Replication of Organizational Routines: Conceptualizing the Exploitation of Knowledge Assets

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Revised: November 2000

Forthcoming in:  
The Strategic Management of Intellectual Capital and Organizational Knowledge: A Collection of Readings  
To be published by: Oxford University Press, New York  
Edited by: Nick Bontis and Chun Wei Choo
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The replication of organizational routines, as in the case where best practices are replicated within an organization or when a business system is deployed in a new geographical locale, provides a particularly vivid example of the idea of leveraging knowledge assets. Organizations that intentionally replicate practices and/or business models could be propitious settings for the systematic study of the management of knowledge assets. Yet, systematic study of the exploitation of knowledge assets in such settings requires conceptual infrastructure that is not yet fully in place. The replication of organizational routines offers a conceptual lens that could fill this theoretical gap. However, replication requires careful specification to be useful as an analytical approach to design experiments in knowledge management. In this chapter, we begin the journey towards such specification. First, we distinguish replication from conceptual neighbors such as the transfer of technology, and the diffusion of innovations between and within organizations. We then outline theoretical dimensions of replication. Next we illustrate those dimensions of replication of routines with two examples drawn from in-depth fieldwork. We conclude the chapter by raising broader theoretical considerations that we believe must also be part of a discussion of knowledge utilization in productive settings.
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The fundamental problem of improving knowledge utilization in organizational settings continues to attract considerable attention. This interest manifests itself under rubrics like organizational learning (Argote 1999; Garvin and Oliver 2000), knowledge sharing (Hansen 1999; Dixon 2000), internal transfer of knowledge and best practices (O'Dell, Grayson et al. 1998), closing the knowing-doing gap (Pfeffer and Sutton 2000).

It would appear that interest in leveraging knowledge assets outstrips the ability to achieve results in that domain. For example, a recent survey of 431 U.S. and European organizations conducted by Ernst & Young shows that only 14% of the respondents judged satisfactory the performance of their organization in transferring existing knowledge internally; the remaining 86% found it lacking (Ruggles 1998). There seems to be ample room for improvement.

Organizations can learn from experience how to exploit knowledge assets. Such learning is generally more effective when selected key aspects of the exploitation effort are varied, while the rest is kept constant or comparable. This way, causal explanations of success or failure in exploiting organizational knowledge can be rigorously assessed. For such quasi-experimental conditions to occur in a real life setting there must be numerous attempts to exploit knowledge, e.g. to transfer best practices, attempts that are comparable in all but those aspects that are being manipulated, which means that such efforts must be simultaneous or adjacent in
time, if they are to remain comparable. Such conditions are rare, especially when each attempt
is in and of itself a large-scale effort.

This is why few settings rival replicating organizations – organizations that intentionally
replicate internal processes and business systems – in their promise to illuminate fundamental
problems of knowledge management. Such organizations routinely conduct efforts to replicate
knowledge, often hundreds of times per year. Examples of such organizations are McDonalds,
Starbucks and Mail Boxes Etc, three chain organizations that have each opened several
hundred new stores worldwide over the past year. In all cases, they replicate outlets uniformly,
to the extent possible; each outlet being the implementation of a sophisticated business concept.
Such replicators can be regarded as natural laboratories for studying the leveraging of
knowledge assets.

Yet, systematic study of the exploitation of knowledge assets in such settings requires
conceptual infrastructure that is not yet fully in place. Economics and other disciplines that
employ the theoretical tools of decision theory to analyze organizational action presume that
those actions that would be needed to exploit knowledge are familiar and, for the most part,
readily available (Dosi, Nelson et al. 2000: pg. 10). Such treatment of knowledge utilization
typically relies on the signaling metaphor (Shannon and Weaver 1949), which portrays the
transfer of knowledge as an instantaneous and costless act– rather than as a costly and
protracted process (Rogers 1994; Putnam, Phillips et al. 1996). While useful to highlight the
basic elements of the transfer, such a view blurs the process by which exploitation occurs or
does not occur. As a consequence, the process of utilization is not well understood, and is
typically, often mistakenly, assumed to be trivial (Teece 1976; Szulanski 1994; Bradach 1998). Theory development efforts in this domain have been relatively rare and modest in scope.

The replication of organizational routines offers a conceptual lens that could remedy this theoretical deficiency. The replication perspective applies to a broad class of exploitation situations where an organization attempts to reproduce at multiple internal sites the outcome of an existing activity (Nelson and Winter, 1982). In this chapter, we begin the effort toward a more complete specification of replication as an analytical approach. First, we distinguish replication from conceptual neighbors such as the transfer of technology, and the diffusion of innovations between and within organizations. We then outline theoretical dimensions of replication. Next we illustrate those dimensions of replication of routines with two examples drawn from in-depth fieldwork. We conclude the chapter by raising broader theoretical considerations that we believe must also be part of a discussion of knowledge utilization in productive settings.

**Defining Replication of Routines**

Leveraging idiosyncratic profit opportunities latent in existing knowledge endowments often takes the form of replicating the firm’s productive routines in the quest for greater profit. In a straightforward descriptive sense, replication involves the creation of "replicas" -- that is, of a series of local routines that are quite similar to the original routine in significant respects. At the micro-level, a routine in operation at a particular site can be conceived as a web of coordinating relationships connecting specific resources; without those resources it could not exist. Considered as an abstract activity pattern, however, “that same routine” may be in operation also at a different site, where a different but similar set of resources is coordinated by a very
similar web of relationships. It is in that sense that routines can be replicated (Winter 1995: pp 149-150).

Replication of routines is one important process by which organizations re-utilize knowledge that is already in use. Seen that way, replication has several conceptual neighbors, including the diffusion of innovations, and horizontal transfers of technology between and within organizations, that also involve the transfer of knowledge embodied in organizational routines, practices and cultures. Despite many similarities, there are important, sometimes subtle, differences among these.

Differentiating replication from conceptual neighbors

The connotations of "replication" include the theoretically significant idea that there is an original that is being copied. We use the term "template" or "template site" to refer to this working example.\(^1\) Perhaps the most salient difference between replication and conceptually similar processes hinges on the fact that, unlike conceptual alternatives, replication allows explicitly for the possibility that the target routine, the routine that is being replicated, is only partially understood at the source. In other words, the target routine is causally ambiguous (Lippman 1982).

This assumption has two important implications. The first is that replication is likely to be a costly and difficult process. A causally ambiguous target routine would normally have some features that are irrelevant or even detrimental to its effectiveness and others that, though

\(^1\) The role of template may be played by a "flagship" example that is not the original in a historical sense but now stands out as an appropriate model of the type.
desirable, are impossible to replicate – such as unique human capital. Furthermore, some of its features may be tacit (Polanyi 1966; Kogut and Zander 1992; Nonaka 1994). Such tacit knowledge must be recreated by the recipient, rather than obtained through a single act of transmission and absorption (Rosenberg 1982; Attewell 1992; Zander and Kogut 1995). Replication thus could be a protracted iterative process rather than a single directional transfer, because several iterations may be necessary to produce an acceptable replica.

Second, and implied by the first, the replication of routines is an organizational capability that is learned by doing. Specifically, through repetition, the organization learns to increase the scope and speed of replication. For example, Bradach (1998) notes how, the central organizations of five restaurant chains he studied, progressively improved their ability to grow by replication by developing expertise in site selection, building outlets faster, and operating them more efficiently. Likewise, Love (1995, p.277) reports that McDonalds doubled its central real estate and construction staff to implement its ambitious acceleration of growth in the late 60s. Firm-level factors that may play an important role in creating and sustaining superior performance at the sub-unit level may include skill in site selection, human resource practices, and logistics or economies of scale in purchasing.

The contribution of the center can be conceptualized as the differential ability of the organization to access the template or target routine, when compared to that afforded to an imitating outsider. As Nelson and Winter (1982) explain, when problems arise in the replica, the replicating organization can attempt to resolve them by closer scrutiny of the original (p. 123); closer scrutiny of subtle features of the template site, of the fine detail of its productive routines,
and of the accompanying input flows. Such scrutiny may even extend to recollections of the process by which the template was constructed.

Attention to the role of the focal firm distinguishes replication from the diffusion of innovations in a population of organizations – on which there is a large literature (Rogers 1995) – and from an even closer neighbor, but one on which the literature is much smaller, intra-organizational diffusion (Cool, Dierickx et al. 1997). For the most part, the diffusion literature treats the recipient (adopting) organizations as the key locus of decision making and gives little or no attention to the source or promoting organization -- this notwithstanding the fact that informing the decisions of the latter organizations has been from the start an important practical rationale of the research interest in the area.

Studies of the transfer of practices and technologies do reveal the same sort of activism in the source firm that we find in replication strategy, and in this respect the subjects are close relatives. Such studies tend to be of “one-off” examples. Partly as a result, they tend to neglect the evolving role of the ‘center’ when there is one. This difference looms larger in intra-firm contexts.

**Dimensions of replication**

In what follows, we expand Nelson and Winter’s (1982) definition of replication as the costly, time-consuming process of copying an existing pattern of productive activity, by outlining theoretical dimensions of replication.

**Intended vs. Unintended Replication.** We seek to understand the managerial challenges of leveraging knowledge. Our focus, then, is on replication as an intentional activity. In saying this, however, we recognize that the early manifestations of knowledge re-use in a
given firm may not necessarily indicate an explicit effort to replicate, but that it might lead to such an orientation. At the opposite end of the spectrum, we find firms where replication of routines to leverage knowledge is a taken-for-granted feature of the organizational reality. The managerial challenges are most prominent in the broad zone between the "emergent" and "taken for granted" extremes.

What could be called unintended replication is a staple of the literature on firm behavior, under such rubrics as organizational inertia and the persistence of routines and cultures. These issues do impinge on our topic, in the role of obstacles to profitable replication. Also, when replication seeks to transform an existing business, established cultures and routines may offer resistance.

**Spatial vs. Temporal Replication.** We are primarily interested in the spatial replication of routines, i.e., replication in another geographical location with a different set of specific resources. The specific resources involved in the performance of the activity at a new locale are entirely, or almost entirely, different from those at the source or template site -- but the activity itself is, from a functional point of view and in many of its details, highly similar to what goes on at the template site. Spatial replication stands in obvious contrast to temporal replication – the reproduction of activity through time at a given site.¹

In many respects, however, the two forms of replication are close cousins. Spatial and temporal replication both rely on the existing example provided by the ongoing activity to be replicated. If, in a temporal replication, the process doesn’t work today but it did work yesterday, diagnostic effort is naturally guided by the question “what changed?” If, in a spatial replication, the process doesn’t work at the new site but it still works at the old site, the natural
The question is “what’s different?” The former effort must rely partly on memory while the latter can be supported by direct comparison. Neither sort of effort is guaranteed success, but in both cases the space of possibilities searched is vastly smaller than is required to diagnose the cause of a failure when the available reference is only a plan or concept of what success might look like.ii

**Broad and Narrow Scope.** Replication involves knowledge transfers of varying scope. In general, the notion of a routine involves no commitment regarding size – large routines are typically structured sets of medium-sized routines – nor does it make any assumptions about significance. The relative size of a routine could be loosely defined by its share of the productive activity of the organization. A large routine confers upon an organization’s management a set of decision options for producing significant outputs of a particular type. Such a large routine is referred to by Winter (Winter 2000: pg 983) as a “high-level” routine or as a “capability.” In contrast, a small routine could be entirely invisible and unknown to decision makers and may be triggered automatically by external events to the organization.

The transfer of a large routine is deemed to be of broad scope. The transfer of large routine will create or greatly modify the organizational context of the target organization, possibly defining or re-defining its identity. In contrast, a transfer of a small routine – even though it could be a large effort in absolute terms – is considered of narrow scope because the organizational context of the target organization will remain relatively stable. In a transfer of narrow scope, the locus of adaptation activities will be primarily internal and will consist mostly of modifications to the transferred routine, with possibly some minor accommodating changes made to the inner organizational environment (Downs & Mohr, 1976; Leonard-Barton, 1988).
In a broad-scope transfer, adaptation efforts seek to align the target organization to the characteristics of its external environment.

Replication may involve the creation of a new establishment, with a work force consisting for the most part of employees new to the organization, or it may involve the conversion of an existing establishment with a substantial carryover of the previous work force. In the latter case, the establishment as a whole may be relatively new to the organization or it may have a longer history in it.

Obviously, in a narrow-scope replication that involves sets of practices or key systems, rather than an entire business model, there must be an existing establishment in which the change takes place. A characteristic set of issues arises involving possible interference between new and old ways of doing particular things, dysfunctional interactions between the new ways and complementary parts of the existing organization, or cultural incompatibilities.

These same issues tend to loom larger as the scope of the change increases, and are most prominent when a new and comprehensive business model is imposed on an existing organization. More typically, when an entire business model is replicated, a new establishment is created at the same time. This avoids the pitfalls associated with the legacy of the past, but the creation of an adequately coordinated productive organization where there was none before involves substantial learning costs.

**True vs. False Replication.** Replication is concerned with leveraging existing organizational processes. Any changes that may occur in the characteristics and the quality of products and services, in the customer satisfaction, or in the firm’s reputation are seen as indirect consequences of replicating routines, and therefore as possible indicators of outcome.
Thus, it is important to distinguish replication of routines from *faux replication*, i.e. from the replication of superficial features of the template without costly involvement with internal organizational processes. This approach seeks to derive marketing advantages from the general expectation that similar looking things will prove to be similar. Faux replication is more likely to be a tempting strategic option in contexts where even a short-lived favorable reputation is well rewarded.

Narrow scope replications are often directed at improving internal efficiency. At this end of the spectrum, the customer may not carry away any distinct impression as a direct result of the replicated practices. Sometimes, however, even a small routine may have a noticeable impact on reputation. One example is McDonald's French fries. The fries are the product of a standard process that is carefully replicated and monitored (Hayes, Pisano et al. 1996); they also constitute an important feature of McDonald's reputation – for most people, an affirmative reason for seeking out a McDonald's stand.

Below, we illustrate the theoretical dimensions of replication with two examples drawn from in-depth fieldwork.

2.1 Replicating Routines at Rank Xerox

Rank Xerox is a European multinational with operations in all Western European countries, and also in Africa and in Asia. In 1992, it had 26000 employees and a turnover of 4 billion ECU. The early 1990s had been a time of substantial change at both European Rank Xerox and its parent company, Xerox Corporation, headquartered in Stamford, Connecticut. To match the financial performance of the US operations, Managing Director Bernard Fournier launched the Rank Xerox 2000 initiative in September of 1992. An important part of the
initiative consisted of a reorganization designed to shorten the “line of sight” between headquarters and customers to match the customer responsiveness levels achieved by the Business Division structure of Xerox US. A main thrust of the RX-2000 initiative was to identify and transfer “best practices” across countries. Fournier formed a series of expert teams to meet these objectives. The most ambitious initiative, “Team C,” had the goal of increasing incremental revenues by identifying, documenting, and transferring best practices associated with discrete sales and marketing processes.

The first wave of the Team C initiative (Wave I) began in 1994. The goal of Wave I was to identify, document, and transfer best practices to bring specific products to market to increase revenues. Team C searched for discrete best practices that were contained entirely in a specific location. These best practices would be then transferred to other locations, with the originating unit offering the working example of that practice, for others units to consult and emulate. Team C selected nine validated best practices for revenue growth. The units where best practice was found and validated were designated as benchmarks. Team C then prepared and distributed a set of easy-to-understand books detailing those practices. The table below details the nine best practices.
<table>
<thead>
<tr>
<th>1. MajestiK</th>
<th>An initiative to increase market share in the European color copier market.</th>
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<td>2. Customer Retention</td>
<td>A plan to encourage current customers to repurchase equipment from Rank Xerox by providing special incentives to salespeople for customer retention as well as technological database aids for tracking customer equipment stocks, usage requirements, and contract expiration dates.</td>
</tr>
<tr>
<td>3. DocuTech</td>
<td>An initiative to sell offset printers to commercial and educational users by focusing on overall document solutions rather than on traditional product or price selling.</td>
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<tr>
<td>4. New Business Major Accounts</td>
<td>A plan to establish salespeople whose sole responsibility is generating new business.</td>
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<tr>
<td>5. DocuPrint</td>
<td>A plan to accelerate sales of the newly launched line of high speed network printers, particularly to the banking and insurance industries, by emphasizing the product’s image printing capabilities and systems integration features.</td>
</tr>
<tr>
<td>6. CSO Competitive MIF Identification</td>
<td>An initiative for rapid updating of the Rank Xerox companywide sales database to track competitive information and provide salespeople with reliable leads.</td>
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<tr>
<td>7. Analyst Time Billing</td>
<td>A plan to sell the value-adding, problem-solving consulting services of Rank Xerox technical analysts.</td>
</tr>
<tr>
<td>8. XBS</td>
<td>A plan to educate salespeople on how to sell facilities management services effectively through the creation of simple packages and pricing options (i.e., Rank Xerox providing to the customer a packaged service consisting of both equipment and manpower).</td>
</tr>
<tr>
<td>9. Second Hand CEP</td>
<td>An initiative to regain control of the secondhand market for centralized mainframe printers (typically found in data centers) by repurchasing secondhand machines, refurbishing them, and reselling them to targeted accounts for which price sensitivity is very high.</td>
</tr>
</tbody>
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The Team C, Wave I initiative was started and closely tracked by the senior management team. The steps taken by Team C to collect best practices, document them and
diffuse them exemplifies possible roles of the ‘center.’ It exemplifies a situation that involves deliberative, conscious choice, i.e., intended replication.

Replication is however not a fully institutionalized part of the organizational fabric at Rank Xerox. The original implementation goals of Wave I were tentative and relatively modest: 50 percent of the opportunities to transfer best practice would be pursued in 75 percent of the regional units. The corporate office asked each regional unit to choose at least four from the set of nine practices. These voluntary features undoubtedly mitigated the problem of fit between the transferred routines and their new organizational environments. Even though the Wave I project met overall expectations, the different initiatives experienced varying degrees of success. Some surpassed expectations, others merely met expectations, and some failed to meet expectations. Team C, Wave I initiative increased revenues by $106 million in the first year and by $150 million in 1995, at an estimated cost of roughly $1 million per year.

Rank Xerox’s Wave I exemplifies also spatial replication. The effort aimed at reproducing those practices in different national subsidiaries. The Team C Wave I initiative concentrated primarily on leveraging small routines, consisting exclusively of narrow scope replications. Yet, the internal processes represented by these routines did have some impact on the customer’s perception of Rank Xerox.

2.2 Replicating Routines at Banc One

From 1982 till 1993, Banc One, a regional retail bank, grew its asset base from $5 billion to over $46 billion mainly by acquiring and affiliating 36 banks. In that period, Banc One

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grew its assets 15 times, from $5 billion to over $75 billion. By 1997, Banc One Corporation was one of the nation's largest bank holding companies with assets of over $101.8 billion with 1,502 offices in Arizona, Colorado, Illinois, Indiana, Kentucky, Louisiana, Ohio, Oklahoma, Texas, Utah, West Virginia and Wisconsin. Increasingly larger new affiliates were converted to a standardized product line supported by common data processing (DP) systems through the “affiliation” process.

An important part of that process was the “conversion” of the bank to common DP systems and operating procedures. Banc One relies on standardization of deposit and loan products, and implementation of "common systems" of data processing. Their conversion process is admired by the industry, in both its quickness and completeness. In general, a bank can close its doors Friday evening, switch over to Banc One systems and operating procedures, and re-open on Monday morning with a completely different appearance and operating practices.

The chart below illustrates the state holding companies' return on average assets the year prior to their affiliation to Banc One and after their conversion was completed. As can be seen from this chart, Banc One virtually doubled the return on average assets of the banks it acquired in this period. At its 1997 size of 100 billion dollars in assets, roughly $1 billion per year of returns on average assets could be attributed to successful replication of BO practices.

[Figure 1 about here.]

The benefits that Banc One derives from replication are not, however, limited to a once-and-for-all improvement in new affiliates. Rather, the common systems implemented in all BO banks provide the foundation for continuing comparison, knowledge sharing, and performance
incentives. Thus the whole corporate performance standard is lifted because of the replication-induced comparability of the outlets.

The informal process used to convert early affiliates became progressively formalized. Because even brief malfunctions of converted affiliates were prohibitive, achieving flawless implementation of conversions was of utmost importance to Banc One. Indeed, as converted banks grew larger, corporate efforts to make conversions work smoothly took precedence over efforts to develop new products.

Banc One's conversion process has six phases spanning approximately two hundred days: PLANNING the project scope and resources; DEFINITION where the converting bank's and Banc One's current and desired environments are defined; DESIGN where the converting bank's post-conversion environment is designed; DEVELOPMENT where the computer programs and the bank's new work environment is developed; TRAINING where the bank is prepared for the post-conversion environment; and SUPPORT when the bank begins to operate in its new environment. Each phase begins and ends with an event, however, different application areas may be in different phases at the same time. The figure below graphically summarizes the process. Interaction between BOSC and the new affiliate is intense at the beginning and end of the process, when information on the existing state of the affiliate is gathered and the conversion team assembled, and later in the training and support phases surrounding the conversion date. Design and development, by contrast, are largely processes internal to BOSC.

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3See Uyterhoeven (1994) page 17.
Significant and measurable events during the process are called deliverables. The timing of their delivery is relative to the conversion weekend, or more precisely, to "Day 0" - the first day of the affiliate's operation with BO systems. Specific deliverables mark the termination of one phase and the beginning of another. Once the conversion date is chosen, the calendar for that specific conversion project is automatically set. For this reason, conversions are taken-for granted aspects of Banc One's organizational reality, and considered largely automatic from the top management perspective.

Indeed, the hallmark of a good conversion is that, for everybody but those directly involved in the conversion, the transition from the affiliate's existing systems to BO systems is a non-event. BO's corporate management essentially assumes that a conversion will be completed successfully and thus their awareness of the conversion process rarely encompasses more than issues related to setting the conversion date. They will devote time and effort to the conversion process only when delays in the completion of a key deliverable disrupt seriously the conversion process or when cost overruns are so significant as to impair BO's ability to conduct other planned conversions on the same budgetary year. This has happened; not all conversions are non-eventful.

This non-eventful nature of a good conversion is to a large extent also true for the existing customers of the affiliate, even though they are directly affected by the conversion because the product offerings change and because the reports issued by the affiliate may change. In a successful conversion, the affiliate's customers are given advance notice of these
changes. This transforms them into little more than small and predictable inconveniences. Thus, in a successful conversion the bank should not lose customers because of the conversion.

At Banc One, replication efforts concentrate on processes and efforts to replicate process knowledge are explicit and central. In some cases but not all, these processes had a direct impact on the customer's experience. Banc One converts affiliates to its "common systems," the set of systems that are standard to the corporation at any given time. Although the exact composition of common systems varies as new applications are developed and old ones discarded, three groups of applications are usually covered: Strategic Banking Systems (SBS), Branch Automation systems (BA) and credit (overdraft line of credit) and deposit (checking, savings, certificate of deposit) applications. Banc One offers over 75 different credit and deposit products, each supported by its own dedicated application. Branch Automation systems have two separate subsystems: Teller Automation and Platform Automation. Within a single workstation, Teller Automation provides the tellers with all the information and transaction capabilities they need to identify customers and to review account relationships, transactions, activity and balances. Platform Automation supports sales and service of banking products by allowing service representatives to open accounts on line and by generating automatically the necessary forms. Information common to numerous accounts is entered only once and transferred by the system to the respective application systems. The Strategic Banking System, developed primarily to expedite the introduction of new products and give banks a total and accurate picture of the customer's relationships, acts as an integrating application by providing the capability to process customer information, deposit and credit accounts all in one system.
To operate with BO systems, the branches and the back office of a bank need suitable operating procedures. To address this need, BOSC offers affiliates a set of generic operating procedures, in the form of guidelines or flowcharts, that the new affiliate can customize for their own use by filling in the blanks and expanding some details. For example, such step-by-step procedures instruct tellers on how to handle commercial loans, utilities, installment loans, money orders or food stamps. Similarly, they provide instructions that platform operators could follow to open a new savings account, sell loans, stocks or treasury notes. These codified procedures support and complement the detailed training provided to the affiliate’s personnel.

A Banc One affiliate that undergoes conversion essentially unlearns its own identity to become a member of the Banc One family. Converting data processing systems means that a new affiliate abandons one tool to do business and unlearns the accompanying operating procedures in order to learn new ones that suit the new set of tools. By adopting Banc One's systems and operating procedures, a new affiliate adopts the same set of tools that all other members of the BO family are using to conduct their business and thus its tools can be supported by BOSC, and its results directly compared with those of other units. Subsequently, responsibility for keeping the systems operational and current falls to BOSC.

Converting a new affiliate means installing new applications in the affiliate's computer system and converting its existing data files on customers to a format which is compatible with the new applications. The new affiliate's personnel are trained and then supported until they can comfortably operate the new systems on their own. After a conversion, a new affiliate will have changed its standard operating procedures and supporting assets and systems in irreversible ways – and this provides strong protection against “backsliding” to old routines. The precise
nature of the conversion is tailored to the affiliate's new operating environment, not its existing
identity, and its old practices are effectively discarded. Thus, the organizational change at the
local level is much more fundamental than in a typical example from the diffusion of innovations
literature.

During a replication, Banc One selects a "sister" bank to provide a realistic scenario for
the post-conversion operating environment of a new affiliate. The new affiliate can visit the sister
bank to see how it operates and how it is structured. This helps the new affiliate to make
conversion-related decisions with more confidence. This also reduces the likelihood that the
converted bank will repeat avoidable errors. Sister banks can help train a big new affiliate and
may even temporarily lend specialists to new affiliates to help them solve transition problems. To
select a sister bank, Banc One looks for a bank that has converted recently to a similar set of
products and systems, and that operates in a similar market context.

Banc One has also started to develop a different sort of template in the form of a
"model" bank, which consists of a functioning laboratory model of a retail bank's front office and
back office, where the latest corporate standards, operating procedures and work flows are
implemented. Every new system that is made part of Banc One's Common Systems is also
made part of the model bank. The role of the model bank is to complement the sister bank
approach to support conversions before, during and after they occur. It provides a forum where
pilot trials and experiments can be conducted without disrupting the functioning of an actual
bank.

In short, Banc One provides an example of intentional replication, where replication
activities have been routinized. Replications at Banc One are of broad scope. High-level
routines that substantially impact the capabilities and identity of the acquired bank are the object of replication.

**Theoretical Considerations in the Replication of Routines**

So far we have refined the notion of replication of routines by specifying some of its theoretical dimensions and outlining differences with neighboring concepts. We have then illustrated our theoretical discussion with two in-depth examples. We now raise broader theoretical considerations that we believe must also be part of a discussion of replication of routines as a mechanism of knowledge utilization in productive settings.

**Relevance of the information economics paradigm**

Our theoretical approach to replication is grounded in the economics of information. Fundamental to the modern literature on this subject is the recognition that information has properties that distinguish it from typical economic commodities and consequently requires a distinctive theoretical analysis (Arrow 1962; Stewart 1997; Shapiro and Varian 1999). Although a particular item of information may be very costly to discover or create, the costs of additional use of it once it is in hand are typically low. An idealization that is often close to the truth -- and more often as information technology advances -- is that information is costly to produce but (relatively) costless to reproduce, store and transfer through space. Given this idealization, it is clear that the second receipt of given information by a specific recipient is essentially of no consequence, since the recipient can costlessly derive as much use as desired from the first receipt – an economic attribute that contrasts sharply with the situation that obtains for the second carload of wheat or the second acre of land.
A familiar point in the strategy literature is the difficulty of appropriating rents from a fully codified innovation, unless the innovation is well protected by intellectual property rights or can be exploited secretly. The force of this point arises precisely from the fact that the secret only has to get out once to undermine the innovator's claim on the rent stream. Even within the context of effective intellectual property rights protection, the economics of costly original creation and cheap reproduction is a dominant strategic theme in such areas as pharmaceuticals, movies and videos, software and publishing. The relationship between the costs of original creation and the magnitude of demand for the product (as modified by efforts to increase it) is the key to profitability.

Replication exemplifies, however, a class of non-standard examples of these information economics ideas. In standard examples, there is typically little occasion to distinguish among three separable aspects of the notion that information is cheap to reproduce, specifically 1) the “non-rivalrous” character of information, i.e., the fact that reproduction does not diminish the information content of the source, (2) the absence of ambiguity about the information content of the “original” that is reproduced, and (3) relatively low costs of the reproduction process. In the printing of an issue of a newspaper, for example, the discovery, development and organization of the information that constitutes the content of the newspaper is a cost that has to be incurred only once for the issue, independent of the copies subsequently printed. Once rendered in a form capable of generating a single copy of the newspaper, that content unambiguously expresses an “original” in symbolic form, and it is a fact of technology and economics that the per copy costs of reproduction are extremely low relative to the cost of
creation of the original. By contrast, replication – and many other situations – illustrates that aspect (1) need not be accompanied by aspects (2) and (3).

The teaching of a tacit skill through apprenticeship or coaching provides a basic illustration of these “non-standard” situations. Certainly the teacher’s command of the skill is typically not diminished by the effort to convey it to the student; it may well be enhanced. Thus, aspect (1) prevails. On the other hand, the fact that the content is a tacit skill means precisely that the content of the original cannot be adequately and usefully rendered in symbolic form, and with that comes an inevitable ambiguity about what the content amounts to and whether the student’s command matches the teacher’s. For example, the degree of transferability of the skill to novel contexts is likely affected by the way it is taught, but not in straightforward and easily characterized ways. Finally, imparting skills in this way requires at least the substantial time investments of teacher and student and perhaps also the services of some valuable apparatus on which to practice – a tennis court, an aircraft, a surgery patient. Thus while the information content of the teacher’s skill is per se non-rivalrous in use, that fact implies neither that it can be delineated precisely nor that it can be reproduced cheaply.

Replication presents these same issues and attributes, but on a large scale. While standard information economics logic may apply, for example, to the printing of menus and manuals, or to outlet décor, there are typically also requirements for training in tacit skills, including particularly the outlet manager’s tacit appreciation of the coherence of the total process – the sense of how the whole thing fits together. The problem of the ambiguity of the original presents itself with particular force, because replication efforts quite typically begin with an observed business success at one or a few local outlets. The aspiring replicator entertains
the cheerful hypothesis that the success is attributable to non-rivalrous business information that can be successfully replicated at other locations and confer benefit in excess of costs – but what it is that is to be replicated, and how, is unknown at the start.

This logic, clearly illustrated in the examples of Banc One and Rank Xerox Wave I, is of central relevance to a broad range of business situations.

The application of the information economics paradigm to replication thus presents a variety of issues; some of them illustrate the kinship to the standard examples and hence seem familiar in that perspective, while others are clearly deviant. Beginning with the first category, we note that the various outlets of a business systems replicator resemble each other closely in appearance. They look like “copies.” Economic sense suggests that the likely explanation for the existence of all these copies is that there are gains to be had by making them; from this it is easy to infer the substantial economic value of the original creation that lies behind them. This interpretation is underscored by managerial words and actions that affirm the value of making high fidelity copies, such as those observed in our two examples.

Appearance, however, is not the relevant test. In the language above, resemblance in appearance might only be indicative of "faux leveraging." Consider the classic case of McDonalds. Creating a large chain of outlets with strong superficial resemblance to McDonalds stands in matters of décor, menus, and so forth would be expensive, but it is not difficult from a knowledge viewpoint. Such resemblance at a superficial level is easily produced. Producing strong resemblance among a number of different outlets in terms of internal processes and customer experience is another matter, especially when it comes to details like the flavor of the french fries. Each outlet is a functioning organization in its own right, though perhaps a small
one, and the task of creating such an organization is far more complex than the printing of another copy of a newspaper, producing another 100 doses of some drug, or putting up golden arches. It requires not only that the requisite plant and equipment be put in place, but that a work force be recruited and that the relevant skills and routines be imparted to that work force, one way or another. Each local outlet has a manager with a distinct personality, and that fact alone is enough to suggest that the organizational cultures of different outlets cannot be precisely the same. Differences in culture, stemming from this source and others, can in turn affect the details of organizational routines, perhaps to the point where there are readily observable differences in the outcomes realized by customers.

Viewing the start-up of an outlet in the perspective of organizational learning and organizational knowledge suggests additional considerations illustrating the non-standard character of the information economics analysis of replication. The term "information" is often used in a way that implicitly assumes the existence of a symbolic medium by which information is conveyed, and of an infrastructure for encoding, decoding and (most importantly) interpreting it. Further, there is assumed to be no binding constraint on the capacity of this infrastructure. In fact, communication in organizations typically involves specialized language (or “codes”) understood only by the participants in the organization at a given time (Arrow 1974; Nelson and Winter 1982).

Thus, leveraging knowledge by replication of routines necessarily involves an investment in communication infrastructure, at least in the form of training in the organization’s specialized language. Adequate command of the language requires, however, substantial knowledge of organizational context: the link of information to action typically depends on the knowledge-
based interpretive powers of individual human beings. Hence, the organizational use of symbolic information depends on the stocks of knowledge held by the participants; much of this is tacit and/or context dependent and it reflects the accumulation of local experience. Under these circumstances, the creation of the requisite knowledge stocks at a new outlet can be accomplished only through a variety of costly processes that are substantially less straightforward than a standard notion of transmission of information would suggest. It often includes processes that both require support from a template site and involve a significant component of new organizational learning at the new outlet.

To adapt the information economics paradigm to the analysis of replication, we need conceptual apparatus that captures the standard and non-standard features and the linkage between them. Without denying the complex, costly and problematic character of a "copying" process that involves causal ambiguity, knowledge transfer and learning, we can still affirm the basic validity of the idea that a successful business model or set of routines is at least potentially a valuable template: it may contain what we will call an "Arrow core" -- an abstract, quasi-informational source of economic merit that can be replicated by embodiment in new resources at new locations and yield a surplus over the combined costs of the new resources and the replication process. Such a surplus represents successful leveraging of the idiosyncratic knowledge asset the firm possesses in the template.

The Arrow core is (by definition) information-like in the important sense that it is non-rivalrous in use; it is not used up in the process of replication. Hence, the extent of the leveraging is not limited from the "supply side" by the scarcity of the Arrow core – a situation
quite analogous to what happens in the standard examples of information economics logic, such as book publishing.

On the other hand, the template as an ongoing business entity *is* rivalrous in use; efficient allocation of its activity between direct production and contribution to replication is a consideration affecting the appropriate rate and method of replication. Similarly, the resources of the new outlet are rivalrous in use; for example, it would not suffice for only one teller in a new BO affiliate to be familiar with the new systems. The structure of the situation parallels that of a teacher imparting knowledge to a group of students. It is fundamental that the knowledge in the teacher’s head is non-rivalrous in use; the knowledge is still there after it has been imparted to the students (unlike the teacher’s copy of the textbook). However, the teacher’s time *is* rivalrous in use, and so is that of the students and the classroom and other support services. So the fact that there is non-rivalrous knowledge in the teacher does not make knowledgeable students free. There is economic magic in the non-rivalrous character of information and knowledge, but it is not magic of unlimited power.

Obviously, the firm's ability to achieve these good outcomes would be enhanced by good information on the relevant considerations. Equally obviously, this sort of information is likely to be very scarce in the early stages of a replication strategy. This fact enhances the relative importance of the initial conceptualization of the replicable advantages; this "mental model" will be much more controlling of initial efforts to leverage a particular resource, for example, than actual but yet unknown circumstances. In this sense, it can learn replication by doing it.
As the replicator accumulates experience in transferring knowledge, it learns about the transfer process itself. It may make substantial investments in resources specialized to the replication activity, and establish organizational units that are dedicated to this activity, gradually accumulating the sorts of resources featured in the analysis Dierickx and Cool (1989).

The higher order capabilities created in this way are likely to present a stronger barrier to imitation than the visible activities of local outlets, since access to the firm-level template can be more effectively restricted. It is one thing to contemplate imitating a Starbucks coffee bar, quite another to consider imitating a set of organizational capabilities that makes it possible to locate, design, build, furnish and train personnel for new coffee bars at the Starbucks rate of about one store a day.

**Sustainability.** Attempts to leverage knowledge assets are obviously of greater strategic interest when the advantage so derived is sustainable, i.e., cannot be easily eroded by imitation. Our analysis of the leveraging of knowledge assets through the conceptual lenses of the replication of routines suggests some of the keys for sustainability. First, the replicator has superior access to the template, a working example of the successful business model or set of routines. The significance of this point is enhanced to the extent that key features of the routines are not readily observed in a local outlet, and to the extent that the routines involve tacit components that can only be acquired through “hands on” training by a qualified trainer, and with equipment that is itself idiosyncratic and not accessible to an imitator.

Second, the replicator learns from experience and often makes specialized investments to facilitate replication. The challenge facing the imitator is not to copy a local outlet at whatever cost, but to acquire a replication capability that can compete in terms of cost, effectiveness and
speed with that of the challenged firm. These higher order capabilities are likely to be both less observable and, as the fruit of experience, intrinsically less inimitable on the basis of mere observation than the local outlet routines.

Third, apart from capabilities directly related to knowledge transfer, the replicator may have other firm-level advantages in replication capabilities, such as site selection and acquisition. When suitable sites for the type of business are scarce and differentiated, the combination of site selection capabilities and first mover advantages provides a paradigmatic example for the point that a firm can profit from its superior information about its own intentions. The replicator that first introduces a particular business model can acquire good sites at prices reflecting their value in inferior uses; subsequent challengers are left to pick over inferior sites in what has become a better-informed market – and then to compete with the established incumbent. A frontal challenge may actually be deterred in some locales – not every McDonald’s has a Burger King nearby.

Fourth, the replicator may also develop further layers of protection by cultivating operating superiority in such areas as logistics, supplier relations, quality control, economies of scale in purchasing, and perhaps upstream integration in key inputs. While each of these advantages might be overcome, their individual and collective effect is to extend the period of time required for a challenger to reach break-even.

While our analysis of sustainability refers implicitly to advantages derived from broad scope replication, the analysis of sustainability of advantages derived through narrow scope replication follows a similar logic. Each individual attempt at narrow scope replication is likely to be less significant but also less observable. While each one of a series of individual attempts may
be easier to imitate in isolation, a mosaic of narrow scope replication efforts would be more
difficult to decipher and thus imitate. The logic of specialized investments and the role of the
center could apply to this situation as well.

**Laboratories of Knowledge Utilization**

Our analysis of replication identifies variables that could be manipulated to further our
understanding of knowledge utilization. Specifically, our analysis points out to two aspects of a
routine, the tangible aspect embodied in the working example or template and the intangible
aspect that we called the Arrow core. It also points out to the importance of considering the size
of such routines and the scope of their replication, to whether the replication that occurs in
space versus replication that occurs over time, and to the degree to which replication is a
genuine effort to recreate the working of productive routines versus a more superficial concern
with mere appearances of similarity.

We have suggested that replication provides a relatively transparent window on
knowledge issues in general. Thus, in settings where replication is attempted with sufficient
frequency, such variables can be manipulated systematically to isolate how they affect the gains
from replication. For example, one deeply entrenched belief in international business posits that
there are no global best practices. Rather, practices must be tailored in advance to the
characteristics of different national contexts to be effective. This is a specific manifestation of the
fundamentally important problem of transfer of learning: what is learned in one context may be
useful in others -- but which learning specifically, and which other contexts? Some organizations
such as chain organizations pursue broad scope replication as their strategy. Others pursue
replication of internal processes of smaller scale. In dealing with those challenges, such firms are ideal settings for systematic study of thorny issues of knowledge management.

The attractiveness of replication settings as a laboratory arises, above all, from its pervasive “one to many” structure. At least over a short time frame, a given replicator is reasonably viewed as engaged in an effort to accomplish “the same thing” in different places. The same “treatment” is being applied in a variety of environments; measurable differences in environmental conditions therefore provide powerful probes to determine how (or whether) success is affected by those differences. Note that the concept of attempting “the same thing” can be applied flexibly in this sort of analysis; for example, when the replication process involves an element of routinized responsiveness to local conditions, there is still an underlying identity of treatment at the level of the application of the same routinized process. Changes in the policies of a given replicator over time, or contrasts in the contemporaneous policies of similarly positioned replicators, provide additional sources of analytically interesting variance. For example, by examining contrasts and similarities in the ways that MBE Master Licensees approach the problem of building MBE networks in different countries, and relating these to their success, we hope to build a case that there are indeed global “best practices”.

A secondary but nevertheless significant virtue of replication settings is that they abound in practices that, while quite sharply defined, are not particularly esoteric. The observer is therefore in a position not only to understand in general terms the content of the knowledge that is being transferred, but also to probe its details to the extent necessary. This means that the list of possible explanations for transfer difficulties need not include highly technical issues that may be beyond the observer’s ability to assess.
Ernest Rutherford, 1908 Nobel Prize in Chemistry, once said, “if you need statistics for your experiment you ought to have designed a better experiment.” Alas, the field of knowledge management is not yet at a stage in which it could profitably apply statistics, much less the advanced stage at which it could dispense with them. It lacks the theoretical infrastructure to design experiments, and settings in which to conduct them. We believe that the replication of routines could provide a paradigm for the systematic study of the leveraging of knowledge assets. And companies that regularly attempt to copy their business process internally could be appropriate settings to conduct the needed experiments. We hope this chapter will inspire new experiments. We hope replication of routines will help realize the promise of gaining systematic knowledge about knowledge management.

Acknowledgments

We would like to acknowledge useful comments from Arie Lewin, Bruce Kogut, Mark Bonchek, Hank Chesbrough, Ned Bowman, Chun Wei Choo, Hans Pennings, Connie Helfat, Mark Bonchek, Alice Rivlin, Mary Tripsas, Michael Porter and Jan Rivkin, two anonymous referees, and participants of the Conference on Risks, Managers and Options, held at Wharton to honor Ned Bowman. We wish to acknowledge also Deepti Chauhan’s research assistance. Research support was provided by the Reginald H. Jones Center Management, Policy, Strategy and Organization and the Emerging Technologies Program of the Huntsman Center for Global Competition and Innovation.

Endnotes

for a discussion of temporal replication in relation to the firm’s ability to maintain its technological competence in a changing world.

The HBS Case Corning Glass Works: The Z-Glass Project presents an interesting example of a struggle to diagnose the cause of failure in a process that was previously working well. It is clear that an actual working example would be a better basis for diagnosis – and codification, the objective in the case – than a previously working example.


This section is based on Szulanski’s fieldwork for his dissertation, Appropriating Rents from Existing Knowledge – Intra-firm Transfer of Best Practice (1995). For discussion of research methods and further detail on the Banc One example, see Ibid.

A striking contrast with Banc One’s smoothly routinized conversion process is provided by the Wells Fargo acquisition of First Interstate in April 1996. Wells targeted a
seven month process for converting First Interstate to Wells’s computer system. As it turned out, the computer system did not have the capacity to handle the combined load, and the bank’s entire computer system went down for two days in September. Repercussions included losses of market share in loans and deposits; in early 1997 Wells was losing accounts at a rate of 1.5% a month. Hansell, S. (1997). Banking with a heavy hand; Wells Fargo risks becoming a victim of its own power. New York Times. New York: Sec. 1, p. 33..

vi The term “application” means a software program closely associated with a particular financial product and necessary to deliver that product. Applications may be developed by Banc One or supplied by an outside vendor.
References


Figure 1

Performance in

State Holding Companies
Return on Average Assets

(percent)

OH  IN  WI  TX  IL  KY  CO  AZ  WV

Year Prior to Affiliation
1992
1993
Figure 2

- Planning
- Definition
- Design
- Develop.
- Training
- Support

- Bank Completes Questionnaires: Day: -120
- Application Strategy Published: Day: -90
- Conversion Agreement: Day: -60
- Testing Complete, First Training Class: Day: -30
- Conversion Day: 0
- Handover Day: +30

- Due Diligence
- Announcement
- Kick-Off
- Conversion
- Handover