Ezzamel et al., 2004). Also, when management relies on normative control, work may be organized informally and remain dependent on workers' tacit knowledge. Examples of such arrangements include Barker's (1993) study of 'concertive control' and experiments with 'humanistic', neo-craft work designs (Sandberg, 1995). However, such high-autonomy work systems fail to capitalize on opportunities for system-wide rationalization (Adler & Cole, 1993; Ingvaldsen & Rolfsen, 2012) and as a result, they compete at a disadvantage. Politically, globalization and financialized capitalism undermine the bargaining power of labour (Thompson, 2003).

In contemporary industry, the far more relevant counter-tendencies are those associated with neo-Taylorism and externalized employment relations (Thompson, 2003; Vidal, 2011). These tendencies limit the actualization of 1\*–4\*, but they do not provide much support for 1–4. Coercive formalization is still formalization, and is still led by managers and technologists. Use of peripheral and temporary workers creates new barriers to cooperation and does not support the reproduction of communities. Even when the counter-tendencies to socialization are dominating, the assumptions underlying CoP theory are undermined by capitalist rationalization.

### *Implications for future research*

Since the structural-Marxist model aims to capture the dynamic quality of capitalism, it will have the strongest explanatory power where this dynamism is most intensively actualized. High-volume manufacturing and process industries, which have provided the illustrative examples throughout this paper, are the sectors where the theory's application is most straightforward. However, capitalist rationalization is not restricted to these sectors, and future research on organizational learning might usefully test the fruitfulness of Propositions 1\*–4\* in other sectors. Consider the spread of lean production beyond large-scale manufacturing:

With respect to the service sector, the general principle seems to be that wherever a labour process consists of a multiple-step process, lean tools can be applied. It is hard to conjure a reason why lean will not continue to diffuse throughout the service sector wherever multi-step processes exist. (Vidal, 2011, p. 282)

A recent review reports an increased popularity of lean and total quality management (TQM) in such diverse sectors as healthcare, financial services, education, aviation, hotels and restaurants (Suárez-Barraza et al., 2012). Call centres and fast food are other well-known examples of capitalist rationalization of services (Bain & Taylor, 2000; Bowen & Youngdahl, 1998). New public management doctrines aim to rationalize public services by mimicking practices from the private sector (Hood, 1995).

The applicability of structural-Marxist ideas is less obvious in some other sectors. In particular, high-end services such as those of traditional professionals (medical doctors, lawyers, accountants etc.) may not easily conform to the multi-step process required for their rationalization. In these contexts, variants of the CoP perspective, in particular the epistemic or professional community (Amin & Roberts, 2008), may be more explanatory. Adler et al. (2008) argue that these professional activities are indeed under socialization pressures, but we lack detailed empirical studies that test that hypothesis. Similarly, it is not yet clear how much insight is afforded by the structural-Marxist theory of organizational learning in very turbulent, fast-changing business environments. It is possible that more informal learning will be relevant in such settings, although the reproduction of stable task/craft-based identities will likely be undermined.

Beyond these boundary conditions, the other big challenge facing structural Marxism is to develop a better account of the various configurations that emerge through the socialization/valorisation contradiction. Structural Marxism offers a very high level account of the dynamics of capitalist development, but offers few hypotheses about how these dynamics are likely to play out in given local contexts characterized by various levels of automation, by various degrees of competitive pressure, and by various patterns of relations between workers, managers and specialists. Management's strategic orientation and workforce disposition are surely key variables in explaining how socializing and alienating tendencies conjoin to create different forms of organizational learning (Vallas, 2003b; Vidal, 2007). This paper has discussed the fundamental tendencies of capitalist rationalization. Future research should explore how these fundamental tendencies are influenced by sector-, market- or firm-specific characteristics.

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<sup>1</sup> Originally, Adler labelled his interpretation ironically as 'paleo-Marxist'; later as 'structural Marxist'. 'Structural' should not be confused with 'structuralist' and the works of Althusser and his followers.

<sup>2</sup> Cohen (2000) upholds the primacy thesis of classical Marxism, stating that the superstructure can be explained (functionally) by the base, and that the relations of production can be explained (functionally) by the forces of production. This opens up a philosophical discussion about the nature of functional explanations. This paper follows Collier (1998) and Joseph (1998) in treating the Marxist stratification of society as a special case of critical realist ontology. Thereby the question of primacy is bracketed.

<sup>3</sup> Some sceptics, such as Marglin (1974), deny even this, but their argument seems more provocative than substantive and has little empirical foundations (Landes, 1986).