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RESEARCH NOTES AND COMMUNICATIONS

RESOURCE RECOMBINATIONS IN THE FIRM: KNOWLEDGE STRUCTURES AND THE POTENTIAL FOR SCHUMPETERIAN INNOVATION

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Building on the resource-based view of the firm, this paper explores the notion of 'resource recombinations' within the firm. We suggest such recombinations can occur when competencies within the firm (which are interpreted as organized clusters of firm resources) either combine to synthesize novel competencies (synthesis-based recombinations) or experience a reconfiguration or relinking with other competencies (reconfiguration-based recombinations). Central to this paper is an examination of the antecedents necessary for such innovation to occur, and in particular the nature of knowledge in the firm. We argue that several characteristics of knowledge (tacitness, context specificity, dispersion) and its social organization (the way competencies come to be formed and institutionalized) will have important consequences on the likelihoods of resource recombinations. Our paper develops a model of resource recombination likelihoods and propositions. © 1998 John Wiley & Sons, Ltd.

INTRODUCTION

Contemporary strategy research has seen a shift in emphasis from the structure–conduct–performance paradigm which emerged from industrial organization economics and towards theories which focus on the internal resources of individual firms as a key determinant of competitive advantage (e.g., Amit and Schoemaker, 1993; Teece, Pisano, and Shuen, 1997). Even within the internally focused, resource-based theories (RBV), however, there is a progression from an account of which (and why) resources may be valuable (i.e., scarcity-based or Ricardian rents) to an exploration of how these resources may be generated (e.g., Amit and Schoemaker, 1993; Henderson and Cockburn, 1994; Iansiti and Clark, 1994; Grant, 1996; Moran and Ghoshal, 1996; Helfat, 1997; Teece *et al.*, 1997). Central has been the prescribed role for the firm as the developer of novel resources—that is, firms are encouraged to innovate by searching out new resources, or new ways of using existing resources, as the basis for future organizational rents. In this paper we focus on one possible source of firm innovation, what we shall call resource recombinations, as pointed to by Penrose (1959: 25 emphasis added):

> The services yielded by resources are a function of the way in which they are used—exactly the same resources when used for *different purposes or in different ways and in combination with different types or amounts of other resources* provides a different service or set of services.

The seminal work of Joseph Schumpeter (1934), in particular, underscores this source of innovation (cf. Mahoney, 1995). Schumpeter emphasized that entrepreneurship was the key motive force in the capitalist process, generating the innovations, often radical in nature, that may alter the rules by which an industry or economy operates. Indeed, Schumpeterian rents imply inno-

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vation-based rents (Mahoney and Pandian, 1992). While noting the radical outcomes of such innovation, Schumpeter also considers their source. The 'entrepreneurial role' he described consisted of recognizing the value in the underlying parts of diverse systems and discerning that these parts could be recombined in a novel fashion:

> To produce means to combine materials and forces within our reach . . . To produce other things . . . means to combine these materials and forces differently. (1934: 65)

By this, Schumpeter was noting that sometimes innovation 'consists to a substantial extent of a recombination of conceptual and physical materials that were previously in existence' (Nelson and Winter, 1982: 30). In terms of its outcomes, Schumpeterian innovation is primarily radical and disruptive in nature. In terms of its source, we can think of Schumpeterian innovation as *the reconceptualization of an existing system in order to use the resources from which it is built in novel and potentially rent-generating ways* (see Henderson and Clark, 1990; Kogut and Zander, 1992; Grant, 1996).

Though Schumpeter regarded new combinations as largely the work of new firms and not existing ones (1934: 66), our focus is on why existing firms may find such novelty difficult to achieve. Below, we continue by briefly defining what we mean by resources in the firm, emphasizing knowledge-based resources, how they are structured in firms, and the importance of their flow to resource recombinations. We then briefly outline some forms recombinations may take before focusing on a model of resource recombination likelihood. This model will examine how characteristics of knowledge and its social organization in the firm may impact resource recombination likelihoods.

RESOURCES, KNOWLEDGE AND RECOMBINATION

Recent work in the RBV has placed greater emphasis on the properties of resources, and, in particular, distinguishes between more tangible, input resources (e.g., people, machinery, financial capital) and knowledge-based resources (e.g., Kogut and Zander, 1992; Nonaka and Takeuchi, 1995; Conner and Prahalad, 1996; Teece, Pisano and Shuen, 1997). Knowledge-based resources generally refer to the ways in which the more tangible input resources are manipulated and transformed so as to add value (Teece *et al*., 1997: 509). In essence, they are the organizing principles, skills, and processes that direct organizational action (cf. 'know-how,' Kogut and Zander, 1992: 386). Three notable properties of knowledge include tacitness (the extent to which knowledge is or is not codifiable) (e.g., Polanyi, 1966; Nonaka and Takeuchi, 1995), context specificity (the extent to which knowledge is highly contextualized and codependent on unidentified aspects of the local environment) (e.g., Nelson and Winter, 1982), and dispersion (the extent to which it is concentrated in the head of an individual or spread out across the minds of many) (e.g., Weick and Roberts, 1993). Each of these will have implications for resource recombinations.

Knowledge-based resources, however, along with their complementary input resources, also come to be further organized within the firm. Indeed, one often noted feature of the firm is its integrating role, bringing together diverse basic inputs and specialized areas of knowledge and bundling them to perform a productive task (Grant, 1996). Moreover, firms are full of such 'clusters' of input and knowledge-based resources. Such clusters include the specialized knowledge surrounding the use and manipulation of constituent parts as well as the architectural knowledge (Henderson and Clark, 1990) needed to use them together productively. Moreover, such clusters of resources are consistent with what many have referred to as capabilities or competencies of the firm (e.g., Prahalad and Hamel, 1990; Leonard-Barton, 1992; Barney and Zajac, 1994; Teece *et al*., 1997). Given some ambiguity over these terms (Collis, 1994), we adapt Grant (1996) and use the term competencies to describe combinations of input and knowledge-based resources that exist at higher levels in a 'hierarchy of integration.' At the base are the aforementioned highly specialized capabilities, typically held by individual members of the firm. These are then integrated into some form of higher-order systems or clusters of resources, whether technological areas (e.g., printed circuit board assembly), functional groups (e.g., manufacturing), and so on (cf. Teece *et al*., 1997: 516). Regardless of their exact shape, key to our thinking is that competencies will display *social and institutional qualities within the firm* (cf.

Collis, 1994: 145), such as strong local identities or 'thought worlds' (Dougherty, 1992). This social and institutional packaging of firm knowledge will also impact recombinations.

Our concern is with how the properties of knowledge and its organization within competencies may impact the likelihoods of resource recombinations in the firm. First, resource recombination concerns itself with how the knowledge embedded within a competence may have to be untangled, altered, and integrated with other knowledge bases to create novel business concepts and/or competencies. For instance, novelty may be generated through the *synthesis* of existing competencies. Hargadon and Sutton (1997) provide a good example in their study of a product design firm, where they show how this organization 'brokers' knowledge via its central network position between several industries, merging the different competence domains to which it has access and, through 'inventive combinations,' creating novel business concepts (see also Nonaka and Takeuchi, 1995; Helfat, 1997). Novelty may also be generated through *reconfiguring* the ways in which competencies are linked to jointly achieve some broader purpose (see Henderson and Clark, 1990; Grant, 1996). Regardless of the exact form recombinations come in, however, we hold that recombinations depend upon competency-related knowledge flows in the firm (e.g., 'internal information flows,' Itami and Roehl, 1987: 20). By knowledge flows, we mean all the various ways in which information, know-how, understandings, histories, etc., may be exchanged in the firm regarding competencies. For example, synthesis-based recombinations may require such knowledge flows to be created between relatively isolated competence areas (e.g., Nonaka and Takeuchi, 1995). In the case of reconfiguration-based recombinations, where some stable interactions already exist, new information and insights on neighboring competencies may be important to generating alterations in the linkages themselves (see Henderson and Cockburn, 1994: 67). In either case, the realization of resource recombinations depends upon the flow of competency-related knowledge between competence areas. In turn, these knowledge flows depend upon the basic characteristics of knowledge and its social construction in competencies in the firm (see Henderson and Cockburn, 1994:67). In the next section we present propositions for the likelihood of resource recombinations which rest upon the three basic properties of knowledge and its organization in competencies (see Figure 1).

Finally, Figure 1 also shows the role of two mediating constructs through which these five themes operate on knowledge flows: the *detection likelihood* of novel uses for existing resources and the *exchange costs* associated with implementation. (cf. Iansiti and Clark, 1994). Detection likelihood focuses on the *ex ante* knowledge flows that may be required to conceptualize novel recombinations. For example, knowledge regarding competencies, exchanged between individuals in the firm prior to some discovery (i.e., *ex ante*), may raise the probabilities for detecting novel uses of resources or alterations in linkages between competencies. The nature and organization of some knowledge may make novel arrangements of resources more difficult to conceive. Exchange costs captures the notion that even while some novel uses may be detected, for such insights to be implemented knowledge may have to be transferred across competence boundaries (i.e., *ex post*). Given that the transmission of knowledge is not costless (Teece, 1981), exchange costs may also influence recombination likelihoods. Similarly, certain characteristics of knowledge and the way it is held in the firm may raise exchange costs.

RESOURCE RECOMBINATION LIKELIHOODS IN THE FIRM

Basic knowledge characteristics

Tacitness of knowledge

Tacitness is now a familiar category for knowledge in organization theory (see Polanyi, 1966; Itami and Roehl, 1987) and generally describes the extent to which knowledge is or is not codifiable. Note that we do not require the more severe claim that tacit knowledge is never codifiable. Codifiability may change depending on what is available to assist in the codification. For example, processes involving the mechanics of motion of the human body were probably long thought noncodifiable until scientific techniques (e.g., video and computer analyses of motion, and other tools of Kinesiology) were brought to bear and some explication made possible. Within

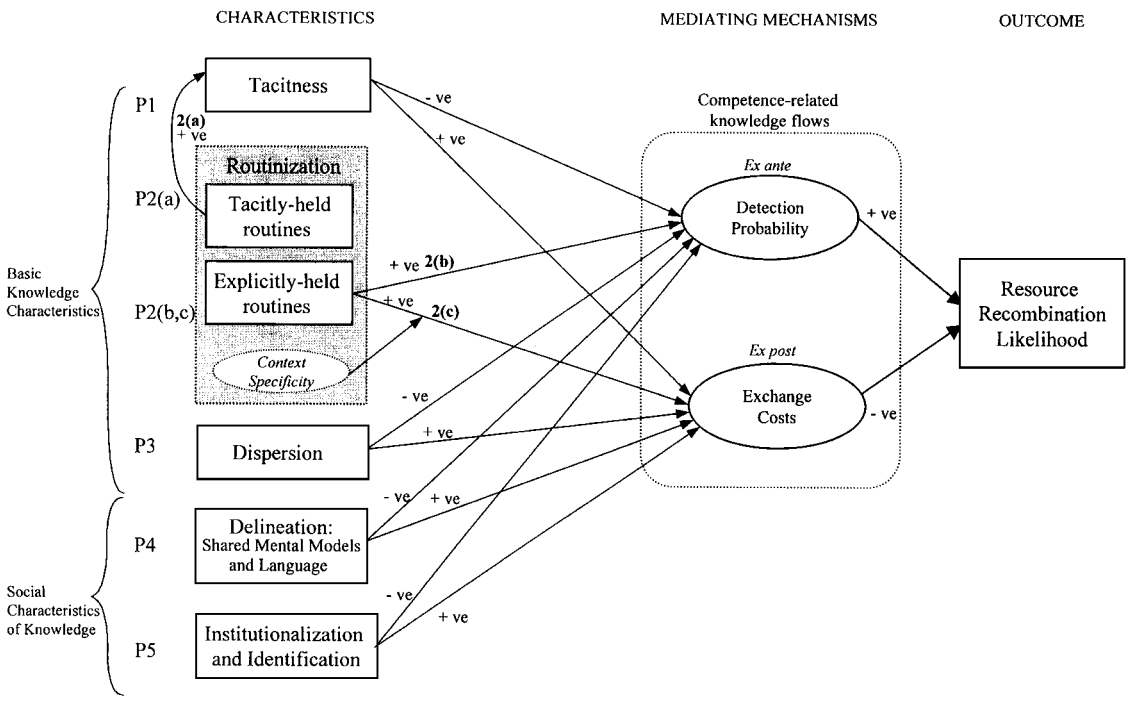

Figure 1. A model of resource recombination likelihood

the firm it is likely that no means currently exist to codify certain knowledge, or where such technology might exist it may be too expensive compared either to the expected returns from its transfer or from those returns anticipated were transfer achievable without codification.

Knowledge that is difficult to codify is likely to be difficult to detect. It will thus be more difficult for someone to identify this potential resource and imagine how it may be used in novel ways. This will be particularly true across competencies, where people are less likely to spend appreciable time interacting with one another, and thus less likely to have the time to experience and therefore to detect highly tacit resources. Thus, although the novelty of recombination is more likely where tacitness is high, tacitness reduces the likelihood of such discovery.

An alternative means of transferring tacit knowledge involves moving the people possessing the tacit knowledge to different areas in the firm and allowing socialization to inspire new combinations. Because this should ensure greater effectiveness of knowledge transfer (Nonaka and Takeuchi, 1995), it should raise probabilities of detecting new combinations. However, transferring knowledge through socialization is costly, involving the prolonged, if not permanent, interaction of individuals with whom tacit knowledge resides. This is particularly problematic across broad and disparate competence areas. Given the uncertainty of innovation, firms may be reluctant to invest in a costly exchange of people, in the speculative hope that a fruitful exchange of knowledge will result in the creation of a novel resource combination. Thus, knowledge exchanges will diminish with increasing tacitness and the likelihood of detection of new combinatory opportunities will fall as a consequence. Finally, even if a recombination opportunity were to be roughly identified, knowledge that is difficult to codify will be difficult to transfer in order to combine it with other knowledge in the firm (Teece, 1981). The effectiveness of documentation as a method for making knowledge available across competencies will decline quite rapidly the greater is the tacit component and, as was described above, socialization as a means of transfer is costly. Both factors reduce the flow of tacit knowledge between competencies needed to stimulate and support the creation of novel resource combinations. In general:

Proposition 1: The likelihood of resource recombinations will be diminished the more tacit the knowledge base, both due to lower detection probability and higher costs of resource exchange.

Context specificity and the routinization of knowledge

The context in which knowledge is developed is also important to its flow. This is mainly because knowledge is often highly contextualized. Take for example the tight coordination of an aircraft carrier flight-deck crew, as Weick and Roberts describe (1993). This valuable resource (i.e., its 'group mind') is likely to be of little use outside of the relatively narrow context for which it was developed. It would be far less effective a resource at New York's JFK airport even if it were given the same basic set of tasks—the differences in technology, physical layout, time pressures, and social atmosphere may all serve to reduce the usefulness of the carrier crew. This is not to suggest that knowledge could not have multiple uses (Prahalad and Hamel, 1990). However, because of the advantages of specialization, knowledge may be heavily customized to one particular use, increasing the context specificity and lowering its chances of flowing elsewhere. While desirable at the interfirm level, creating imperfect mobility of resources, it may be detrimental to intrafirm recombinations. In general, the likelihood of resource recombinations will be diminished the more context-specific is the knowledge involved.

One particular way in which this operates in the firm is through routinization. Routinization here refers to the development of a sequence of individual or organizational actions that require relatively little attention (Nelson and Winter, 1982: 125), so that the execution of the task becomes reliable, easily reproducible, and efficient (Meyer and Rowan, 1977). Furthermore, as Nelson and Winter point out, organization routines are often context dependent in various ways (1982: 87). That is, routines are often built over time and in such ways so as to hone-in the specific actions to the local context within which they are embedded. In this sense routinization, in general, may represent an obstacle to Schumpeterian innovation (Nelson and Winter, 1982: 131).

Routinization, however, may be further unpacked to reveal other implications for recombinations. First, we suggest that routines can often consist of both tacit and explicit knowledge. Using Nelson and Winter's (1982) example of the routine of driving to work, knowledge which began in documented form (say a map) becomes tacit with repetition and the map is often discarded. The routine may be recodified at some later date (e.g., by noting where exactly to turn, the best time of day to travel, hazards to avoid) only some of which may be captured by the map. This routine can therefore come in the form of documented, verbatim instructions, where it is primarily explicit, or auxiliary learning as one goes through the process and develops habits, where it is primarily tacit. Just as in the case of tacit knowledge described above, however, knowledge held in tacit routines will make detection problematic and may be a burden to codify. The more organizations run on tacit routines the less likely it will be that they will be able to realize novel resource recombinations. In general:

Proposition 2a: The likelihood of resource recombinations will be diminished the more organizational activities depend on tacitly held routines.

There are also implications, however, stemming from the knowledge retained in explicitly held routines. The portion of a routine held in codified form is likely to have two, opposing influences on resource recombinations. First, codification will improve detection probability. A routine that one area documents, say in a manual or a data base, is more likely to be identified by another area of competence than one that is not documented (for example, this is part of the rationale behind Andersen Consulting's data base on case histories and consultant experiences (*Economist*, 1996)). Therefore:

Proposition 2b: The likelihood of resource recombinations may be enhanced where routines are held in explicit forms due to an increase in detection probability.

The codification of routines, however, may also present problems for recombinations. First, the imposition of a routine across an entire organization may reduce the heterogeneity or variance of activity taking place within the organization. This will reduce the variety of knowledge held in the organization and thus lower the potential

for new combinations.[1] Second, since the documentation of tacit routines typically strips away the rich detail in which may be embedded understanding of *why* a routine functions as it does in that context, application to new contexts will be difficult. While codification may possibly make 'know-how' explicit (a causal chain for 'knowing how to do something' (Kogut and Zander, 1992)) it will usually do a poor job in explicating the 'know-why,' the understanding of how the original context mediates links in the causal chain. Because such understanding of the routine's contextual dependence will greatly facilitate its redeployment into new settings, any reduction in this understanding will render the routine far less mobile across contexts. Where redeployment is across competence boundaries, meaning that knowledge is used in new contexts, such context specificity reduces its utility for recombination.

For example, while business units may document tacit routines for internal use, they seldom go far enough in mapping processes so as to make them useful to other business units in the firm (who would be without the benefit of going through the same process in the same context). Although codification may very well increase the likelihood of exchange, the loss of this understanding will work in an opposing direction, by diminishing its perceived impact in a new setting. If more analytical work is put into developing a deeply nuanced understanding of the underlying reasons for the routine's effectiveness, its applicability in new contexts may be improved, but this comes at a higher cost and thus may diminish an organization's willingness to undertake the task on a speculative basis:

Proposition 2c: The likelihood of resource recombination may be reduced where routines are held in explicit form, reducing the heterogeneous activity that leads to new knowledge and increasing the cost of transferring the underlying understanding which might make the knowledge useful in new settings.

Dispersion of knowledge

Knowledge can also be distinguished according to its dispersion. It can be tightly held when self-contained and residing in the minds of individuals. It can also be widely dispersed, residing in the collective 'organizational mind,' for example in patterns of heedful interactions between individuals (Weick and Roberts, 1993). Dispersion does not mean information that is widely distributed. A picture on a jigsaw puzzle is *distributed* when each person receives a photocopy of the picture. The same image would only be *dispersed* when each of the pieces is given to a different person.

The dispersion of knowledge will influence its detection and movement. In general, concentrated knowledge may be detected and moved much more easily than dispersed knowledge. The first difficulty is in tracking down and identifying all the necessary 'parts of the puzzle'—because accurate views of complex systems are difficult (i.e., trying to determine the picture on the puzzle box by sampling potential owners of individual pieces) detecting dispersed knowledge may be problematic. Moving dispersed knowledge is also difficult. For example, when knowledge resides in systems of interactions, moving such knowledge cannot simply be achieved by transplanting an individual into the new setting. The transplanted individual will likely bring with him/her too small a part of the total system of heedful interactions. Moving this type of systems-embedded knowledge may require the wholesale uprooting and transplanting of the system, which may be expensive if not unrealistic. Moreover, since competence areas are likely to consist of relatively more dispersed knowledge, issues of lumpiness will be particularly problematic for recombinations of this form.

Proposition 3: The likelihood of resource recombinations will be diminished the more widely dispersed the knowledge, both because of higher costs of exchange and lower detection probabilities.

Social characteristics of knowledge

Having considered how some general characteristics of knowledge impact across-competence recombinations, we now turn our attention to how the organization and social interpretation of competence areas impact recombinations.

[1]We are grateful to one of the *SMJ* reviewers for pointing out this aspect of making routines explicit.

Delineation of competencies

Although competencies are much discussed in the literature, a question that deserves more attention is 'What or who defines their boundaries?' For example, Canon describes its competencies as fine optics, precision mechanics and electronics (Prahalad and Hamel, 1990). However, fine optics could be further subdivided into smaller categories, such as lens design, casting, grinding and polishing and thin film deposition of optical coatings. Where do the competence boundaries fall? While each element is potentially independent, within Canon they are typically clustered together into the groups in which they are most commonly deployed, i.e. fine optics. Moreover, boundaries between competencies are likely to arise around groups of individuals who interact frequently and come to share a common meaning or interpretive system (e.g., Walsh and Ungson, 1991; Kogut and Zander, 1992). As individuals interact (say around a new technology or an emergent process within a young firm) a particular body of language and symbols (both social and technical) develop over time, facilitating information exchange. The use of a common (often unique) language improves the efficiency of knowledge exchange first by allowing exchanges to take place more quickly and second by avoiding the necessity for ideas to be translated into a higher-level language for exchange (Kogut and Zander, 1992). Such an esoteric language itself represents a store of tacit knowledge since it often contains words with highly specific associations and meanings that are seldom (if ever) documented. More generally, this process suggests the construction and solidification of perceived reality through the imparting of common *meaning* to repeated exchanges and patterns of action (e.g., Rorty, 1991). These 'externalized' actions and routines (see Zucker, 1977) create mental models by which actors are guided in subsequent interactions.

As the stock of within-competence knowledge and meaning grows, and becomes more complex relative to the stock of knowledge about other competencies, people's absorptive capacity for within-competence knowledge will rise compared to their intercompetence absorptive capacity (Cohen and Levinthal, 1990). The difference between mental models of people in one competence and those in another will reduce the detection probabilities of potential useful knowledge. Because individuals' mental models filter the inflow of information, they increase the tendency to perceive data congruent with one's own mental models and unconsciously ignoring information that might not fit (cf. Vallone, Ross, and Lepper, 1985). This 'distorted perception' reduces the identification and retention of knowledge that might seed a significant change to existing knowledge structures (Neisser, 1976; Dutton and Jackson, 1987; Rumelt, 1995). Penrose points to this (1959: 113, emphasis added):

> [A firm's] opportunities are largely determined by its existing resources. Its entrepreneurial and managerial personnel work within the framework provided by these resources and their *interests and abilities are conditioned by them.*

Although Penrose intended this as an explanation of firm growth, we note that the same mechanisms can operate within the firm to explain why delineated resource bundles may fail to adequately interact, reducing the probabilities of resource recombinations. Moreover, differing language systems are likely to also result in exchange costs between competencies being higher than those within a competence. In other words, innovative search and knowledge flow will be local and the likelihood of recombinations diminished. In general:

> *Proposition 4: The likelihood of resource recombinations will be diminished the more delineated the competency area (i.e., having distinct and idiosyncratic mental models and histories), because of both lower detection probabilities and the higher costs of exchange with other competence areas.*

Competencies as sources of identity

Competencies can be institutionalized in a slightly different sense as well (cf. Scott, 1987). Sharing the same world-view will tend to strengthen ties and build a feeling of association with similar others. In turn, competencies may develop a taken-for-granted quality that imparts to them a *social value* beyond their usefulness in communication and exchange (Selznick, 1957; Leonard-Barton, 1992). Such structures tend to be identified by individuals as distinct, 'living' entities, with certain anthropomorphic qualities; indi-

viduals therefore tend to identify themselves with particular competencies and contexts (Fiol, 1991). This may make competence areas within a firm less susceptible to alteration, both to the extent that they are seen as value-laden entities and thus worthy of preservation and to the extent that personal identities are wrapped up within them. Moreover, not only do the competence areas themselves become institutionalized over time but so do their *interrelationships* with other competencies in the firm—institutionalization, in essence, is about the stability of one's *relative* role or status, thus linkages may also become more rigid.

In general, where such institutionalization of a competence area is strong, resource recombinations are less likely. First, the greater an individual's identification to the competence to which they belong, the lower will be the value attributed to knowledge from other competencies, and hence the lower the attention paid to other competencies' knowledge sets (cf. Vallone *et al*., 1985). Hubris (e.g., an overestimation of the value of one's competence regime (Rumelt, 1995)) and general defensive behavior (e.g., perceiving competencies outside of one's immediate association as threats (Argyris and Schon, 1978)) also contribute to reduce the probability that novel recombinations of knowledge will be detected. Second, stronger identification is also likely to increase resistance to any new knowledge which must be transferred for some discovery to be implemented, especially where alterations to one's existing area is required. As Scott (Argyris and Schon, 1978) points out, institutionalization of this sort tends to promote stability in the structure being institutionalized:

> *Proposition 5: The likelihood of resource recombinations will be diminished the more personal identities become bound up in and associated with a competency area, both because of the lower probabilities of detecting novel uses for existing resources and the cost of overcoming frictions in their subsequent transfer.*

CONCLUSION

Focusing on competency-related knowledge flows in the firm, we have suggested a number of propositions relating to the potential for discovering and implementing novel resource combinations within firms. These propositions seek to guide management in what we believe are some key impediments or issues to consider if novelty through resource recombinations is desired. They should also help strategic management scholars to build better frameworks for implementing or further operationalizing recombinations. For us, however, the focus has been more on the prior issue of what is it about the way firm resources are organized that may or may not allow such an important phenomena to occur.

REFERENCES

Amit, R. and P. J. H. Schoemaker (1993). 'Strategic assets and organizational rent', *Strategic Management Journal*, **14**(1), pp. 33–46.

Argyris, C. and D. A. Schon (1978). *Organizational Learning: A Theory of Action Perspective*. Addison-Wesley, Reading, MA.

Barney, J. B. and E. J. Zajac (1994). 'Competitive organizational behavior: Toward an organizationally-based theory of competitive advantage', *Strategic Management Journal*, Winter Special Issue, **15**, pp. 5–9.

Cohen, W. M. and D. A. Levinthal (1990). 'Absorptive capacity: A new perspective on learning and innovation', *Administrative Science Quarterly*, **35**, pp. 128–152.

Collis, D. J. (1994). 'Research note: How valuable are organizational capabilities?', *Strategic Management Journal*, Winter Special Issue, **15**, pp. 143–152.

Conner, K. R. and C. K. Prahalad (1996). 'A resource-based theory of the firm: Knowledge versus opportunism', *Organization Science*, **7**(5), pp. 477–501.

Dougherty, D. (1992). 'Interpretive barriers to successful product innovation in large firms', *Organization Science*, **3**(2), pp. 179–202.

Dutton, J. E. and S. E. Jackson (1987). 'Categorizing strategic issues: Links to organizational action', *Academy of Management Review*, **12**, pp. 76–90.

Economist (1996). 'Andersen's androids', **339**, p. 72.

Fiol, C. M. (1991). 'Managing culture as a competitive resource: An identity-based view of sustainable competitive advantage', *Journal of Management*, **17**(1), pp. 191–211.

Grant, R. M. (1996). 'Prospering in dynamically-competitive environments: Organizational capability as knowledge integration', *Organization Science*, **7**(4), pp. 375–386.

Hargadon, A. and R. I. Sutton (1997). 'Technology brokering and innovation in a product development firm', *Administrative Science Quarterly*, **42**, pp. 716–749.

Hayek, F. (1945). 'The use of knowledge in society',

The American Economic Review, **35**(4), pp. 519–530.

Helfat, C. E. (1997). 'Know-how and asset complementarity and dynamic capability accumulation: The case of R&D', *Strategic Management Journal*, **18**(5), pp. 339–360.

Henderson, R. and K. Clark (1990). 'Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms', *Administrative Science Quarterly*, **35**, pp. 9–30.

Henderson, R. and I. Cockburn (1994). 'Measuring competence? Exploring firm effects in pharmaceutical research', *Strategic Management Journal*, Winter Special Issue, **15**, pp. 63–84.

Iansiti, M. and K. Clark (1994). 'Integration and dynamic capability: Evidence from product development in automobiles and mainframe computers', *Industrial and Corporate Change*, **3**(3), pp. 557–606.

Itami, H. and T. Roehl (1987). *Mobilizing Invisible Assets*. Harvard University Press, Cambridge, MA.

Kogut, B. and U. Zander (1992). 'Knowledge of the firm, combinative capabilities, and the replication of technology', *Organization Science*, **3**(3), pp. 383–397.

Leonard-Barton, D. (1992). 'Core capabilities and core rigidities: A paradox in managing new product development', *Strategic Management Journal*, Summer Special Issue, **13**, pp. 111–125.

Mahoney, J. T. (1995). 'The management of resources and the resource of management', *Journal of Business Research*, **33**, pp. 91–101.

Mahoney, J. T. and J. R. Pandian (1992). 'The resource-based view within the conversation of strategic management', *Strategic Management Journal*, **13**(5), pp. 363–380.

Meyer, J. W. and B. Rowan (1977). 'Institutional organizations: Formal structure as myth and ceremony', *American Journal of Sociology*, **83**, pp. 340–363.

Moran, P. and S. Ghoshal (1996). 'Value creation by firms', *Academy of Management Best Paper Proceedings*, 56th Annual Meetings, pp. 41–45.

Neisser, U. (1976). *Cognition and Reality*. W. H. Freeman, San Francisco, CA.

Nelson, R. R. and S. G. Winter (1982). *An Evolutionary Theory of Economic Change*. Belknap Press of Harvard University Press, Cambridge, MA.

Nonaka, I. and H. Takeuchi (1995). *The Knowledge-Creating Company*. Oxford Press, New York.

Penrose, E. G. (1959). *The Theory of the Growth of the Firm*. Wiley, New York.

Polanyi, M. (1966). *The Tacit Dimension*. Doubleday, New York.

Prahalad, C. K. and G. Hamel (1990). 'The core competence of the corporation', *Harvard Business Review*, **68**(3), pp. 79–91.

Rorty, R. (1991). 'Inquiry as recontextualization: An anti-dualist account of interpretation', *Objectivity, Relativism and Truth: Philosophical Papers*, Vol. 1. Cambridge University Press, Cambridge, UK, pp. 93–110.

Rumelt, R. P. (1995). 'Inertia and transformation'. In C. A. Montgomery (ed.), *Resource-based and Evolutionary Theories of the Firm*. Kluwer Academic Publishers, Boston, MA, pp. 101–132.

Schumpeter, J. A. (1934). *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*. Harvard University Press, Cambridge, MA, (originally published 1911).

Scott, W. R. (1987). 'The adolescence of institutional theory', *Administrative Science Quarterly*, **32**, pp. 493–511.

Selznick, P. (1957). *Leadership in Administration*. Row, Peterson, Evanston, IL.

Teece, D. J. (1981). 'The market for know-how and the efficient international transfer of technology', *Annals of the American Academy of Political and Social Science*, **458**, pp. 81–96.

Teece, D. J., G. Pisano and A. Shuen (1997). 'Dynamic capabilities and strategic management', *Strategic Management Journal*, **18**(7), pp. 509–533.

Vallone, R. P., L. Ross and M. R. Lepper (1985). 'The hostile media phenomena: Biased perception and perceptions of media bias in coverage of the "Beirut Massacre"', *Journal of Personality and Social Psychology*, **49**, pp. 577–585.

Walsh, J. P. and G. R. Ungson (1991). 'Organizational memory', *Academy of Management Review*, **16**, pp. 57–91.

Weick, K. E. and K. H. Roberts (1993). 'Collective minds in organizations: Heedful interrelating on flight decks', *Administrative Science Quarterly*, **38**, pp. 357–381.

Zucker, L. G. (1977). 'The role of institutionalization in cultural persistence', *American Sociological Review*, **42**, pp. 726–743.