

**The Role of Routines for Organizational Capabilities --
A Critical Examination for Knowledge-intensive Organizations**

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*Paper prepared for the Conference on
Organizational Capabilities: In Search of Micro-foundations”, Copenhagen, December 2005*

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I. Introduction

The concepts of routines and organizational capabilities have extensively been discussed in the literature on innovation and corporate change since they have been put center stage in Nelson and Winter (1982). Organizations are considered the carriers of routines and capabilities in which organizational knowledge is encapsulated. Organizational routines seem to mediate between the behavior and capabilities of the individual firm members on the one side and the collective, organizational behavior and capabilities on the other. However, the precise relationships are still not entirely clear; problems occur not least when an attempt is made to apply these concepts in empirical work (cf. Becker 2004 and Becker, Lazaric, Nelson and Winter 2005). Two sets of problems seem particularly relevant here.

(a) At the descriptive level the question may be raised what kind of phenomena precisely are considered routines, and what, precisely, they effectuate. In which way can these routines, or some of their features, be characterized more generally?

(b) At the theoretical level an important question is how these routines emerge from the organization members' individual behavior and capacities.

(c) Furthermore, what precisely is the role often claimed for routines (e.g. by Zollo and Winter 2002) in creating and sustaining organizational capabilities?

In this paper an attempt will be made to clarify these questions. Our discussion of question (a) is based on an empirical study for two particularly suitable types of organizations. The one focuses on scientific research organizations with which most of us are quite familiar: research groups organized by university professors, larger university-based research centers, and professional research organizations for performing basic as well as applied R&D. The other case study focuses on professional service organizations, namely management consulting firms. As will turn out, within each of the organizations very different routines can be observed at different levels, while between the two types of organizations the routines at the same level in many cases do not differ much.

With respect to question (b), particular attention will be paid to the question of whether organizational routines are designed and implemented by the organization leaders, as could be expected given their importance for coordinating exchange and production inside the organization. Furthermore, we explore how the use of knowledge at the individual level is geared to the processes by which organizations develop and apply their capabilities. Without the input of previously (possibly on the job) acquired individual knowledge of the organization members no organizational production process can be run. What role organizational routines play for the individual processes of knowledge acquisition and application is important for understanding the organizational capabilities – question (c) above. This is evident not only, but in particular, for the knowledge intensive services of research organizations and consulting firms.

The paper proceeds as follows. Section II presents the theoretical coordinates for discussing the relationships between knowledge, routines, and organizational capabilities in this paper. Section III explores the case of research organizations and puts the routines that can be observed in such an organization in perspective with the theoretical conjectures developed before. Section IV turns to the case of consulting firms and conducts a similar analysis for this organization which differs from

the former basically by the private nature of the knowledge it produces. Section V offers some conclusions.

II. Individual Knowledge and the Mystery of Organizational Capabilities

Before turning to the question of how knowledge is transmitted, used, and produced in concrete (knowledge-intensive) organizations such as research centers or consulting firms, some reflections on the nature of knowledge are useful. As will turn out, these considerations also help to clarify the role and origin of organizational routines and capabilities. Knowledge is a factor that enables productive activities. However, in order to attain this production enabling capacity, knowledge needs to be acquired by the individual agents in the first place and then be “expressed” through the actions they take – the necessary cognitive capabilities presumed. Indeed, it may be claimed that all productive human activity involves the expression of previously acquired knowledge. (Even when “programmed” into tools, machinery, and automata, the pre-programmed knowledge can only be deployed through human users who thus express their individual user knowledge.) This is important to keep in mind when turning to cooperative forms of production. Based on specialization and a corresponding division of labor they are usually motivated by the increasing returns that can thus be realized.

As has often been emphasized (cf., e.g., Loasby 1999), the division of labor goes hand-in-hand with, and relies on, a corresponding division of production-enabling knowledge. To specialize in productive activities means to specialize in expressing particular knowledge. The coordination of the specialized activities requires corresponding knowledge flows between the agents. Where the division of labor is organized on the basis of market exchanges, the necessary transmission of information follows the spontaneously emerging market ties. The coordination of individual production activities (and, to a lesser extent, knowledge specialization) is then achieved spontaneously by individual decision making based on information on price and availability of exchange opportunities. The returns expected to be earned in market transactions provide the incentives.

Where specialization and division of labor are realized inside organizations, be they commercial firms or non-profit organizations, individual productive activities and the corresponding specialization in knowledge need to be coordinated differently. This is achieved by a governance scheme of *decision* rights/responsibilities and corresponding *information* transmission modes on the one hand, and the set of usually more technically determined *production* procedures on the other hand. Jointly they give rise to organization-specific *dip*-practices by which the internal interactions are regulated. In reality the *dip*-practices may often be difficult to separate from each other and vary greatly between organizations. If they do not mimic an internal market mechanism (including the corresponding incentive mechanism), they usually reflect a hierarchical structure of information flows, of giving and taking directives, of carrying them out, of monitoring the outcome, and of granting remuneration. Sometimes this is supplemented by continuing intra-organizational negotiations on who is doing what, how, when, and on what terms.

Analogously to question (b) raised in the introduction one may ask how the organizational

dip-practices come into existence. To answer that question, it is useful to distinguish between formally stated practices and practices that have not been formally stated. By and large, formal *dip*-practices – as well as modifications in them – are the result of deliberate design by the organizational leader(s). By virtue of the leaders' contractual position they are imposed as binding on the organization members in the hierarchy or at a certain layer of it. In contrast, informal *dip*-practices usually spontaneously emerge from interaction among the organization members processes, often within organizational sub-units, without being consciously planned by anyone.¹ Unlike formal *dip*-practices, whose compliance is usually formally sanctioned, their informal counterparts are either incentive-compatible and, thus, self-enforcing, or compliance with them is enforced informally, e.g. by forms of social ostracism within the group. Usually, formal and informal *dip*-practices co-exist in organizations simply because the formal ones are not sufficiently fine-grained to cover all details or the intra-organizational interactions. Compatibility between them is not necessarily always and fully ensured so that incoherent decision rights and responsibilities, poor and/or biased information flows, and inefficiencies in production can occur.

Before this background, question (b) can now be given an answer as follows.

Proposition 1: Intra-organizational *dip*-routines – which are carried out on a habitual basis by the involved organization members – emerge over time from designed or spontaneous *dip*-practices if the latter are repeated over and again.

A conversion like this obviously needs an extended period of sufficiently high interaction intensity to take place, a core assumption underlying the notion of organizational routines in Nelson and Winter (1982, Chap. 5).² The benefit of the conversion are intra-organizational interactions speeding up like under a learning curve effect, connected with reduced demands on the individuals' scarce cognitive resources. The conversion is independent of how the *dip*-practices have come about in the first place and whether they imply some incoherence and coordination slack. If so, this can, of course, result in inefficient organizational outcomes, cf. Lazaric and Raybaut 2005. It should be noted, however, that routinization is unlikely to occur if a practice persistently conflicts with individual incentives.

At the level of the individual organization member, especially newcomers, organizational *dip*-routines have to be learned to become a part of the individuals' habitual behavior. This learning process does not only have positive, but also in normative, connotations. The latter are connected with the often only implicit expectations about what happens in the case of deviating from the *dip*-routines, i.e. expectations about the nature and frequency of sanctions. Complying with organizational practices can be learned through explicit instructions and observational learning. The individual adoption of routines is, in contrast, a matter of continued repetition of the corresponding contingent action on the job. Only then routines get what they are: more or less unreflected courses

¹ Cf. Narduzzo, Rocco and Warglien (2000). Occasionally, informally emerged *dip*-practices can ex post be formally declared binding.

² For a thoughtful review of the historical roots of the notion of routines cf. Lazaric (2000).

of actions. Precisely this feature of organizational routines may, however, become an organization's Achilles heel, if the competitive environment is changing. There is thus also a potential cost to the conversion of practices into routines. Because of their unreflected nature, it may at least temporarily go unnoticed that the organizational routines have become ineffective or even dysfunctional and need to be adjusted or replaced. The phenomenon of once advantageous organizational routines that have turned into impediments for organizational adaptations and restructurings is frequently described in the literature (cf. Becker 2004). It is hard to avoid except by persistent reviews of, and deliberate reflections on, an organization's existing routines by, or in behalf of, the organization leader(s).

Organizational practices and routines thus can, but do not necessarily do, establish and secure an effective, cooperative production process. They coordinate the organization members' contributions, i.e. their expression of individual knowledge. It is this concerted expression of individual knowledge on which the organization's capabilities rest. For this reason the answer to question (c) raised in the introduction (the role of routines for organizational capabilities) can more specifically be put in the following form

Proposition 2: Without the expression of individual knowledge there are no organizational capabilities. But without the coordination of the distributed knowledge expression by intra-organizational practices and routines the organization cannot establish an internal specialization and division of labor on which the distinct *organizational* capabilities rest.

Once established and sanctioned, organizational routines are likely to channel individual activities. By the same token they also channel the individual acquisition and application of knowledge. The latter effect is essential for securing a certain level of cognitive compatibility between the individually held knowledge sets so that an organizational capability can collectively be sustained. The organization specific *dip*-routines which they have internalized enable the organization members to assess what parts of their individually held knowledge have to be expressed to make what kind of organizational activity feasible. This may involve problem solving and creativity and thus the generation of new individual knowledge. However, problem solving and creativity presuppose an organizational environment fostering intrinsic motivation on the part of the organization members and room for them to unfold their idea without narrow directives and tight controls (Williams and Yang 1999). If the *dpi*-routines of an organization fail to meet these prerequisites this can substantially impede the generation of new knowledge and the improvement of organizational capabilities.

Thus, organizational routines can differ substantially in the efficiency with which they activate supportive individual knowledge and elicit innovativeness. As has long been conjectured (cf., e.g., Kogut and Zander 1992, Foss 1996), qua the organizational capabilities that can be supported, *dip*-practices and routines can give an organization a unique, competence-based competitive advantage. In order for this to happen the underlying *dip*-routines must not easily be imitated; or the organization must have exclusive access to unique individual knowledge sets or capacities that cannot easily be imitated. In the former case the competitive advantage is unique

because of the coordinative competence of the organization, in the latter it is unique because of the collection of individual competencies that the organization coordinates.

If, as suggested here, organizational routines are interpreted as mediating between individual knowledge and its collective, selective expression, this allows to draw a few conclusions showing that there is nothing mysterious about organizational capabilities. *First*, it becomes clear that the organizational capabilities cannot be more than the sum of the individual knowledge sets all organization members taken together are able to express (be it overt or tacit individual knowledge expressed verbally or by action respectively). But, by virtue of the intra-organizational specialization and division of labor, organizational capabilities are, of course, more than each individual organization member knows. Due to its specific specialization patterns, certain capabilities may therefore be a unique to an organizations. *Second*, it is easy to understand that members moving from one organization to another one effectuate little in their new environment as long as they do not attune their knowledge expression to the specific *dip*-practices or routines of their new environment. *Third*, it can conversely be explained why existing *dip*-routines – often unlike organizational capabilities – do not break down when some members leave the organization. Organizational routines continue to function, if a critical mass of organization members attuned to them remain in the organization. The same is not necessarily true for organizational capabilities. If by the leaving members the composition of individual competencies coordinated by the *dip*-routines is changing in a critical way, organizations capabilities resting exactly on that composition may go lost.

III. Routines and Organizational Capabilities in Research Organizations

There is a rich and growing literature on auditing performance in universities and research-organizations. Yet most of these studies are outcome-oriented, and are not really dealing with the internal practices and routines which will – hopefully – lead to the expected results. Similarly, scholars interested in the study of routines have rarely found it worthwhile to study effective organizational routines in research groups, university departments, or other types of research organizations including their own. When one looks into the internal processes of high-calibre research teams it becomes obvious, however, that there are routines and organizational capabilities at work. ³ What kind of routines are these and what, precisely, do they effectuate?

Research organizations basically represent an environment in which different forms of scientific and technological knowledge are ⁴
– collectively reproduced by teaching and training,
– often only marginally extended through creative search, problem solving, experimentation, and

³ See Knorr-Cetina (1999) for a very interesting description of the internal processes within scientific organizations.

⁴ For a recent discussion of, and the distinction between, the different forms cf. Zellner (2003)

testing,

- documented or recorded,
- disseminated through publications in diverse media,
- employed to provide scientific or technical advice on demand, particularly in the more technically oriented fields.

Underlying this multi-faceted production process is an often highly complex network of parallel knowledge processing and knowledge expressing activities which need to be coordinated in order to contribute to the common output. Formally, the governance structure of research organizations in most cases is one of hierarchical supervision and responsibility but, due to the knowledge-centered nature of production controls are rather soft and the elicitation of intrinsic work motivation has priority. Most of the activities, particularly those in the day-to-day business are split-up into “operational” (Murmann, Aldrich, Levinthal and Winter 2003) *dip*-practices or routines. They seem to differ substantially from discipline to discipline and even between different research organizations in the same discipline.

However, a selected number of outstanding *core procedures*, in which high-performing research organizations typically are strong, seem to show less variance within and between the disciplines. These core procedures involve

- the process of screening and selecting high-calibre researchers;
- a stringent process of developing young scholars, typically through the Ph. D. process;
- managing the publications pipeline, i.e. attaining highly-valued targets in scientific journals and
- last but not least, the process of placing senior researchers in attractive academic positions.

Both the particularities of, and the contrast between, the diverse operational *dip*-routines and the more uniformly organized core procedures may be illustrated by a case study of a particular research facility within the Max Planck Society, a large basic research organization in Germany with roughly 15.000 employees which runs about 85 semi-independent research institutes specialized in diverse research disciplines. The Max Planck Society has implemented stringent rules governing the budget distribution and control, research evaluation, and the selection of the research directors of the institutes. In contrast, the operational *dip*-practices or routines, the accumulation and implementation of precedures for the Ph. D. process, the managing the publication pipeline, and the support of academic placement of senior researchers are left to the level of the semi-independent research institutes.

Our description of routines and organizational capabilities within this research environment differentiates between three organizational levels;

- at a primary resp. entry level, research centers select, socialize and develop promising young people;
- at a secondary level, focussed research groups are integrated into departments or competence centers;
- in addition, larger research centers with several departments need strong integrated capabilities (research mission, corporate culture, brand recognition etc.).

We will concentrate on a description of the first two levels of building and leveraging organizational capabilities. At the *entry level*, research centers hire young postgraduates and need

to develop and bundle skills in addition to university education. Promising young researchers with the appropriate mix of university degrees are selected and involved in a continuous learning procedure. Through group interaction and close monitoring, they learn and apply sophisticated research methods and tools, writing and presentation skills, behavioural skills of how to interact in Ph. D. workgroups as well as in scientific circles. Each research group or department develops and replicates its specific mix of exchange devices (the way how researchers exchange and share information), production devices as well as coordination devices. The effectiveness of these devices is measured by outcome in terms of

- number and quality of Ph. D. dissertations;
- publications in A and B class journals;
- presentations at conferences and peer recognition.

At the *secondary level*, experienced scholars, team leaders and directors develop organizational capabilities. These include the integration and coordination of research groups, active participation in conferences, as editors of journals, and in international research groups.

Secondary and entry-level capabilities need to be closely coordinated. In research centers there are limits to growth and the span of control (or better: the span of attention) is much narrower than for management consulting. Team leaders and research directors need to be continuously involved in selecting and developing younger researchers and Ph. D. candidates. They are actively involved in teaching at universities and use this as an important channel for educating as well as selecting high-calibre young people. Furthermore, they are constantly involved in developing and teaching research methods, in integrating Ph. D. workgroups and in co-authoring journal articles.

IV. Routines and Organizational Capabilities in Consulting Firms

Management consulting firms have been selected here as a second prototype organization for several reasons. First, the service they offer is often as knowledge-intensive or skill-intensive as the output of scientific research organizations. Second, they often display similar characteristics of team-based work and motivation. Third, they are often an important user or outlet of research results and offer career options for scientist leaving from publicly funded research organizations. On the other hand, the typical clear-cut business orientation of consulting firms, their commercial targets, and the private-good nature of their services set them apart from organizations in scientific research. These differences are likely to call for different solutions at both the level of the operational *dip*-practices and routines and that of the core procedures of management consulting firms. As will turn out, these differences also result in organizational capabilities which differ in a typical way from those of the scientific research organizations discussed in the previous section.

Unlike research organizations, management consulting firms produce an output that is clearly measurable in terms of the market value of their consulting contracts. The reason is mainly that potential demand willing to pay for the firms output – newly generated knowledge that reflects tailor-made solutions to specific problems of a customer – can at least temporarily be excluded from its use and thus be induced to engage in market transactions. Still, the production process itself resembles that of research organizations in many respects. Scientific and technological knowledge

relevant for consulting tasks is

- imported, adapted, blended with own experiences, and reproduced through training activities mostly on the job;
- applied to specific customer problems and, where necessary, ad hoc expanded;
- documented or recorded internally and communicated to customers and own staff working on similar problems for other customers.

Again this involves a usually fairly complex process of parallel knowledge processing and knowledge-expressing activities in the day-to-day business which are coordinated and controlled by operational *dip*-practices or routines

A special feature of the consulting business is that – usually originally only individually acquired – problem solving knowledge can often be reused within the organization. In this way, solutions for the same or similar problems occurring in different contexts and/or in relation to different customers can be produced with costs substantially lower than the costs of generating the generic problem solution. Prerequisite is, of course, that the originally only individually acquired knowledge is either communicated directly or documented and made accessible to other organization members with sufficient absorptive capacity. The cost-saving effect of the reuse of knowledge constitutes a competence-based competitive advantage for the organization, provided the generic problem solution can be prevented from disseminating and being imitated by competitors and/or users.⁵ Wherever this kind of reuse of organization-specific problem-solving knowledge is possible, *cip*-routines can be expected to have high priority that ensures the documentation and in-house proliferation of information covering earlier projects.

In the case of the consulting firms the outstanding core procedures involve

- the process of selecting and socializing smart young people;
- a sophisticated training and personal development program for developing effective project managers;
- the process of building new routines around relevant themes addressing complex problems in client organizations and certain industries;
- a balanced process of promoting and renumerating senior professionals and partners. While the working of the last two core processes is quite different from research organizations, the first two processes, namely the selection of high-calibre young staff as well as personal and team development involve similar routines in research as well as in consulting.

Management consulting firms have quite similar educational skill requirements as research centers. Almost 100 percent of consultants have university degrees, and there is a high percentage of Ph. D.s and some firms have strong affiliations with university professors and research centers. The company analyzed in our case study has been formed by a professor of business administration, and has consistently grown to a size of more than 200 consultants. While university degrees and Ph. D. degrees are important as entry-level requirements, the mix of skills and experiences is different

⁵ In the case of scientific research organizations the publication requirement usually confines the finder's competitive advantage to the period of the publication time lag, unless it is possible to gain a lead in difficult to imitate technicalities required to produce the results.

from research centers. At the primary level, less than 40% of consultants are hired directly from universities, while the majority of new people has between two and five years of practical experience, gained in business firms or in other consulting companies. Mixed teams of consultants serve as exchange-devices for sharing information about specific firms and managerial networks, relevant consulting tools and practices, as well as research methods developed at business schools.

Consultants of diverse background share knowledge and on-the-job training on business cases. The company maintains stringent routines of socializing, developing and monitoring young consultants during the first two to three years. The company runs an in-house “university program”. Every consultant is expected to participate in a two-day-workshop in spring and in a three-day-camp in fall every year.

Through continuous training seminars, on-the-job case work and mixed teams, consultants develop the required mix of skills including business experience and industry-specific know-how (e.g. supply-chain management in automobile firms), consulting tools and experiences (e.g. portfolio concepts, case structuring methods), communication and presentation skills in addition to the theoretical background gained through university education. Progress is monitored and measured on the basis of completed high-quality consulting work, personal reviews and feedback from clients.

At the secondary level, the firm is organized by practice areas, which can be compared with departments in research centers. Strong practice areas develop and maintain organizational capabilities which include

- a stream of similar projects for firms within an industry, part of which will become codified;
- this “synthesized knowledge” allows the firms sometimes to know more than each individual client (in the form of benchmark studies and comparative industry databases);
- the firms apply stringent quality control procedures and regular customer satisfaction surveys;
- joint workshops, strategy conferences and training camps play a strong role for integrating teams and building a group identity for the practice;
- an advanced inhouse-database contains up-to-date information on completed cases, appropriate tools and methodologies used, as well as industry-specific information and contacts (part of corporate knowledge management).

The company invests a considerable amount of time and money for these organizational capabilities which represent effective coordination-devices and exchange-devices that increase productivity in selling new contracts and for ongoing casework. Project managers as well as practice area leaders are expected to spend a certain percentage of time for developing routines and feeding the knowledge bases just described.

IV. Conclusions

In this paper organizational routines and capabilities have been discussed for two types of organizations with a very knowledge-intensive production, scientific research centers and consulting firms. Their accumulation, transfer, and implementation of organizational capabilities display many similarities. Both types of organizations need to develop diverse sets of capabilities and need to

bundle and reconfigure these capabilities. They are both active in different "arenas" and their performance is measured differently. Value and performance is defined by peer groups and research communities in the case of research organizations. The value and performance of consulting firms, by contrast, is measured by more mundane criteria like revenue-growth, client-satisfaction etc.. To compare effectiveness and performance of both types of organizations is assessed in terms of correspondingly defined "high-value targets". Both types of organization need to develop and bundle capabilities and they concentrate these capabilities in order to perform high value targets as defined by their respective stakeholders.

In research organizations, high-value targets are influenced and defined by peer groups and isomorphic pull through scientific communities. The most important "currency" are publications in highly-respected journals and rankings in the science citation index. In addition and related to these rankings, positions in Universities and newly established or growing research organizations represent the most important value targets. Knorr-Cetina's (1999) study on epistemic cultures provides an excellent account of how resource-allocation in science is influenced by socially-constructed value targets, much less than by the quest for truth and substantive discovery. In consulting firms, high-value targets are demanding clients with challenging and complex problems. Scott (1998) and Gaiser, Gerybadze (2005) have described the resource-allocation and incentive mechanisms within knowledge-intensive service providers. Demanding clients lead to the establishment of new consulting routines, a strong and lasting client relationship and above-average growth and profitability. This again will attract high-calibre professionals and will keep the virtuous circle of routine accumulation and retention moving.

As has been explained, there are similarities in the process of how *dip*-practices and routines and selected core procedures are created and sustained in both types of organizations. Yet the details of the practices and routines vary substantially. In any case, team-based capabilities in solving problems are derived on this basis from a coordinated acquisition and application of individual knowledge. The similarities between research organizations and consulting firms increase when it comes to the core procedures by which knowledge-intensity and highly skilled people are recognized as the core assets. Significant differences of both types of organizations in the core procedures relate to the outcome and performance indicators: research organizations are peer-oriented, mostly science-driven and not-for-profit, while consulting firms are customer-driven and represent for-profit organizations.

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