The Problem with Dispersed Knowledge: Firms in Theory and Practice

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I. INTRODUCTION

As world markets become globalized, heightened competition poses significant new challenges for firms. It has become increasingly important for firms to develop management systems that have the capability to react quickly to change and that promote innovation. Successful firms are eschewing management systems with origins in the past era of mass production in favor of those employing less hierarchy and more team production. Old management systems favored top-down direction, which often prevented those most able from making on-the-spot decisions. But as global markets demand greater flexibility, on-the-spot decisions become crucial and workers become ‘knowledge’ workers - they come to have decision-making advantages over superiors higher up the hierarchy. Japanese and many European business leaders have come to this realization; most American business leaders have not. Neither have most economists.

When economists evaluate the importance of knowledgeable workers, we use asymmetric information models. These models are based upon the strong, and increasingly untenable, supposition that the principal could know what agents should do. These models preclude the possibility that agents could ‘know’ more than the principal. Instead, asymmetric information models presuppose that agents possess information which would be of immediate use to the principal if its transfer wasn’t prevented by costly observation (or some other transaction cost). In contrast, knowledge problems remain even if observation is costless. The purpose of this paper is to show how knowledge and information differ, how dispersed knowledge causes a strong form of uncer-
tainty, and how this uncertainty undermines the applicability of asymmetric information models offered by economists. Finally, I suggest that a new literature – the capabilities literature – can be extended to help solve the problem of dispersed knowledge.

1. Knowledge

Asymmetric-information models usually focus only on the private aspect of knowledge. Typically, an agent is assumed to possess information or to ‘know’ something that the principal does not without incurring some cost. The principal may not know about the agent’s type or actions. What economists really mean, however, is that there is something the principal does not ‘observe’. A principal cannot costlessly observe an agent’s type or actions. To observe something is to acquire facts about it. The information problems economists address, therefore, are roughly equivalent to problems of data collection. In contrast, to know something is to be able to understand and otherwise make sense of it. Knowledge implies that one has a theory of the system (process, phenomena) capable of explicating the observations. Surely one may observe something without understanding it. Thus information-based models preclude the possibility that agents could understand more than the principal about certain aspects of production.

The Austrian school ascribes three dynamic characteristics to knowledge. Knowledge is empirical, potentially tacit, and often the source of ‘surprises’ (O’DRISCOLL and RIZZO [1985, p. 102]). Knowledge is empirical because agents who seek it are searching for ‘knowledge of the particular circumstances of time and place’ (HAYEK [1945, p. 52]). According to O’DRISCOLL and RIZZO [1985, p. 103], ‘empirical knowledge consists of information of temporary and fleeting significance, which may be factual (i.e., profitable) only so long as others don’t know it.’ Knowledge is tacit if it can’t be communicated or otherwise transferred to other individuals. NELSON and WINTER [1982, p. 73] write,

‘the knowledge that underlies a skillful performance is in large measure tacit knowledge, in the sense that the performer is not fully aware of the details of the performance and finds it difficult or impossible to articulate a full account of those details.’

Finally, the search for knowledge involves surprises. A surprise is the discovery of elements not anticipated by the searching agent. Ideas and insights are surprises. One could not sit down and intentionally have a specific idea (i.e.,
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one that could be specified initially). And certainly one could not direct another to have a specific idea. Ideas originate spontaneously, and their usefulness cannot be known or planned beforehand.

2. Uncertainty

The inclusion of the empirical, tacit, and surprising aspects of knowledge imply that knowledge is dispersed—agents know things or are able to discover things that are not easily conveyed. Why is the distinction between information and knowledge important? Dispersed knowledge causes structural uncertainty, the type of uncertainty that exists if a decision-maker cannot ex ante specify all relevant alternatives or outcomes. In contrast, a weaker form of uncertainty, parametric uncertainty, common to the asymmetric information approaches, exists when a decision-maker can specify all possible alternatives ex ante, but does not know which of these outcomes will prevail. By focusing on parametric uncertainty, asymmetric-information models have simplified the problem considerably.

To demonstrate why this is so, I will show how dispersed knowledge causes structural—not simply parametric—uncertainty. Suppose agent A is more knowledgeable about something than agent B. That is, suppose agent A can list alternatives 1, 2, and 3, while agent B only knows about alternatives 1 and 2. Then agent B is structurally uncertain about A’s choices. Had this been the weaker case of an information asymmetry (e.g., a hidden information problem) characterized by parametric uncertainty, A would have been able to list only the same alternatives as agent B, but B could not have known with certainty which of the two alternatives A would choose. This distinction is important.

1. Other strands of literature have recognized this strong form of uncertainty. When Knight referred to ‘uncertainty’ he was referring to situations in which a decision-maker could not stipulate all of the possible outcomes [Langlois and Cosgel, 1993]. Post Keynesians refer to structural uncertainty as true uncertainty [Davidson, 1991]. Austrian economists utilize structural uncertainty in notions of entrepreneurship [Kirzner, 1973]. The concept has also been recognized by some economists who work in the principal-agent framework. For instance, Milgrom and Roberts [1986, p. 30] write: ‘Our decision-maker may not know the alternatives that are available or even those that might possibly be available . . . Such uncertainties make it impossible to formulate prior beliefs about the set of alternatives, and so rule out the use of Bayesian decision theory. Uncertainty of this kind is an important aspect of reality . . .’ Also see Shackley [1972], Kay [1984], and Langlois [1984].

2. Arrow [1974, p. 33] frames it this way: ‘we consider the world to be in one or another range of states. Each state of the world is a description which is complete for all relevant purposes. Our uncertainty consists in not knowing which state is the true one.’
because the same contracts or monitoring procedures that could induce agent A to choose the efficient alternatives under conditions of asymmetric information could be completely ineffective under conditions of dispersed knowledge. That is, dispersed knowledge causes structural uncertainty, which in turn poses contract and monitoring problems not previously recognized in the literature.

3. Evidence of Dispersed Knowledge

The problem is not just theoretical, much knowledge is in fact dispersed. Franchising and professional partnerships are organizational forms that explicitly recognize the existence of dispersed knowledge and in which there are many decision-makers. However, the decentralized nature of knowledge, combined with the notion that everyone has ideas (finds surprises), means that the list is far more inclusive. Evidence suggests that manufacturing workers possess and can develop significant knowledge and are the source of important ideas and innovations, especially process innovations and especially in conducive environments. Many, if not most, Japanese industrial firms have recognized this and are using organizational innovations like employee participation, team production (cooperative rather than hierarchical or sequential decision-making), just-in-time inventory systems, and employment guarantees. Many European firms are following suit, especially in Germany.

American firms have been slower to change, resulting in the loss of competitive advantage. In a comprehensive and important book, the MIT Commission on Industrial Productivity undertook the task of defining the problems of American manufacture [DERTOUZOS et. al., 1989]. In researching Made in America, the book’s authors interviewed business leaders from firms in eight American manufacturing industries and from Europe and Japan in order to gain insights about American manufacturing practices. The report suggests that the American emphasis on product rather than process innovation has steadily eroded organizational capabilities. Repeatedly it is suggested that American firms are too wed to old mass production manufacturing techniques, and that organizational structures must change to adapt to the realities of increased world competition. For instance:

Empirically, franchisees have been the source of innumerable ideas used by franchisers. In McDonald’s, for instance, franchisees originated the ideas for every menu item except for two. McDonald’s franchisees also have substantial discretion in marketing. See MINKLER [1992] for an explanation of franchising based upon franchisee knowledge advantages.
By defining jobs narrowly and making each job relatively easy to learn, American industry pursued flexibility through the interchangeability of workers with limited skills and experience rather than the cultivation of multiskilled workers. Employees could be hired and fired with the ups and downs of the business cycle without much loss of efficiency. The result was a progressively narrowing of worker responsibility and input and the tendency of management to treat workers as a cost to be controlled, not as an asset to be developed’ [p.83].

Comparative organizational restrictions against worker contributions can also be seen when the report’s authors write:

In Italy we observed highly trained loom operators working together with fabric designers to exploit the technical possibilities of the loom and to dream up new products. In the United States we heard a prominent textile manufacturer boast that only the top manager in the plant knew how to set up the new looms and that the operators, ‘guys down from the hills who are good at fixing cars’, did not need any special training to work on them’ [p.82] (emphasis added).

However, some American firms are adjusting by abandoning outdated management strategies. Among the examples of ‘best practice’ American firms offered in Made in America is Chaparral Steel, where there are only four different job levels. In that firm:

Production workers are responsible for identifying new technologies, meeting with customers, maintaining their equipment, and training. Foremen and crews install new equipment, security guards are trained as emergency medical technicians, and they input data while on their shift [p.124] (emphasis added).

The authors go on to write that for organizations to become flexible enough to react quickly to change, firms must allow workers to develop broad-based skills so that they can understand a larger range of the production process and hence participate in problem solving. Hierarchy must also be reduced to more ‘egalitarian organizational structures’ which induce more shop floor (process) innovation and coordination. The theme that worker knowledge is important and that organizations must harness their contributions is continually repeated throughout the study.

Saturn automobile company, a semi-autonomous division of General Motors, is another example of an American firm that recognizes the importance of the dispersed knowledge. The company has a flat hierarchy and employs

4. Harley-Davidson might be considered another example of a ‘best practice’ American manufacturer that has eschewed divisive distinctions. Reid [1990, p. 165] writes: ‘Most important, Harley has dropped the concept of whitecollar thinking and bluecollar doing, a notion that has plagued American business practices but is anathema in Japan. The goal now is to have everybody thinking and doing. The color of their collars is irrelevant’
teamwork and worker participation. The workers belong to the United Auto-
mobile Workers Union and were chosen from GM’s other plants based upon
their motivation and desire to work in a cooperative environment. From the
very conception of the plant’s design workers were involved in all stages of
decision-making. They have continued to exert significant decision-making
authority and responsibility. At Saturn any production worker (called member)
can stop the production line—but if she does she has thereresponsibility to correct
the problem. The intent is to develop an organization that fosters commitment
and that promotes ideas which can be used not only at Saturn, but at GM’s other
facilities as well.

Dispersed knowledge in a cooperative organization has led to innovations
from all different sources. In a 1990 interview, the president of Saturn, RICHARD
LEFAUVE, talks about the advantages of the firm’s organizational structure:

‘Before if we had a tough decision to make, we would have two or three different perspectives,
with strong support of all three. In a traditional organization the bossman decides after he’s heard
all three alternatives. At Saturn we take time to work it out, and what generally happens is that
you end up with a fourth answer which none of the portions had in the first place, but one that
all three portions of the organization fully support’ [AutoWeek, Oct. 8, 1990, p. 20] (emphasis
added).

Elsewhere LEFAUVE writes:

‘Saturn has introduced a number of important technological innovations to American car
building, such as the plastic external panel and the use of the skillet system method of assembly.*
Saturn was also the first U.S. automobile manufacturer to build both automatic and manual
transmissions on the same line, an unusually flexible operation in the manufacturing industry.
All of these accomplishments have been obtained by involving the team members who participate
in these tasks in the design stage of the new technologies and the work environment. Saturn lets
people drive technology.

* . . . Two of Saturn’s engineers discovered the [skillet] system while visiting GM’s Opel facilities
in Rüsselsheim, Germany. While it was still in the design stage at Spring Hill [Saturn’s
manufactaching plant], Saturn team members adapted it to make their time spent on the skillet
more efficient’ [LEFAUVE and HAX, 1992, p. 16] (emphasis added).

The mounting evidence suggests that organizational structures need to change
to meet the new demands placed upon them. Why has change been so slow?
For the U.S., both the authors of Made in America and LAZONICK [ 1990] place
much of the blame on a culture of managerial authority that stresses the
expertise of managers and the concomitant need for ‘expert’ (credentialled)
decision-making. American business schools have been responsible for turning
out managers more interested in financial reports and their own status than in

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the details of production. This historical neglect of the production process, while not as important during the era of mass production, is now starting to reveal itself.

I have argued that information and knowledge are different, and have suggested how this difference leads to different kinds of uncertainty. Organizations are starting to recognize the importance of dispersed knowledge5. Economists must also recognize this importance. I now show how our analyses to date are largely inadequate to handle dispersed knowledge within the firm, and I will point to a new line of research that holds promise in addressing the issue.

II. THEORIES OF THE FIRM

The agency literature may be segregated into two parts: positive agency literature and formal agency literature. Consider each in turn.

1. Positive Agency Literature

The seminal papers in positive agency literature are Alchian and Demsetz [1972] and Jensen and Meckling [1976]. Both focus on the importance of monitoring in the firm.

The starting point of Alchian and Demsetz' analysis is team production – the case in which inputs are more productive if used jointly rather than separately. The technology of team production suggests that each worker's marginal contribution to output cannot be inferred just by observing output. For instance, one could not tell how hard each of two crate-lifters worked simply by observing the total number of crates loaded onto a dock. If all the team members

5. There are other examples of American firms that have come to recognize the importance of dispersed knowledge. Pepsi's Riverside plant [Lang, 1990] and Harley-Davidson’s entire operations [Reid, 1990] were constructed using employee ideas and have incorporated management systems that involve employees in decision-making and problem-solving. Womack, Jones, and Ros [1990] attribute Toyota’s success largely to its allowing workers to make decisions based upon their on-the-spot knowledge. In fact, the use of just-in-time supply systems intentionally forces employees to use their knowledge to solve problems. Helfgott [1988] notes that the computerizing of manufacturing processes can profit by using employee ideas, and writes for many authors when he suggests that Taylorism and its vestiges has led to ‘a system that put all the decision-making in the hands of supervisors [and] destroyed worker motivation and denied employers the benefits of ideas that workers could have contributed to better production methods.’ [p. 89].
are paid equally, this information failure implies that each team member has the incentive to shirk because no single member has to pay the full cost of shirking (in terms of lost output).

The solution to this problem is for the team to hire a monitor to observe the behavior of team members and to direct production. By observing team members, the monitor can more closely reward each agent with his or her marginal product. Accordingly, those members who perform well are paid well, while those who shirk are paid less, or worse. And in order to assure that the monitor does not shirk, the monitor should obtain the rights of residual claimancy.

Thus the classical firm is born. Alchian and Demsetz’ argument is powerful because it explains both the firm’s origins and also its internal organization, as Putterman [1984] notes, however, the authors did not prove that an external monitor must be the residual claimant, they assumed it. As the sole residual claimant, the monitor does have a large incentive to prevent shirking. But it is likely that that same monitor has less information about individual performances than the other team members themselves. While it is true that each team member can only benefit proportionally from the detection and prevention of shirking, his or her information about team member performance may be superior to that of the monitor. This incentive-information trade-off implies that optimal monitoring, emanating from either an external agent or the team itself, is not theoretically determinate.

But the dispersion of knowledge suggests that the problem is even greater. The monitoring process consists of a superior directing, observing and sanctioning (or rewarding) a subordinate. The act of directing the subordinate is key. A superior can only direct a subordinate over the activities she knows about. If the subordinate is knowledgeable about activities that the superior is not, the superior could not direct the subordinate to engage in those activities. That is, Alchian and Demsetz and the literature they have spawned presuppose that the principal could direct the agent over all activities, even activities in which the agent but not principal knows about. The supposition implies that the principal can specify or list all of the alternative courses of action that the agent knows about, that is, the principal does not confront structural uncertainty. If the agent is more knowledgeable about some alternatives than the principal, however, this supposition is unjustified and, unfortunately, has led economists astray in believing that the relevant organizational problem is that of principal monitoring of agent. If the agent is more knowledgeable than the principal, then the principal is structurally uncertain about the agent’s activities and therefore could not direct her over those activities. Only if the principal is as knowledgeable as the agent could the monitoring problem be important.
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A similar problem confronts Jensen and Meckling's analysis. There, the problem is for an owner-manager to find ways to prevent herself from shirking if she has sold shares in the firm. The solution is for the shareholders to monitor the owner-manager. Again, the supposition is that shareholders could know what activities the owner-manager should be engaged in.

2. Formal Agency Literature

Although Alchian and Demsetz do provide an explanation for the internal organization of the firm, they rely on a particular technology. Since that article first appeared, an industry has emerged that has produced a number of methodologically formal articles that do not in general rely on the team production assumption (though the results are often quite sensitive to the assumptions made). A complete taxonomy of these principal-agent literatures is beyond the scope of this essay. Instead, I offer a brief assessment6.

In the principal-agent framework, the principal wants the agent to do something on the principal's behalf. The problem arises because there is some sort of information asymmetry. The type of asymmetry determines the nature of the problem. If there is an information asymmetry at the contracting stage, there is an adverse-selection problem, as when, for example, a manager cannot costlessly determine whether a prospective employee is a 'good' or 'bad' worker7. This kind of problem is sometimes called the 'hidden characteristics' problem.

A moral hazard problem, on the other hand, occurs when an agent's action or information cannot be costlessly determined by the principal ex post. Although the parties to the contract have symmetric information before the contract is signed, once it is consummated the information asymmetry develops. The moral hazard problem is thus referred to as the 'hidden action' problem, the case I now develop further.

Consider the moral hazard problem in the employment setting. The employer (principal) wants the employee (agent) to perform some task or action in return


7. We will not focus on this literature because the process of screening out the most qualified agents does not preclude selected agents from either being more knowledgeable than the principal, or the ultimate decision-maker.

8. The regulation literature often employs 'hidden information' models, in which the regulator's problem is to choose low cost types. The distribution and density functions of types is assumed known by the regulator (see, for example, Baron and Myerson [1982]). Since the hidden action case formally subsumes the hidden information case [Hart and Holmstrom, 1987], we will not be concerned with this further distinction.
for some compensation. The problem is that the employer cannot observe costlessly the agent’s action. In order for the moral hazard problem to have meaning, it must be assumed that (1) output includes a random element, and (2) agents are risk averse. Agent risk aversion is important because if agents were risk neutral in income, contingent claims contracts could be written that induce optimal actions (i.e., there would be no risk-information trade-off).

The assumption of a random element in output is important because this assumption assures that the employer could not infer the employee’s action just by observing output. To see this, let an employee’s output \( Q \) be a function of the action \( a \) taken, the amount of capital \( k \) used, and some random component \( \theta \):

\[
Q = q(a,k) + \theta
\]

The presence of \( \theta \) assures that the employer cannot infer ‘a’ by observing \( Q \) and \( k \). If the employer cannot infer the agent’s action, she cannot compensate the employee with his marginal product. Hence the employee has the incentive to shirk. How then can the employer induce the employee to perform the optimal action?

The moral hazard literature proposes several alternatives. All the compensation rules, however, focus on using observable elements of the environment to reduce the cost of the initial information asymmetry [MacDonald, 1984]. For instance, the principal might try to gain information about the random element of production by observing something that is correlated with the random factor. Holmstrom [1982] suggests that relative performance comparisons among employees in teams has value not in promoting competition among agents, but rather because these evaluations provide information about the random element of production. Therefore, monitoring of observables is useful to the extent it provides information about this random element, and allows the principal to compensate agents more closely in accordance with their marginal product.

The problem with the literature’s characterization of the situation is that the principal knows the underlying distribution and density functions; they are based upon parametric uncertainty. In essence, the problem reduces to one in which the principal’s task is to write a contract that takes into account costly observation, stochastic production, and agent risk-aversion in which the principal chooses the agent’s actions. Thus, these models are based on the supposition the principal could choose the optimal action for the agent. What if the agent knows about actions or alternatives the principal does not? In other words, how could the principal pick actions for the agent if the principal does not know
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the set of all the agent’s actions? Implicit in the literature is the assumption that the principal knows at least as much as the agent. The focus is on costly observation and stochastic production, not differential knowledge. If knowledge is dispersed, however, then the contracts would have to incorporate structural uncertainty, where potential alternatives are unknown to the principal. This strong form of uncertainty prohibits the principal from formulating statistical distributions over agent activities. And if agents are initially ignorant of their own alternatives or production possibilities then no incentive contract, based on the principal’s knowledge of agent alternative activities, could be written.

3. Transaction Cost Economics

Coase’s 1937 article is the seminal effort in transaction cost economics. Coase argues that the existence of firms can be attributed to the presence of transactions costs, which render the price mechanism of market exchange too costly. An incomplete employment contract supplants complete bilateral exchanges because of costly discovery and negotiation of prices and provisions. The key insight, of course, is that the firm is a place in which transactions are not coordinated by market prices. Coase offers an explanation for why this is so.

Some of the more important contemporary contributions are Williamson, Wachter and Harris [1975]; Williamson [1975, 1985]; and Klein, Crawford and Alchian [1978]. Recent transaction cost analyses have come to focus on asset specificity. Earlier work, however, did acknowledge the importance of decentralized knowledge. For instance, Williamson, Wachter and Harris write:

‘Our purpose is to assess better the employment relation in circumstances where workers acquire, during the course of employment, significant job-specific skills and related task specific knowledge. What Hayek referred to as knowledge of ‘particular circumstances of time and place’ and what we refer to as ‘first mover advantages’ play a prominent role in the analysis’ [p. 251] (emphasis in original).

Since the employment relation inevitably comprises idiosyncratic tasks, in which workers acquire specific knowledge, the problem for the employer is to find the least costly way to provide incentives that harness the fruits of this knowledge. Just as Alchian and Demsetz worry about shirking, Williamson, Wachter and Harris worry about employee ‘opportunism’ (‘self-interest seeking with guile’).
If decentralized knowledge is important in the employment context, as the authors apparently believed, then its mere existence reduces the utility of monitoring. If it is the employee who gains knowledge of time and place because of his particular situation, then how could a monitor direct and assess the activities of that employee? The presence of decentralized knowledge implies that monitors would not have the requisite understanding to direct workers’.

Williamson, Wachter and Harris also dismiss the simple sales contract (because of future uncertainty), and contingent claims contracts (because of ex ante bounded rationality) as inadequate arrangements to deal with the problems of the employment relation. Evidently, this dismissal leads the authors to the conclusion that internal labor markets in which wages are attached to specific jobs provide the cheapest solution to the problems of bounded rationality and employee opportunism. The possibility of employee promotion in such a scenario induces what Williamson, Wachter and Harris refer to as ‘consummate cooperation’ – presumably a state in which employees possess less incentives to exploit their individual advantage (derived, of course, from decentralized knowledge).

In fact some type of ex post settling up in a cooperative organization can promote mutual trust and commitment, effectively reducing the need of extensive monitoring systems. The problem is that standard or rigid job classifications, the basis upon which the authors suggest rewarding performance, could be too inflexible to take advantage of dispersed knowledge. If job classifications spell out tasks – especially how things should be done – then these job classifications are just an extension of the narrow job assignments used in mass production manufacturing techniques.

More recent work in transaction cost economics (e.g., Williamson [1985]) does address who would be the decision-maker in an organization. But it does not focus on the question of who will be the decision-maker in the presence of dispersed knowledge. Williamson [1985] argues that the owners of specific assets (sunk assets in an incomplete contract setting) are vulnerable to quasi-rent expropriation under conditions of bounded rationality. Hence, it will be in the interests of all parties to craft governance structures that leave the decision-

9. Instead, the authors criticize (correctly) Alchian and Demsetz as characterizing the employment relation as a sequential spot sales contract. The problem is that if employees learn idiosyncratic tasks during the initial stages of employment, it will be costly to terminate the employment relationship later on. During the relationship, employees learn skills and gain knowledge that can not be employed in other firms. Thus exit is costly. This cost is ignored by Alchian and Demsetz and is not a feature of a sequential spot-sales contract.
making to those asset owners who are most vulnerable to this expropriation hazard. These owners are willing to pay the most for decision-making rights. But as Dow [1987] points out, how could agents agree ex ante on governance structures under the literature’s own assumption of bounded rationality? The problem is even more severe in the face of structural uncertainty”.

Finally, recent papers that focus on incomplete contracts (e.g., Grossman and Hart [1986], Hart [1988]) and measurement costs (e.g., Barzel [1987]) share the feature that it is the economic agent whose decisions are most important who should be the residual claimant or owner. Not surprisingly, this turns out to be the principal. Incomplete contracts could be problematic because of third party enforcement problems, while the measurement cost argument hinges on the difficulty of assessing marginal contributions. Both strands of literature are refinements, rather than additions, to the existing transaction cost and agency literatures. As such they suffer from the same weaknesses, namely, how does one induce knowledgeable agents to perform if knowledge is dispersed? Just because one agent’s knowledge is deemed ‘important’ (how would we know whose is important under structural uncertainty?), this doesn’t mean that decision-making should be confined only to that agent or that the incentive problems of other, less important agents is solved. Given dispersed knowledge, all agents are potentially important.

10. It is beyond the scope of this essay to get into a detailed discussion of bounded rationality versus structural uncertainty. However, it is important to address the issue because bounded rationality seems to be an elastic term. Simon used the term to refer to the cost of calculating the solution to a known problem. Current uses of the term seem to sometimes include the possibility that decision-makers do not know all possible future alternatives, that is, they are structurally uncertain. The distinction is crucial because of the different implications. If the world is characterized by bounded rationality in the Simon sense, then as information processing techniques advance incentive alignment problems will diminish. Relying on governance structures in this world to align incentives makes some sense, Dow’s criticism notwithstanding. This is equivalent to the notion that if monitoring costs fall to zero organizations could become very centralized. If the world was instead characterized by structural uncertainty, then even if information processing costs fell to zero, incentive problems would still arise and ways to align incentives would still have to be found. It is this world that renders the current literatures’ suppositions suspect.

11. In fact, Hart [1990] argues that even the relatively weak type of information problem imposed by bounded rationality is not necessary in a correct understanding of an explanation for organization.
4. Austrian Economics

Austrian economists have yet to offer a theory of the firm. Some authors (e.g., O’DRISCOLL and RIZZO [1985, p. 123]) acknowledge this explicitly, while others (e.g., REEKIE [1984, ch.6]) do so implicitly. Instead, economists working in the Austrian tradition tend to focus on the entrepreneur, an agent who perceives and exploits profit opportunities [KIRZNER, 1973]. This is not to say that the Austrian view, with its focus on competition as a process and the role of the entrepreneur, is incompatible with other approaches. O’DRISCOLL and RIZZO note that the evolutionary approach offered by NELSON and WINTER [1982] is consistent with the Austrian view precisely because it incorporates learning, adaptation and a commensurate role for the entrepreneur. Like the Austrian approach, the evolutionary approach eschews static equilibrium analysis in favor of the importance of change. Still, these explanations do not go far towards determining who will be the decision-makers in organizations.

It may be that Austrian economists have not attempted to answer the question of decision-making in firms because it poses a dilemma for them. In arguing for the virtues of the market (e.g., its use of decentralized knowledge) and in opposition to central planning, HAYEK [1945, p.524] writes:

‘It follows . . . that central planning based on statistical information by its nature cannot take direct account of these circumstances of time and place, and that the central planner will have to find some way or other in which the decisions depending on them can be left to the ‘man on the spot’.’

For Hayek the question is ‘who should do the planning?’ that is, should planning be done centrally or by many individuals? Of course, HAYEK (and all Austrian economists) argues for the efficacy of decentralized decision-making because of decentralized knowledge when if comes to economic systems as a whole.

The problem is that historically most firms have been characterized by hierarchy and centralized decision-making. The firm is a place where the market is not used; that is what Coase emphasized. Transaction costs are reduced with centralized decision-making. The classical employment relationship exists when the owners of labor (workers) exchange the decision-making rights over their asset in return for a wage [CHEUNG, 1983]. But if all individual agents (workers) possess dispersed and incomplete pieces of knowledge of time and place, knowledge not known by any one agent, why are they not then the decision-makers over their own assets (labor)? It seems that to be consistent, an Austrian theory of the firm would have to recognize that organizations exist despite dispersed knowledge, not because of it.
Vague references to the selection processes of the market will not work. If Austrian economists argue that the market is a superior resource allocating institution precisely because of the way it uses decentralized knowledge, they cannot then argue that an institution that violates this principle is also efficient, simply because it exists in the market. Selective use of when decentralized decision-making is and is not appropriate needs further, and perhaps quite extensive, explanation. This is a fundamental question that must be answered by Austrian economists if they are to make progress towards a coherent theory of the firm.

III. DISPERSED KNOWLEDGE AND CAPABILITIES

A new literature is emerging that can accommodate the idea of dispersed knowledge. Some representative works of this ‘capabilities’ literature are TEECE [1980,1982], NELSON and WINTER [1982], WINTER [1988], LAZONICK [1990], PRAHALAD and HAMEL [1990], NELSON [1991], KOGUT and ZANDER [1992], and LANGLOIS [1992]. Capabilities refer to what a firm can do. The basic idea is that the firm is a repository of pooled knowledge and skills. The focus is on production rather than exchange, and a crucial element is that firm decision-makers must make decisions under structural uncertainty. This strong form of uncertainty accounts for the literature’s rather informal methodology. Furthermore, because of the tacit nature of knowledge, a firm is capable of doing things that it cannot easily describe. Together these elements suggest that it’s futile for either firms or economists to try to pre-specify actual production functions. Instead, the focus needs to be placed on how various organizational structures perform in different economic environments. Currently, for instance, it seems important to analyze organizational structures that permit flexible manufacturing techniques because of the globalization of world markets and the rapid change and uncertainty involved. Thus the literature looks at how firms can develop and enhance their capabilities in different circumstances and over time, rather than on exactly how firms actually make something (i.e., specifying some production function)12. Successful firms are the ones that

12. One of the problems with the capabilities literature is its informality, caused by the apparent impossibility of modeling structural uncertainty. MINKLER [1993] is one attempt to overcome this problem by modeling how an entrepreneur could form a conjecture about a worker’s production possibilities (which the worker herself doesn’t even know until a contract has been executed) without contemplating how that output could be produced, contingent upon various transfer and payment parameters. The main finding is that profit-sharing schemes can transform structural uncertainty over how something could be produced into parametric uncertainty over what could be produced.
develop organizational capabilities that allow them to continue to innovate; firms that rest on their past accomplishments decline. While most economists would agree with that statement, only the capabilities literature talks about innovation explicitly.

Although the capabilities view of the firm emphasizes the importance of knowledge – especially its tacit nature – and structural uncertainty, nowhere in the literature can one find mention of the dispersed nature of knowledge. As such, with the exception of Lazaronick [1990], the potential role of production workers as an important source of knowledge is altogether ignored. Lazaronick argues, in a historical and comparative (including the U.S., Britain and Japan) analysis in the tradition of Chandler [1977 and 1990], that mass production in the U.S. evolved in a way that took production skills off the shop floor and placed them in top management’s hands. While this ‘de-skilling’ of production workers was an efficient means to produce (homogeneous) output quickly and at a low cost and it prevented a contentious workforce from subverting production, it is no longer an appropriate model in an era requiring flexible manufacturing. Like Made in America, Lazonick argues that U.S. workers need to be trained better and allowed to develop generalized skills in order to take advantage of more flexible technologies. However, while Lazonick correctly points out that workers need to be given expanded roles if firms are to take advantage of their skills, his analysis omits the possibility that production workers themselves are the sources of new technologies or modifications to existing technologies.

The capabilities view of the firm can be expanded to incorporate the notion of dispersed knowledge. Nelson [1991] suggests that the firm’s capabilities is largely determined by the interplay of its strategy and structure. Although the firm’s strategy must be developed in the face of structural uncertainty (and hence it is difficult to specify), firms can change their strategy relatively easily. A firm’s structure refers to the way in which it makes its operating level decisions and the way those decisions are then carried out. It is much more difficult to change a firm’s structure. But by changing the distribution of decision-making authority within firms, they change their structure. Thus organizational innovations like worker participation, teamwork and just-in-time inventory systems can be seen as attempts by firms to expand their capabilities by placing decision-making authority and responsibility in the hands of those most able to meet the firm’s objectives. Combined with guaranteed employment, these innovations foster commitment to the firm and reduce the need for high degrees of hierarchy and monitoring. And the role of managers changes from one of director of production to one of coordinator and facilitator. Managers now incorporate ideas from all quarters, from marketing, engineering
and production, into initial planning decisions and then facilitate needed changes once production is underway. The base for ideas is expanded and everyone becomes responsible for more than just narrowly defined tasks.

These kind of organizational changes have enabled firms to enhance their product quality and tailor their output according to specific market segments. Simply put, by recognizing that ideas come from places other than R&D departments and that not only top level managers are capable of idea implementation, firms can now do things they could not do before. This lesson has been, and still is, a difficult one for firms to learn because the entire organizational culture has to change. But by focusing on the capabilities of firms, economists may now learn the same lesson.

REFERENCES


ALANSON P. MINKLER


SUMMARY

In this paper I show how the dispersed knowledge workers possess poses problems for both firms and economists’ theories of the firm. For firms, continued adherence to old style mass production techniques when market demand changes rapidly is proving to be inadequate. For economists, dispersed knowledge causes structural uncertainty, which in turn implies that agency, transaction-cost and Austrian analyses of the firm are inadequate. In contrast, I suggest how the ‘capabilities’ theory of the firm could incorporate dispersed knowledge to account for organizational innovations that redistribute decision-making within the firm.

ZUSAMMENFASSUNG

Dieser Artikel legt dar, auf welche Weise sowohl den Firmen als auch der Unternehmenstheorie der Ökonomen das verstreute Wissen der Belegschaft Probleme bereitet. Bei schnellen Änderungen der Marktannahmen hat sich beständiges Festhalten an überholten Massenproduktionsmethoden für Firmen als unangemessen erwiesen. Nach Ansicht der Ökonomen verursacht verstreutes Wissen strukturelle Unsicherheit, was wiedem impliziert, dass herkömmliche Analysen der Firma unzulänglich sind. Im Gegensatz dazu schlägt der Autor vor, wie die ‘Fähigkeitstheorie’ der Firma verstreutes Wissen miteinschließen könnte, um organisatorische Innovationen zu begründen, die das Treffen von Entscheidungen innerhalb der Firma neu verteilen.

RÉSUMÉ

Dans cet article je montre comment la connaissance dissipée que les travailleurs possèdent pose des problèmes à la fois aux entreprises et aux économistes spécialistes des théories de l’entreprise. Pour les entreprises, la croyance persistante dans les modes anciennes de techniques de production de masse quand la demande du marché change rapidement, se révèle inacceptable. Pour les Economistes, la connaissance dissipée provoque une incertitude structurelle qui, à son tour, implique que les actions, les coûts de transaction et les analyses autrichiennes de l’entreprise sont inadéquats. Par contraste, je suggère comment la théorie des ‘possibilités’ de la fié pourrait incorporer la connaissance dissipée pour rendre compte des innovations organisationnelles qui répartissent d’une nouvelle manière la prise de décision à l’intérieur de l’entreprise.