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The Organizational Approach of Capability Theory: A Review Essay

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ABSTRACT: Richard Langlois, Tony Yu & Paul Robertson have assembled a collection of previously published papers that move beyond textbook production theory. This essay discusses work by Frank Knight and Hendrik Houthakker not reproduced in LYR in relation to the capability theory of economic organization. Knight identified the problem of organization as the search for and the coordination of different dispersed capabilities. Houthakker helps us to see more clearly that the benefits of specialization are not brought at zero cost; whatever is the governance structure employed, there will inevitably be coordination costs due to differences in capabilities.

1. Introduction¹

Once upon a time, the firm was no enigma for economists. The firm coincided with a production function of the form $Y = F(N, K)$, where Y represents output, and N and K the labor and the capital inputs. This function and the profit maximization objective constituted the whole of what an economist needed to know about the firm. Richard Langlois, Tony Yu & Paul Robertson have edited an impressive three-volume collection of previously published contributions by maverick scholars who question this conception of the firm. The collection (hereafter LYR) covers issues like bounded rationality, incomplete contracts, knowledge dispersion, opportunism, production coordination, shirking, technological and organizational coevolution, and the structure of production. It also gathers together a good deal of the

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¹ This essay reviews Richard N. Langlois, Tony Fu-Lai Yu & Paul Robertson (Eds.), *Alternative Theories of the Firm*, Vols I–III (Cheltenham, UK: Edward Elgar, 2003). I wish to acknowledge the useful suggestions made on an earlier draft by two referees.

literature on organizations from the agency, Austrian, behavioralist, capability/competence, evolutionary, property rights, resource-based and transaction-cost perspectives.

The breadth of LYR makes it a useful resource for anyone working in the general area of the economics of organization (a subset of which is the theory of the firm) and management theory. This is *a fortiori* so if one considers that the only ‘orthodoxy’ to which the collected articles are meant to provide an alternative ‘is the portrayal of the firm in the microeconomics textbook (whether it be freshman or postgraduate),’ according to the editors’ Introduction (Vol. I, p. xi). In other words, LYR collects a number of works that try to unpack—in different, but to a large extent complementary, ways—the familiar cost curves by exploring the nature of the firm from different angles.

The purpose of this essay is not so much to challenge the alternative theories contained in LYR as to supplement them. But because LYR is a massive collection of articles that look at the firm through many different theoretical frameworks, the discussion will, of necessity, be selective. In many ways in fact, the present essay, like the contents of LYR, is part of a still-emerging research program concerning alternative theories whose boundaries must be considered sufficiently fluid to allow for analytical developments along any of several now-predictable trajectories. This provisional situation leaves me free to discuss one particular theory within this emerging research program without paying too much attention to the other constituent theories. I therefore propose to concentrate on a theory that appears to be less-known than the others and to which the editors have made a substantial contribution, namely, capability theory (this approach is the subject of LYR, Vol. II, Part I; see Nelson & Winter,

1982, ch. 5; Langlois, 1988; Langlois & Robertson, 1993; Teece, Pisano & Shuen, 1997; and Yu, 2001).²

The collection under review omits two contributions that fall within its scope: the first chapter of Frank Knight's *The Economic Organization* (1933b); and Hendrik Houthakker's 'Economics and Biology: Specialization and Speciation' (1956). Knight's chapter outlines what later became the central tenet of capability theory, *viz.*, that the primary purpose of economic organization is to search for and to coordinate dispersed and specific knowledge. Houthakker's article, though not explicitly concerned with matters of economic organization, examines the two cost aspects of the coordination problem, *viz.*, internal and external, that capability theory recognizes only obliquely. These 'missing links' do not weaken capability theory. As the discussion will make clear, quite the contrary is the case.

2. Capability Theory

We owe the birth of capability theory to G. B. Richardson, who had, in turn, been influenced by Edith Penrose (1959). Capabilities refer to that specific—i.e., not easily articulable or transferable—production knowledge that traditional production theory ignores.³ This aspect of production capabilities has nontrivial consequences: it means that notwithstanding the same technological structure of production—which can indeed be rendered in terms of a common production function—production overheads may in actual fact differ. Although 'production

² The capability approach is also known as the competence approach (see Heiner, 1983; Dosi & Marengo, 1994). The organizational capability approach is to be distinguished from the more recent capability approach proposed by Amartya Sen (e.g., 1994) and others in the field of economic development.

³ Following Michael Polanyi (1958), subsequent literature has also referred to such knowledge as *tacit knowledge*. Polanyi's oft-cited example of tacit knowledge refers to the inability of Hungarians to get a light-bulb machine to work, though the machine was identical to one that functioned perfectly well in Germany. An official of a nongovernmental organization recounted to me once how the apparently trivial operation of using a screwdriver turned out to be a major impasse when explaining how to install water heaters in a developing country. Not all knowledge can be represented by a set of blueprints.

functions presume a certain level of managerial and material technology,' writes Richardson, the

point is not that production is thus dependent on the state of the arts but that it has to be undertaken (as Mrs. Penrose has so very well explained) by organisations embodying specifically appropriate experience and skill. It is this circumstance that formal production theory tends to put out of focus, and justifiably, no doubt, given the character of the optimisation problem that it is designed to handle; nevertheless ... we cannot hope to construct an adequate theory of industrial organisation and in particular to answer our question about the division of labour between firm and market, unless the elements of organisation, knowledge, experience and skills [i.e., capabilities] are brought back to the foreground of our vision. (Richardson, 1972, p. 888)

To explain 'the division of labour between firm and market,' Richardson proposes a theory of economic organization founded on specialization and coordination. In general, says Richardson, a firm specializes in activities that draw on its pool of similar capabilities. As a result, it will also undertake activities that are *similar*. But this need not always be the case, especially in more complex organizations that deal with more sophisticated or multiple activities. In these other cases, the *process* of production will obviously regard the coordination of *activities* that are *complementary* but not necessarily similar. For instance, automobile production needs the coordination of activities having to do with (among other things) the production, handling, and assembly of metal, glass, electronics and engines. In cases such as these, coordination involves activities that are dissimilar and that need 'to be matched, in level or specification' (Richardson, 1972, p. 895), that is, coordination requires *dissimilar* capabilities.

This entails that even though some firms may share some capabilities of production they will not necessarily share coordinative capabilities for the production process. So, to continue with our example, today the production of electronics for cars shares capabilities with the production of electronics for laptop computers. We may as a result have a firm that produces electronics for *both* cars and laptops, because such production shares similar capabilities. But the coordination of the process of production of electronics for cars has little to do with the coordination of production of electronics for laptops: electronics for laptops need to be coordinated with the production of, e.g., monitors, printers and scanners. The coordination of different types of production processes can therefore define the boundary between firm and market (meaning other firms).⁴

Current capability theory has extended Richardson's approach by blending considerations of production with those of exchange, i.e., capabilities with transactions. This blending, aimed at more sharply distinguishing the firm–market boundary, has taken place along two trajectories. The first of these trajectories (chronologically speaking) was originated by David Teece (1980, 1986, 1988). The second, which is actually a broadening of the first, is the work of Langlois and various coauthors (Langlois, 1988; Langlois & Robertson, 1993; Langlois & Foss, 1999).

Teece blends Williamsonian transaction cost economics (Williamson, 1979, 1984) with Richardsonian and Penrosean considerations. Williamson's approach is founded on asset specificity, namely, on the assumption that some assets for production are not fungible but can only be used for a unique task (paradigmatically: an automobile die). When a transaction

⁴ This 1972 view of economic organization provides an answer to the complaint raised more than twenty five years later by Holmström & Roberts (1998, p. 90) that information and knowledge 'have long been understood to be different from goods and assets commonly traded in markets. In light of this, it is surprising that the leading economic theories of firm boundaries have paid almost no attention to the role of organizational knowledge.' In a footnote attached to this complaint, Holmström & Roberts note that 'researchers *outside* economic theory have made much of the role of knowledge' (emphasis added).

is specific in Williamson's sense, it may threaten a contractual relationship, because it may subject the owners of the specific assets to rent-seeking behavior by the other transactional parties. In different terms, some contractual parties may behave opportunistically in the presence of asset specificity. Standard market contracts cannot govern opportunism and, as a result, efficiency requires vertical integration. This approach hence replaces the familiar marginal production cost calculation with a marginal cost calculation of devising, executing and supervising transaction completion. In doing so, it holds technology constant.

The primary merit of Teece's work is to have emphasized that technology should not be held constant for the determination of the firm–market boundary. More precisely, Teece focuses on (i) the nature of innovation and (ii) the institutional environment within which innovation occurs. The more radical the innovation, the more difficult it is for the market spontaneously to coordinate the complementary (but not necessarily similar) capabilities that are innate to it (and vice versa). A radical innovation, in short, is generally more likely to be subject to internalization and to have an impact on firm boundaries. Furthermore, Teece emphasizes, innovation does not take place in an institutional vacuum. The weaker the ability of an institutional environment to guarantee returns to an innovation, the higher the probability that such innovation will be a cause of vertical integration. An entrepreneur-innovator will alter the boundaries of the firm through vertical integration when the institutional setting does not guarantee the appropriation of rents from the innovation (i.e., when others can free ride on the benefits of the innovation).

The second capability trajectory is more eclectic than the first. It explicitly endogenizes Austrian, Marshallian, Schumpeterian and transaction cost considerations. But it places more emphasis on the cognitive nature of both capabilities and transactions. It is grounded in a useful biological metaphor (see especially Langlois, 1995).

We live in uncertain environments. Uncertainty derives in good measure from the limited cognition (dispersed and specific capabilities) of different economic actors. Consequently, knowledge differences lead to division of labor and to specialization throughout the economy. A firm is that entrepreneurial organ that utilizes such division of labor and specialization to achieve some more or less well-defined ends. As such, it is akin to a biological organism that, in order to survive, must respond to different external stimuli in an appropriate fashion. Thus, a healthy firm—one that is able to create and recreate its own opportunity set (Penrose, 1959, pp. 31–33)—will eventually evolve (or, if you prefer, will specialize) to the point where it possesses some ‘department’ that has the specific role of dealing with this important survival function. For all practical purposes we may consider this department to be the mind of the firm. In time, the stable environment provided by a firm allows for the learning processes crucial for long-term planning, i.e., for those survival strategies necessary to deal with change. Knight’s work is a useful point of reference: when ‘uncertainty is present and the task of deciding what to do and how to do it takes the ascendancy over that of execution,’ he writes in *Risk, Uncertainty and Profit* (1933a, pp. 268–269), ‘the internal organization of the productive groups is no longer a matter of indifference or a mechanical detail. ... Centralization of this deciding and controlling function is imperative, a process of “cephalization”, such as has taken place in the evolution of organic life, is inevitable, and for the same reasons as in the case of biological evolution.’⁵ A good proxy for this type of organization with functional specialization would be the corporate multidivisional form in which strategic decision-making is separate from routine operations.

⁵ This does not mean that a healthy firm will always plan according to explicit rational criteria, such as maximization of expected profit. Rather, it implies that a firm will tend to adapt to changing circumstances: versatility is what matters (Langlois, 1995).

This biological digression suggests that this second capability trajectory foremost rests on a Smithian specialization argument. It therefore more explicitly returns to a Richardsonian observation: markets tend to specialize in the coordination of knowledge that is intelligible to all (data about prices and quantities), while firms tend to specialize in the coordination of knowledge that is instead specific (capabilities of production) in order to achieve some ends.

Moreover, similarly to Teece, innovation too is important to identify the boundaries of the firm. But, unlike Teece, who, as we saw, suggests that given a weak institutional environment vertical integration is necessary for the entrepreneur–innovator to appropriate rents that otherwise would be captured by others, here technological innovation changes the boundaries of the firm primarily for another reason. Vertical integration can also occur because not all downstream producers have the capability to understand the messages of the entrepreneur–innovator. Vertical integration can therefore solve communication failures that arise in organizational environments that are subject to change (see Silver, 1984).

One substantive implication of this is that transaction costs should be seen in less static terms, that is, as costs that arise primarily from imperfections in knowledge *à la* Dahlman (e.g., 1980, pp. 79–86). We may think of these *dynamic* transaction costs as the costs of bargaining with, coordinating with, informing, learning from, organizing, teaching, and persuading others: they are costs incurred for the search, organization and employment of the required capabilities when these are lacking (Langlois & Robertson, 1993). In light of this, it is not possible to separate capabilities from transactions. But because of their differing natures, the two basic functions of economic organization, namely, production and exchange, have traditionally not been treated as tightly interconnected processes. The more eclectic capability trajectory is, however, able to render them indissoluble by placing uncertainty at center stage.

Does this cognitive organizational vision run counter to Coase's original contractual message whereby the distinguishing mark of the firm is 'the supersession of the price mechanism' (Coase, 1937, p. 389)? Langlois & Foss (1999, p. 204) believe (correctly in my view) that the answer is no. Long-term incomplete contracts, they argue, enable firms to operate with much greater 'flexibility because they eliminate haggling and communication costs and allow those who possess superior knowledge to direct less-informed others. And when "the direction of resources (within the limits of the contract) becomes dependent on the buyer in this way, that relationship which I term a 'firm' may be obtained" (Coase, 1937, pp. 391–392). Thus ... Coase's explanation for the emergence of the firm is ultimately a coordination one: the firm is an institution that lowers the costs of qualitative coordination....'

3. Missing Links

The main message of capability theory is that there is often more to the conscious organization of inputs than the quantities in which the inputs are combined.⁶ In fact, as Radner (1992) has noted, economic organization is largely (if not primarily) about the combinatorics of heterogeneous productive knowledge. This message runs counter to what is often implicitly assumed in microeconomics textbooks, where the process of production and the outcome of production coincide. The more complex purpose of economic organization may be concisely restated following an early (textbook!) definition offered by Knight. Economic organization particularly matters 'when *different things are being* done, in the furtherance of a *common* end, and in definite relations to each other, i.e., in *coordination*.' Because there exist 'some innate individual differences in human capacities and aptitudes'—

⁶ A similar point was made by the behavioralists (e.g., Leibenstein, 1966), who were an important reference point for capability theory (e.g., Nelson & Winter, 1982).

i.e., differences in capabilities—‘the first in the list of gains from organization results from taking advantage of [these differences]. One ... problem is to discover such differences and utilize them as far as possible’ (Knight, 1933b, pp. 6, 17).

This broader restatement of the purpose of economic organization points to two problems. Let us call the first the *coordination cost* problem, and the second the *search cost* problem. As we will see, both problems are essentially capability ones, particularly in line with those investigated by the second trajectory. Consider them in reverse order.

The search problem refers to the discovery of different capabilities so as to organize them in a productive fashion. The discovery of different capabilities in order to employ them in pursuit of one’s objectives is not costless however. Capability search is expensive: there are significant (dynamic) transaction costs involved. Given capability dispersion, the problem of organizational setup does not usually have a cheap and easy solution.

But the search problem is not exhausted once a firm is set up. The search for the capabilities needed to achieve organizational objectives is incessant. Richardson’s matching ‘in level or specification’ continues throughout the lifecycle of a healthy firm, which constantly strives to place capability and rights to act on that capability in the same hands—a co-location problem.

Jensen & Meckling (1992) specify that there are generally two ways we might solve this problem of co-location.⁷ We could let knowledge move to those who have the rights to act; or we could let the rights to act move to those with knowledge. The co-location of decision rights to (nonspecific) knowledge is possible only in markets. In a market I have the right to shop for the brand of tuna that I like, even though I may not know the grocery store that sells my favorite brand until I do some searching. More generally, in a market I can

⁷ The discussion that follows draws on Garzarelli (2006).

voluntarily exchange or sell the decision rights that accompany my knowledge. This is not possible in internal organization. For example, an employee, bureaucrat or politician cannot (legally) sell (or exchange) his or her job (the bundle of employment rights, which includes decision rights over assigned tasks) to someone else and capture proceeds from such alienation.

In internal organization individuals are traditionally directed to a task on the basis of their implied capabilities, that is, the co-location proceeds in the opposite direction of markets—from (specific) knowledge to decision rights. Now, there are infinite ways to co-locate capabilities to decision rights. For instance, in fordist production (a rigid vertical organization of the division of labor) we have limited decision-right autonomy. Ultimate decision rights remain at the top of the hierarchy, notwithstanding the fact that a few basic rights are distributed along the way. In a strategic network alliance the decision rights are present both across and within the allied firms. To take one example, allied automobile firms may for a period of time share the ultimate decision rights about which common chassis design to adopt for a line of their automobile models. Simultaneously, however, the manufactures have the ultimate decision rights over whether to pursue different individual strategic plans.

This suggests that the difference among different organizational forms resides in the degree of decision-right autonomy.⁸ Hence, one ‘efficiency’ criterion to evaluate different organizational forms on a comparative basis may reside in their relative ability to facilitate the

⁸ Indirectly, this also means that the dichotomy between firm and market is off the mark. Again, this is so because the market is about the co-location of decision rights to nonspecific knowledge (prices and quantities), while the firm, and internal organization more generally, is about a variety of co-locations of specific knowledge (capabilities) to decision rights. The spectrum is not one involving market versus firm but is comprised of trade-offs among a variety of internal organizations, which include the firm (Garzarelli, 2006). The literature has alluded to this, though from a variety of angles that are different from the one adopted here; see, for example, Fourie (1989), Dietrich (1991) and Phelan & Lewin (2000).

co-location of capabilities and decision-making. This is a criterion that is seldom considered in the literature, but that, given its dynamic nature, is in line with capability theory.

Note that the co-location process is not limited to organizational boundaries: the attempt by healthy firms to provide a perfect mapping between capability and rights to act on that capability through time may require that appropriate capabilities be sought outside organizational boundaries. As we have noted, the creation of value is not a static problem. Accordingly, in any point in time the scope of a firm and its internal organization may also be a function of co-location. This does not concurrently mean that firms do not incur costs of co-location over time. Dynamic transaction costs are incurred in the attempt to co-locate capabilities of production at efficient cost. In fact, these costs from co-location are (one type of) coordination cost that the capability approach considers crucial.

We may think of the coordination problem as referring to two types of cost: internal and external (Houthakker, 1956). In traditional craft production, a sequential production process is entirely undertaken as well as coordinated by a single artisan. In the souk of Tunis, for example, we find shoemakers who perform every production task—cutting the hide, stitching the sole, dyeing the leather black or brown and so on right down to haggling with customers. In cases such as this the artisan does not need to coordinate any of his production tasks with any other artisan. Whether the artisan's capabilities are fully matched to the requirements of each stage of production is factually irrelevant, for both absolute and comparative advantages dominate the entire production sequence (limiting the extent of the market).

Thus, in craft production co-location costs are negligible. In practice, the artisan is not performing a co-location of capability and rights beyond himself: the capability and rights match not necessarily because of specialization but rather because the same individual is

working on all stages of production *irrespective* of specialization. There is co-location by natural composition. As a result, what the artisan experiences are only internal coordination costs: he internally coordinates a production process—his own—that exhibits low division of labor. In essence, internal coordination costs emerge when an individual needs to coordinate single-handedly not only his own capabilities but also his production sequence.

As individuals specialize, more attention must be directed to co-location, and comparative advantage is not a matter of indifference. Indeed, to benefit from economies of specialization, the organization needs to match capabilities to stages of production as fully as possible. And, as we have seen, this means trying to co-locate capability and rights to act on that capability. As an individual specializes in the performance of one task, the need for that individual to coordinate that task to the rest of the production sequence becomes negligible; that is, internal coordination costs approach zero, *ceteris paribus*. This is so because at least one production task has become a trade of its own.

At the same time it becomes necessary for someone (or something) else to specialize in the coordination of production, which includes the ability to co-locate capabilities with rights to act on those capabilities. When production becomes separated from coordination, external coordination costs manifest themselves. External coordination costs are external in the sense of lying outside the responsibility of production of the individual (who is now a specialist rather than a generalist), but they are not necessarily outside the process of production. They refer to the coordination of different outputs from different specialized individuals by another individual (or another firm or machine) specialized in coordination. This is an instance of Smithian division of labor which Houthakker calls *speciation*, namely, a process whereby specialization assumes specific and independent forms of its own (see also Young, 1928). We thus see the emergence of entrepreneurship, management, system

integrators and the like that coordinate production.⁹ Note that external coordination can refer to processes within as well as across organizational boundaries. System integrators, for example, are firms that are specialized in interfirm coordination; while a manager may only have the task of coordinating a single department of his firm.

Houthakker's framework enables us to bring into sharper focus an important point that is only implicit in capability theory: it introduces the extent of the market *in conjunction* with coordination costs. In internally coordinated craft production the extent of the market is limited by lack of specialization. But specialization bears the overhead costs of external coordination: here the extent of the market is limited by the amount of specialization that needs to be (externally) coordinated. More generally, the extent of the market depends on the relation 'between ... external and ... internal coordination costs' (Houthakker, 1956, p. 185). Much like the origin of dynamic transaction costs, the trade-off between internal and external coordination costs—between individual coordination costs and coordination costs among individuals (or various organizational forms)—has cognitive roots. Houthakker explains:

It is ... from indivisibilities that the division of labor takes its start, and the basic indivisibility is that of the individual For our purpose we may regard an individual as a coordinated complex of activities. The indivisibility of the individual consists in the fact that, although it may be capable of a great many different activities, it can perform only few activities simultaneously because most activities utilize the same resources and more particularly that coordinating resource which is known as the brain. The larger the number of simultaneous activities, the greater the difficulty of coordinating them and of carrying out each one properly, and the smaller therefore the output from each activity. This applies not only to simultaneous activities, but also to activities

⁹ See Brusoni, Prencipe & Pavitt (2001) on system integrators and compare for example Knight (1933a) on the entrepreneurial function, uncertainty and specialization.

that are spread out over time. In the first place some shorter or longer interval is usually needed to switch from one activity to another; in the second place it is usually easier to perform activities that are known from previous experience than to perform them for the first time.

All this, the economist will note at once, can be put in terms of increasing returns. We have increasing returns to the extent that, if several activities are replaced by a single one, there is less need for [internal] coordination and switching time and more scope for acquiring experience. The output of the single activity may thus be raised above the combined outputs of the several activities. (Houthakker, 1956, pp. 182–183)

But raising output to benefit from increasing returns has external coordination costs, which, being limited by our limited cognition like internal coordination costs, limit the extent of the market as well.

4. Conclusion

We have surveyed a set of theoretical frameworks that attempt to go beyond the production function approach that dominates textbook discussions of economic organization. Our focus has been on the capability approach, which we have sought to reinforce by drawing on work by Frank Knight and Hendrik Houthakker not reproduced in the collection under review. Knight identified the fundamental problem of economic organization as the search for and coordination of different capabilities that are dispersed throughout the larger social and economic system. Houthakker helps us to see more clearly that the benefits of specialization are not obtained at zero cost; whatever is the governance structure employed, there will inevitably be coordination costs due to differences in capabilities.

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