BENCHMARKING THE LEAN ENTERPRISE: ORGANIZATIONAL LEARNING AT WORK

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ABSTRACT: Following the success of the Toyota Production System in the world of automotive manufacturing, the new business philosophy of the lean enterprise is gaining ground in that industry and in many others, among them construction; it appears to be positioned well to replace nearly a century of conventional or mass production practices. This study investigates the use of benchmarking in transforming a conventional organization into a lean enterprise. In this transformation, the management of knowledge and the practice of continuous learning and improvement figure prominently. From the perspective of benchmarking as a learning tool designed to reduce uncertainty in the organizational environment by reference to peer experience, the study distinguishes various forms of benchmarking and then addresses issues in knowledge management, information seeking and use, the diffusion of innovations, resistance to change, benchmarking strategies and practices, and benchmarking teams and protocols, concluding with a critique of its limitations.

INTRODUCTION

> The strength of a man's virtue should not be measured by his special exertions, but by his habitual acts.
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> —Blaise Pascal, *Pensées*

Following the clear success of the Toyota Production System in the world of automotive manufacturing (Ohno 1988a,b; Shingo 1989; Womack et al. 1990; Moden 1993a,b; Liker 1997; Knuf 2000b), a new business philosophy is gaining ground in that industry and also in many others, among them construction (Koskela 1992; Alarcón 1997). It appears to be positioned well to replace the accepted wisdom of nearly a century of conventional or mass production practices. This business philosophy goes by several names. In the more narrow sense, it is known as ''lean manufacturing'' (sometimes ''agile manufacturing'' or ''just-in-time manufacturing,'' and broadly as ''lean enterprise'' (Womack et al. 1990). It is characterized by a particularly intriguing form of intellectual behavior, ''lean thinking'' (Womack and Jones 1996), which promotes a variety of methods to reduce or eliminate waste in organizational processes to speed up the customer order fulfillment cycle: (1) A ubiquitous focus on value; (2) the identification of the value stream from the conception of the product to its delivery into the hands of the customer; (3) the arrangement of all processes in the value stream into a smooth and logical flow; (4) the application of the principle of pulling value out of the process; and (5) the relentless pursuit of perfection.

The business philosophy of the lean enterprise is described rather quickly: All activities and systems are designed to deliver products and services to the customer with minimal waste and maximal value. The definition of value is equally simple: Value is everything for which a customer is willing to pay. This parsimonious requirement—value, not waste—has astoundingly complex consequences for business practices, however. Typically it entails a complete realignment of machines, equipment, and tools, of human labor processes, of leadership and management support, of logistics and planning methods, of sales and purchasing activities, of supply chains and, of course, of mental models or thinking (Senge 1990), all in an effort to generate the highest possible proportion of value while excising waste at every opportunity. Following is a quick sketch.

The lean enterprise seeks to satisfy customer needs in the shortest response time. This suggests at first generous warehousing or stockpiling activities of all relevant resources: materials, equipment, capital, labor, and knowledge. But because (except in rare cases, such as wine) physical warehousing adds cost rather than value, this is not an acceptable solution. Instead, resources must be arranged to be available on the basis of actual need, a demand that requires logistical solutions of requisite variety (Ashby 1956). In manufacturing, for example, cus-

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tomers pull the product directly from the end of the production line, so that nothing is ever manufactured that has not been ordered. This avoids obsolescence, damage in storage, and other evils. But pulling the product out of production presumes fully supplied workstations. Rather than allow stations to be stocked by the warehouse—for the given reasons—we find that suppliers deliver their materials and assemblies in a just-in-time manner, logistically masterminded by a system of physical or electronic circulation tokens (so-called *kanbans*), directly to the place of use (Ohno 1988a).

The production facility is laid out in a flow pattern, perhaps also using supporting cellular arrangements, so that all stations can hand off the product to the next, minimizing transportation needs. Good housekeeping is mandatory. There is no clutter, everything is kept clean, and tools and other equipment are assigned their specific locations. Even containers find their customary positions outlined by colored tape on the floor.

The human resource system supports the business philosophy. In the lean enterprise, work should be done with a minimum of supervision and control. To reach this goal, employees must be empowered and, at the same time, held accountable for their decisions and actions (Knuf 1997; this and other lean manufacturing videotapes are available from the Center for Robotics and Manufacturing Systems at the University of Kentucky). Training and education play a large role here but also the use of teams as an organizational principle. Teams supply not just combined experience and emotional support to the work but also social norms that affect performance. A norm-focused workforce is one that follows and enforces the standards that provide value. A competent and committed workforce eventually learns to manage itself to a high degree (Beyerlein and Johnson 1994; Knuf 1998a).

The work itself is done in a well-studied, precisely formulated, and disciplined manner, so that variance in the quality of the product is reduced. This standardized form of work is dynamic, however, and the target of continuous improvement efforts by operators. Nothing ever is done well enough—new opportunities always beckon just around the corner. As the saying goes, the better is the eternal enemy of the good.

What is described are a few of the characteristics of the manufacturing variety of the lean enterprise. Most of them transfer directly to other industries, a few perhaps only indirectly (Knuf 2000b). The axioms of the lean philosophy—the fundamental importance of relationships among all internal and external value chain partners, the uncompromising pursuit of value, and the priority of people—certainly hold. So do the principles of organizing all processes just-in-time, of authorizing operators to rebalance machines (*jidoka*), of creating stability in all processes, and of then using this stability as a platform for continuous learning. Finally, of the generalized techniques, most apply to any lean enterprise: The housekeeping tools of ''5S'' (sorting and scrapping, straightening, scrubbing, standardizing, and systematizing); *kaizen* or continuous improvement; *heijunka* or leveled production; visual management instruments; or the overall focus on the avoidance of waste, such as unnecessary movement, transportation, rework and repair, or inventory, all of which are associated with cost and add no value. Other techniques, such as the use of *takt* times (a set pace of progression from task to task) may need translation or modification.

The systematic adoption of the philosophy of the lean enterprise brings significant competitive advantages to companies. Womack et al. (1990, p. 13) reported that lean manufacturing

> uses less of everything compared with mass production—half the human effort in the factory, half the manufacturing space, half the investment in tools, half the engineering hours to develop a new product in half the time. Also, it requires keeping far less than half the needed inventory on site, results in many fewer defects, and produces a greater and every growing variety of products.

The greater autonomy, empowerment, and knowledge of the workforce, without which lean thinking cannot be practiced, will lead to similar results in workplace democratization and worker self-actualization.

COMPETITION AND COLLABORATION

The race to transform conventional organizations into lean enterprises is on. At the turn of the millennium we are witnessing the stirrings of a new model of industrial work that will replace twentieth century methods of mass production by disenfranchised workers. It will deliver business as well as people outcomes of substantial mutual benefit to all who collaborate in the manufacture of goods (Knuf 2000b) or in the delivery of services. In this transformation, the management of knowledge and the practice of continuous learning and improvement figure more and more prominently. Indeed, organizational learning is proving to be the only competitive advantage any organization can maintain over time.

Currently, knowledge transfer centers such as the Lean Manufacturing Program at the Center for Robotics and Manufacturing Systems of the University of Kentucky are very busy. The program is supporting several thousand engineers, managers, and human resource specialists from companies worldwide through a range of education programs (information can be obtained through the Internet at ⟨www.crms.engr.uky.edu⟩). Throughout the country, the number of consultants on the lean enterprise grows daily, even if the nature of their qualifications is not always apparent and the often piecemeal, functional approach many of them take must be criticized (Knuf 2000b). At the same time, companies are looking for strong examples of successful lean enterprise implementation to see what can be accomplished and to identify avoidable mistakes. Fortunately, this interest grows at a time when organizational learning has been recognized for its importance. Rather than protect best practices, many companies, especially lean enterprises, increasingly are willing to showcase them.

Transformation and Value

In all this learning activity, energized by the ever intensifying competitiveness of the global marketplace, benchmarking features prominently. Drucker (1995, p. 289) traced its origins to the old Bell Telephone System, which he also credits with inventing the practice of continuous improvement earlier in the century:

> From the First World War until the early eighties, when it was dissolved, the Bell Telephone System applied ''continuous improvement'' to every one of its activities and processes, whether it was installing a telephone in a home or manufacturing switching gear. For every one of these activities, Bell defined results, performance, quality, and cost. And for every one, it set an annual improvement goal. Bell managers weren't rewarded for reaching these goals, but those who did not reach them were out of the running and rarely given a second chance.
>
> What is equally needed—and is also an old Bell Telephone invention—is ''benchmarking'': every year comparing the performance of an operation or an agency with the performances of all others, with the best becoming the standard to be met by all the following year.

Since that time, benchmarking has come into its own. Carey (1992, p. 38) wrote that

> Nearly 50% of Fortune 500 companies and all Malcolm Baldrige National Quality Award recipients are benchmarking. Xerox, Motorola, Westinghouse, and Cadillac have made benchmarking key to their continuous improvement philosophy. These and other industry leading companies have found that it provides dramatic results in terms of quality, productivity, and growth.

Benchmarking has pervaded all industries, including manufacturing and the construction industry (Fisher et al. 1995). It has become a developmental instrument of choice in, among others, the quality (Lema and Price 1995), human resource (Ford 1993), and business process reengineering areas (Ardhaldjian and Fahner 1994). Its literature grows steadily, with over 60 books published in English in the last decade alone [e.g., Bogan and English (1994), Camp (1989, 1998), Codling (1992), Leibfried and McNair (1992), Spendolini (1992), and Watson (1992)]. Similar to some authors (Watson 1993; Smith 1997), the emphasis here is on the importance of using benchmarking not simply as a developmental tool to drive incremental improvement, but as a strategic backbone for radical organizational learning and transformation.

In its most basic sense benchmarking is a learning tool designed to reduce uncertainty in the organizational environment by reference to peer experience. Uncertainty results from lack of knowledge and is associated with discomfort. Consequently, benchmarking has both cognitive and affective functions. By identifying what are commonly called ''best practices'' in their industries, companies are creating knowledge but also, and simultaneously, comfort and discomfort—comfort from realizing that many of their fundamental challenges are commonly shared, discomfort from the performance gaps that become apparent in individual comparisons.

Beyond learning, benchmarking renders other, ancillary services to an organization. Benchmarking (re)kindles and focuses energy by promoting significant developmental goals and furnishing concrete evidence of the benefits they bring when accomplished. It generally sharpens an awareness for aggressive performance standards throughout the organization and leads to the discovery of immediate—often incidental rather than systemic—improvement opportunities. Its affective benefit lies in providing visual and salient examples of best practices that create enthusiasm, excitement, and commitment. Perhaps most significantly, however, benchmarking promotes broad dialogue at all levels of the organization about its identity, mission, values, beliefs, and practices. *The benchmark is then both a window and a mirror.*

Companies engaging in benchmarking hope to obtain, on the one hand, valuable direct knowledge about significant organizational processes and structures in their own or a relevantly related industry. Let us call this ''adaptive benchmarking.'' Knowledge garnered in adaptive benchmarking is expected to drive immediate change in the benchmarking company, as observations and data lead to the introduction of homologous or analogous practices. Adaptive benchmarking creates similarity in an industry and, over time, levels competitiveness without enhancing collaboration.

On the other hand, benchmarking companies may seek to establish a more general and permanent knowledge baseline for performance comparisons. They use these criteria to chart their own, independent strategic progress toward the kind of standards that produce outstanding results for their competitors. Indeed, this second approach, ''comparative benchmarking,'' may hold greater potency than the first, as it is not tied to actual practices. Developmental levels of the benchmarking organization play a role in choosing between the two, which can be combined and sequenced as appropriate.

Comparative benchmarking seeks broader information about another company's performance and often allows the expression of the discovered differential in figures. This in turn facilitates the formulation of strategic goals and learning programs to close that gap. The company's performance then continues to be measured against the established benchmark to ensure that after the introduction of innovations the improvements are actually sustained. Finally, the company will develop its next generation of benchmarks to reflect not only its new level of performance, but also the growing learning capability it has developed from meeting its original objectives. Benchmarking hence yields both primary and secondary learning (Bateson 1972).

A special variety of comparative benchmarking is ''transformational benchmarking.'' Here the standard of comparison is not conventional, relative, and familiar, and the performance gap is not simply a quantitative differential. Transformational benchmarking seeks to re-

place the current system of standards with a better one, to recreate the organization, reinvent its processes and structures, and give it a new identity. Hence transformational benchmarking seeks more than the mere survival of a company in the existing business environment. It builds a different kind of strength out of new, lean operational capabilities and strategic business partnerships in the value chain; transformational benchmarking leads companies out of dependence and through independence into interdependence. Future standards are not only higher, they become uniquely meaningful and productive. Ultimately, they drive not simply performance but value. For the absolute benchmark is not competitiveness, but the expectation of the customer. Full realization of the strategic importance of this insight enables companies to leave behind benchmarking as a tool to simply push competence into the organization and to learn instead to use it to pull out value.

Vanquishing Leviathan

As we saw, benchmarking is a time-honored learning tool to improve organizational effectiveness. In one way or another, we have always looked to others to assess our own performance. We are now discovering that in business such comparison can drive two very divergent improvement strategies, one competitive and ultimately wasteful, the other collaborative and hence value-additive. The way competitive benchmarking is practiced by conventional organizations testifies to its cultural roots in Western society, where Hobbesian struggle, the *bellum omnium contra omnes* of the 14th chapter of *Leviathan* (Hobbes 1971), frames many of our decisions. Accordingly, conventional benchmarking seeks to identify the source of the other's advantage so that it can be assimilated to produce, at a minimum, parity. Where competition in the market is effectively conceived as a zero-sum game, partnership clearly has tactical value at best; industrial espionage and product cloning are benchmarking's illegitimate scions.

In the knowledge age, however, benchmarking can shed this inheritance and contribute to the creation of a true value chain that aims to provide customers with products reflecting the highest levels of conjoined effort by all partner companies. Here benchmarking flourishes into a method of spreading organizational effectiveness throughout the immediate value chain, and by including competitors, of eventually enhancing the capability of all providers in the market. In its collaborative and constructive instantiation, benchmarking becomes not simply a transformational and strategic activity, but a relational and value-distributing activity that targets multiple sources of waste in conceiving products and bringing them to market. *Collaborative benchmarking promotes the value chain and contributes to a sustainable global economy*. We see here a devolution of the traditional power of individual companies and the creation of a comprehensive social contract whose fulfillment will enable us over time to eradicate the deepest levels of waste —those resident in the economic system itself.

BENCHMARKING AND KNOWLEDGE MANAGEMENT

Benchmarking the lean enterprise is an ambitious undertaking for any conventional organization. Its purpose is not an incremental adjustment of existing capabilities, but a comprehensive cultural transformation—a qualitative change that will bring new structures, new practices, and new meaning. This radical nature singles out lean benchmarking from other forms.

To understand the complexity of benchmarking as a form of organizational learning (Knuf 1995, 1996), we have to analyze its various dimensions as a knowledge management process. Huber (1991) linked four main activities to organizational learning: Knowledge acquisition, information distribution, information interpretation, and organizational memory. Of these, knowledge acquisition, or information seeking, is the one most immediately relevant to our discussion. The others also play their roles, however. Let us look at some characteristics of the information seeking process.

First and foremost, information seeking is an inherently messy process. It ventures into areas of knowledge whose mere silhouettes are often ambiguous and uncertain. Because information seeking proceeds from a current knowledge deficit, it may not even be clear at the outset exactly what information is required or might be most useful. Belkin (1980) called this an anomalous state of knowledge. Still, a general categorical specification, or at least some query parameters, often can be established (''all we can find out about just-in-time delivery''; ''everything company X does well''). In the absence of such standards, the separation of encountered information into that which is useful, that which is useless, and that which albeit immediately useless might lead to the subsequent discovery of useful insights, is, of course, problematic. Hence not all who go on a quest for information are rewarded with their particular cornucopia; some bring home a Pandora's box of disparate data and inappropriate or precocious interpretations that do more harm than good. In transformational benchmarking especially, reflection is a key preparation.

Second, much information seeking appears to be guided by acute and highly pragmatic considerations deriving from currently perceived knowledge gaps (Choo 1998, p. 42):

> The results of field studies applying the sense making approach show that gap-defining and gap-bridging strategies account for individual information behavior better than factors such as system characteristics, message content, or user demographics.

Choo reported Dervin and Clark's (1987) finding that information seekers look first at what is stopping them from going forward in a given situation and at what information is missing, then identify their questions, and finally define what help they need. How people perceive knowledge gaps and how they conceive of helpful information predicts much of their behavior in seeking and using information. Thus the need to decide between two

alternatives will drive other questions than those raised by people who face an obstacle in the implementation of a single option or who do not perceive any option at all.

Third, information seeking is a social process in which humans interact with one another to produce knowledge outcomes—directly face to face, or indirectly through the use of information media. In benchmarking the lean enterprise, direct interaction is most typical and productive, although engineers and other professionals have a known preference for printed sources (Taylor 1991). Given the newness of the lean experience, only very little has been documented systematically, however. (Incidentally, this circumstance explains the predominance of ''lean implementation war stories'' at conferences and meetings.) We see then that at the core of information seeking is communication; the communication competence of information seekers and providers factors prominently into the success of the benchmarking venture. However, not only their competence results in success. Various personal and professional qualifications, assignments and interests, as well as tactical or strategic considerations of the organizations involved also influence the outcome, as does the specific configuration of organizational networks that link information providers and seekers in interpersonal, group, organizational, and interorganizational structures (Johnson 1993).

Fourth, as a human process, information seeking also has affective dimensions. Facing the unknown, sifting through observational and other data in the absence of guidelines, is frustrating to some, exciting to others. Moreover, information seeking stages may produce their specific responses (Kuhltau 1991, 1993a,b; Choo 1998). In the initiation stage of the search, for example, feelings of insecurity and uncertainty may prevail, which then give way to optimism upon identifying the general area of information needed. Confusion and doubt follow as that area is further explored, clarity as focus is gained, confidence as data begin to come in, and relief, satisfaction or, of course, disappointment as the project is concluded. Information seekers hence benefit from the mutual emotional support of benchmarking team members at least during some of the stages of the process. At the same time, the benchmarking experience itself can be a significant source of motivation (Mann et al. 1998) and produce tantamount strategic commitment.

Fifth, the very structure of the information that is encountered influences the success of benchmarking. There is a specific as well as a general point here. Choo (1998, p. 49) wrote to the specific point:

> Work settings are the social and physical attributes of the organization or unit that a set of people work in—attributes that influence attitudes toward information, the types and structures of information required, and the flow and availability of information. The style and culture of the organization, including its goals and reward and recognition systems, help mold members' perceptions about the role and value of information.

Generally, and without assuming this list to be complete, information may be specific or generic, local or global, integrated or separate, superficial or fundamental, implicit or explicit, informal or formal, and redundant or unique. The location of an information item anywhere on these continua, singly or in combination, has consequences for the benchmarking process.

The most significant concern of a benchmarking company is to determine whether information obtained would allow meaningful transfer. Whether such transfer is facilitated by specific or generic information depends on the individual case. Specific information may be highly useful as long as it is sufficiently topical and discrete—we often find this to be the case in the technical arena. On the other hand, generic information might lead to more comprehensive and fundamental change (for example, when a company learns from another how leadership and cultural practices enhance trust). Sometimes the information sought is not recognizable at the surface of an organization's structure. For example, the manner in which effective decisions are made or how policy is deployed may or may not be explicitly formalized, although the results may be outstanding. Therefore what can count as evidence—moreover, as useful evidence—in benchmarking is often problematic. There can be no doubt, however, that practices that are highly integrated, very informal, or implicit are rather difficult to adopt or even to adapt. Similarly, benchmarking information can be redundant (replicate available information) or unique, in which case the knowledge system of the information seeker may require smaller or larger adjustments. The more unique the information, the greater the element of uncertainty in its interpretation and, of course, the resulting anxiety in its application.

The need then is to gain a clear understanding of these information continua during the encounter and to keep their characteristics in mind during the transfer process, so that decisions based on the new learning are properly scaled. In any case, however, all observations about structures or practices must acknowledge that they are the historical product of the benchmarked organization. They make sense, in other words, in someone else's universe of meaning, and even the most salient resemblances can be deceiving if they are received and interpreted uncritically (Wilson 1994). As Weick (1995) reminded us, sense-making is an essentially retrospective process where meaning is grounded in past experience. Sense-making hence is not improved when that past experience belongs to another organization (although the manner in which members of the benchmarking team make sense of their observations can be a valuable source of learning for both the involved organizations). In particular companies undertaking transformational benchmarking should never loose sight of this point.

Sixth, information seeking should respect the law of requisite variety (Ashby 1956). Any information encountered is only a minute aspect of a larger whole. This is perhaps the most formidable challenge to a conventional organization benchmarking a lean enterprise. Gaining a holistic purview entails more than focusing on operational and management practices and organizational structures that promise to provide customer value.

Other values are equally important and should be investigated fully, such as employee value, investor value, and community value. For example, by returning value to the employee or the community, an organization builds a strong sense of loyalty among its workforce, which in turn raises their commitment (Eisenberg et al. 1983) and trust. Because in times of organizational change the undiminished confidence and support of the financial community is especially important to a company's welfare (Fombrun 1996, p. 195), benchmarking investor relations practices of the lean enterprise can yield crucial insights. As enterprises become leaner, reduced inventory has made many a banker sweat!

Finally, benchmarking should provide reciprocal benefits. The best forms of benchmarking are those that reward all parties. Partnership makes benchmarking a sustainable process in which as much is given as taken from an information environment. In other words, benchmarking should be a source of learning for the benchmarked organization in turn. If a benchmarking report is written up by the visiting team, sharing this report with the host organizations should be considered. Extending an invitation for a return visit is a common courtesy. Reciprocal benchmarking is an important step toward reaping the fruits of collaboration discussed above.

SEEKING AND USING INFORMATION

Now let us look at the benchmarking process itself. Applying Choo's (1998) multiperspective model of information use, benchmarking begins with a definition of information needs, then moves to the information seeking process proper, which leads to actual information use.

Information Needs

The definition of information needs is a complex task. If the problem that gives rise to benchmarking is sufficiently well understood, it may be possible to focus adaptive or comparative efforts directly on gathering explicit quantitative data. Otherwise a more interpretive and qualitative approach will be required, perhaps even one including more tacit information acquisition. In lean enterprise benchmarking, that is, in the transformational mode, typically what specific information may be most productively applied to the work environment of the benchmarking organization may not be clear at all. It hence is difficult to identify the relevant data and concepts, understand their relationship, or anticipate their consequences. Indeed, as benchmarking unfolds, these questions may have to be revisited several times on the basis of a rolling assessment of the accumulating information; relevance is a highly relative construct.

Part of the challenge benchmarking organizations face is that over time they have become blind to their own practices and routines and do not even know where to begin to ask and observe. As Choo (1998, p. 49) reminded us

> An organization that has specialized in a particular area for many years may become set in its ways and may tend to attenuate the effect of new information. Confident in its history and experience, such an organization may absorb large amounts of information without conceiving the need to rethink its behavior.

In some cases it may therefore be necessary—or at least beneficial—in the problem definition phase to call on outsiders who have a more distanced perspective and are not prone to apologetic defense of the status quo. These outsiders do not have to be external consultants; they could be borrowed from other divisions or locations of the company itself or from a company that may be a partner in an interest group or a professional association. The Lean Manufacturing Network supported by the University of Kentucky, for example, conducts plant tours for its members, following which visitors fill in a protocol of their observations that provides formal feedback to their host.

Information Seeking

Assuming some functional problem definition has been arrived at, the actual information seeking process can now begin. In the case of benchmarking, several decisions have to be made at the point. Most importantly, it has to be decided whether information seeking will address general benchmarks, external benchmarks, or internal benchmarks.

General Benchmarking

The general benchmarking process uses a variety of information media and tools; there is no visit to a benchmarked company. Indeed, general benchmarking targets not so much an individual company, but a segment of industry to capture some standard or performance level. Printed and on-line databases, reports published in the trade press, books, and other sources can be scanned to provide insights into organizational or industrial performance. In addition, interviews with key personnel from a variety of companies can be conducted on the telephone or by video-conference. Attendance at professional meetings and conferences also falls into this category.

Although general benchmarking can provide valuable insights, the correct interpretation and assessment of the information gained is problematic because benchmarked processes are not observed in their respective environments. Moreover, it is often impossible to understand the circumstances under which the provided information was processed and documented, so that, overall, this form of benchmarking is unlikely to help with deeper transformational concerns. Finally, Choo (1998, p. 46) reminded us that, when computerized information systems are used in information seeking, they tend to be designed to provide data of high levels of specificity, which makes them less suitable for open-ended, fundamental explorations.

General benchmarking can help an organization formulate a set of standards as it launches into a strategy of change. This may integrate internal and external information sources, but the resulting standards are determined by broad data analysis followed by internal strategic decisions. Establishing a strategic benchmark has

its advantages. For example, it may allow a company to realize that some of its own practices are already the standards by which others should be measured (Dolan 1995), and it cautions against the dangers of simplistic emulation.

External Benchmarking

External benchmarking avoids some of the shortcomings of the general process and is more immediately productive of change. It, too, is not without its problems, however. These problems result from both unfamiliarity with the benchmarked organization and the general restrictions under which benchmarking visits operate. On the other hand, one of the benefits of using an external benchmark is that it offsets a tendency among some professional groups of information users to frequent local sources, even when those sources are not highly regarded (Choo and Auster 1993).

In the simplest case, external benchmarking information derives from the explicit descriptions (and often incidental discourse) of informants in the organization that is visited and from the visual observation of work arrangements and behaviors and of the management and control tools displayed (Greif 1991). Although this appears productive, not everything we hear is reliable information, and what we see might have surprisingly divergent meaning. As in all work with information, the usual precautions apply: Benchmarking companies have to systematically assess the validity of the information they obtain, its reliability, its recency, completeness, and consistence. They must probe into the self-interest of the information provider and the conscious or unconscious protection of practices that might give up competitive advantage if shared. Indeed, they may have to protect themselves from misinformation—intentional and unintentional—that will harm them if it is transferred.

In the more complex case of external benchmarking we find the same need for knowledge conversion strategies that the work of Nonaka and Takeuchi (1995) has established for knowledge creation processes in general. As a result, where knowledge is mostly tacit, external benchmarking may turn into a more extended apprenticeship that partners learners with teachers in coworking arrangements during which the conversion to explicit knowledge may be achieved successively through socialization.

Internal Benchmarking

In any organization there exist operations, skills, and experiences that are exemplary and can be used for internal benchmarking. The historical precedence of the Bell Telephone System has already been described (Drucker 1995). Bell benchmarks were internal and hence readily available and transferable to other divisions in this multisegmented organization. Internal benchmarking has the advantage of bringing together partners who have a history of collaboration and a shared higher interest, although competition among divisions and plants can be fierce. Alternatively, internal benchmarking can use modeling or simulation software that creates scenarios using actual business data (Ardhaldjian and Fahner 1994). Many of the external, competitive issues discussed above therefore may play only a minor role, or they can be resolved at a higher level.

A major advantage of internal benchmarks is the greater likelihood that observations and interpretations of practices will be correct. To some extent, at least, the divisions, plants, and locations of a larger company participate in a common language, organizational culture, and strategic goals. Also, performance measures may be common to all parts of the organization, further facilitating comparison (Locascio 1999). In general, internal benchmarking helps overcome the ''not-invented-here'' syndrome.

However, organizations that seek to transform themselves into lean enterprises rarely find internal resources ready to hand—even when they exist. The writer has observed that the groups charged with implementing lean manufacturing at some of the largest U.S. companies—to mention just a few, General Motors, Boeing, or Lockheed Martin—tend not to be aware of each others' efforts. Mutual learning from internal benchmarking, even where excellent practices could be showcased, is often slow, primarily due to the absence of a comprehensive communication plan, one of the crucial prerequisites of any organizational transformation (Knuf 1997). Furthermore, internal benchmarking brings with it other constraints also, in particular on the degree of innovativeness.

Internal benchmarking can be conducted in reverse. In reverse benchmarking, an outsider, sometimes a consultant, is brought in to examine the processes and structures that are considered to be in need of improvement. This procedure has some advantages. Most importantly, the visitor is able to apply his or her experience to the actual systems and processes of the inviting company. Not only specific segments or aspects of the process can be studied, but also upstream and downstream processes as well as the secondary systems that support the object under investigation. Also, because the members of the organization are intimately involved in this reverse process, learning is more immediate and comprehensive. As mentioned above, resistance based on alienation may be less of an issue.

A last point all three forms of information seeking have in common is that, although the benchmarking process itself or the benchmarking phase of an organizational transformation may have predefined boundaries, deciding when enough information has been acquired is always problematic. The well-known work of Simon (1976) on decision making suggested that managers often look for ''satisficing'' or ''good enough'' solutions to their queries, not comprehensive information. On top of this, they also have a preference for local rather than remote and familiar rather than new and unfamiliar sources (Choo 1998). Setting specific information targets grounded in the well-analyzed implementation needs of the benchmarking organization is hence a recommended practice, as is the use of structured protocols to create discipline. Finally, because lean enterprises continuously

react and develop to meet challenges from the fast-changing business environment, a decision must be made about how often the benchmarking process will be repeated. Indeed, some companies are now benchmarking permanently.

Information Use

To use the information the benchmarking process has produced, it needs to be assessed further to select those elements that are of benefit, that is, those that produce improved knowledge states or lead to organizational action. Typically benchmarking visits generate a rich, and often confusing, variety of observational and representational data, because the benchmarking process is in part driven by what the benchmarked organization offers and in part by the interests and queries with which it is approached, and many other findings may well be serendipitous. In all of this, however, it is important to identify those components that add to the organization's capacity for action (Argyris 1993).

Untangling information, interpretations, and opinions is undertaken in a series of debriefing sessions, preferably organized around topics derived from the initial definition of learning needs. Sufficient time must be set aside for this dialogue, especially in view of the well-known bias of U.S. managers for action over reflection. In these meetings the differing impressions, perspectives, and evaluations of observations in respect of the actual data must be brought to the foreground to create mutual understanding and to construct a first platform for strategic decisions. Obviously, this process must be conducted in a flexible manner to do justice to the needs of the different groups in the organization, including those not involved directly in the benchmarking exercise. Indeed, these needs change over time, so that the evaluation process on—and hence the productivity of—even a finite set of benchmarking data is, in principle, infinite. Therefore all available data, observations, and insights need to be stored in the organizational knowledge database for future reference and reinterpretation (Knuf 1997).

Choo (1998) presented a taxonomy of eight categories of information use, based on the work of Taylor (1991). He distinguished (1) ''enlightenment,'' where information serves to make sense of a given situation; (2) ''problem understanding,'' where information answers specific questions; (3) ''instrumental use,'' where one learns how to do something; (4) ''factual use,'' where information describes some reality or phenomenon; (5) ''confirmational use,'' where the purpose of the information is to verity what is already known; (6) ''projective use,'' where information forecasts the future; (7) ''motivational use,'' where the information serves to keep an effort moving or raise commitment; and (8) ''political use,'' which raises the status, power, or reputation of those in possession of that situation. These categories are not mutually exclusive; in lean enterprise benchmarking they all have their importance.

Information use is influenced by various organizational factors. One of them is the accepted relevance of the results of the benchmarking activity at the personal and the organizational level. This relevance is difficult to determine. It is not simply an objective property of the observations and information obtained. Instead, as a function of judgment, it is perceptual and multiperspectival. Although relevance can be measured at any given point by means of scales or consensus, it dynamically changes from situation to situation, from reviewer to reviewer and, generally, over time (Choo 1998, p. 56).

Also, it is important to be aware of the level of resistance the benchmarked information may generate in the existing organization. Choo (1998, p. 62) noted that

> Individuals are more likely to use information that confirms or supports their existing cognitive structures. When they confront information that contradicts their existing beliefs and assumptions, they experience a sense of conflict or tension. People reduce or relieve this cognitive dissonance . . . by one of several defensive maneuvers, such as avoiding the new information, rejecting its validity, explaining away the differences, reconstructing new cognitive structures, and so on. (emphasis deleted)

The more dynamic the transformations benchmarking suggests, the likelier resistance will be noticeable and organized, giving rise to organizational defense routines. As Argyris (1997, pp. 367–368) wrote

> Organizational defense routines are any actions, policies, and practices that prevent the participants in organizations (as well as members of groups, departments, and other areas) from experiencing embarrassment or threat, at the same time preventing them from discovering and correcting the causes of embarrassment or threat. . . . The consequences of using organizational defensive routines include creating errors that are not detected and corrected, blaming others for errors, and limiting learning.

Resistance may be smallest where the findings of benchmarking largely confirm existing practices. It will be more pronounced where those practices are questioned and strongest where they have to be changed. Also, functional rearrangements may create less resistance than a full-fledged restructuring with new role definitions for many employees. Finally, resistances are particularly tough where a benchmarking team comprised of senior functional management discovers a need to champion change at the strategic leadership level, that is, in an upward direction. Unfortunately this is not an uncommon situation in benchmarking the lean enterprise, because in most organizations this is still seen as a manufacturing responsibility rather than as a comprehensive strategic task (Knuf 2000b). The previous point about the political use of information reminds us, moreover, that occasionally those who embrace change may have more on their minds than improving organizational effectiveness or customer value!

A third issue of importance in information use is advocacy. It is not enough to learn from benchmarking; the

learning must be advocated clearly, regularly, and consistently. This is a communication task, thus the research on the diffusion of innovations is relevant (Rogers and Kinkaid 1981; Rogers 1995; Valente 1995). It emphasizes the central role of an effective strategic communication plan in organizational transformation (Knuf 1997).

Innovations are promoted by several kinds of talk (Rogers 1995). Through ''awareness talk,'' the innovation is disseminated; without awareness there can be no adoption. Awareness is spread by communication media and by word of mouth. Members of the benchmarking team hence should be given ample opportunity to share their observations in face-to-face encounters and meetings, in newsletters, or on in-house video. ''Opinion talk'' promotes beliefs and opinions people have about the innovation. Research has shown that opinions are only communicated at the point where individuals have decided they have sufficient knowledge about the innovation and that it will fit into their existing beliefs. It is therefore not only important that benchmarking results are shared widely and in detail, but that appropriate examples of lean enterprise practices are provided and that the fit of those practices with existing work arrangements, respectively their suitability to overcome current problems, is stressed. One of the paramount issues here is a very clear message concerning personnel stability during and after the transformation; it is highly unlikely that employees would be willing to *kaizen* themselves out of their jobs.

When people share their experiences with the innovation, they engage in ''practice talk.'' In particular those who are recognized opinion leaders in the company must be supportive for the innovation to succeed. Naturally, this point has consequences for the selection of benchmarking team members. Because there are few things as persuasive as good examples, opinion leaders and others with sufficient experience and competence must continue to make use of their interpersonal contacts and of the available communication media to spread the work to the widest possible constituency. ''Advocacy talk'' aims to persuade others to adopt the innovation. The insights gained in benchmarking are used to reach out to those who have not fully committed to the innovation or who might resist it in an effort to influence their beliefs. Advocacy talk is crucial to the success of the innovation, especially in view of ''resistance talk,'' in which its opponents engage. Resistance talk takes the forms of denouncing, disembodying, and deflating the innovation. Denouncements tend to follow failed attempts to implement the innovation; disembodiment shifts the responsibility for failed implementations from those undertaking them to the new practice itself; and deflation detracts from its overall value (Zelizer 1995).

THE PRACTICE OF BENCHMARKING

Organizational learning outcomes can be enhanced by systematically planning and preparing the benchmarking process. Of course, specific approaches need to be constructed by organizations within the parameters of these general observations, especially keeping in mind the degree to which benchmarking results will be used for transformational, rather than simply adaptive or comparative, purposes.

Preparing to Benchmark

The utility of benchmarking should be examined on a case-by-case basis. Not always is it the most productive road to learning. The work of Rosenbloom and Wolek (1970) showed that engineers typically acquire new information routinely from internal sources, mostly by continuous efforts to build their competency or by having information pointed out by colleagues. However, the limits of the organization may well be the limits of available information and, as we saw, particular current knowledge about ongoing innovations may be difficult to obtain through internal sources. This is true even of external sources; published information is subject to considerable lead times that diminish its benefit. Indeed these lead times are roughly proportional to the comprehensiveness and usefulness of the document.

If the decision for an external or internal benchmarking process has been made, certain preparations must be undertaken. Although an open-ended expedition into the inner workings of another company or a sister plant may be productive, setting out with learning goals and techniques focuses and improves data collection considerably. The definition of learning goals and other preparations are the task of the benchmarking planning group. Members of this group may eventually serve on the benchmarking team itself, but this is not necessarily the case. Depending on the breadth and depth of the benchmarking focus, there might be good reasons to have a larger, functionally more diverse planning group. A smaller, but highly prepared, team may then conduct the actual visit.

Typically, learning goals are grounded in three sources of information. First, general goals derive from studying the literature on the lean enterprise. Because this literature is still young and just beginning to expand, it especially is important to take care in separating out the general lessons on lean enterprise practice from the incidental case descriptions of individual implementations —the ''war stories'' referred to already. To provide sufficient anchoring, it is advisable to incorporate in this review at least some of the sources that describe the original lean enterprise, Toyota and the Toyota Production System (Ohno 1988a,b; Shingo 1989; Womack et al. 1990; Moden 1993a,b; *The Toyota* 1996; Liker 1997; *1999 information* 1999; Knuf 2000b).

Second, specific goals can be formulated on the basis of the concrete experience of the organization going out to benchmark. Here a careful analysis of the current situation and of information needs must be conducted, as discussed already. Part of this analysis is the identification and critical examination of existing performance measures throughout the organization, including manufacturing, human resources, quality, research and development, cost accounting, incentives and rewards, and

any other subsystem. Supportive efforts might include creation of a map of all crucial business processes, a communication audit, data collection through interviews with key stakeholders inside and outside the organization—especially with customers—or the use of focus groups (Morgan 1988) to hear from a representative sample of the workforce about their work experiences.

Third, both general and specific goals are mediated by those deriving from knowledge about the benchmarked company. Research on the diffusion of innovations (Rogers 1995) shows that true innovators constitute only about 2.5% of a given population, early adopters around 13.5%, the early majority 34%, the late majority another 34%, and laggards the remaining 16%. Not all companies therefore constitute equally productive benchmarking targets. A case could be made for the selection of early adopters, because they have already benefited from the groundbreaking efforts of the innovators, have compared and evaluated those efforts, and have translated the experience into their own practices. Innovators themselves may be less suitable because their own transformation was effected without reference to exemplars, so that their solutions may reflect rather unique and individual circumstances that defy generalization. Certainly, simple popularity or easy accessibility should never be deciding factors in selecting an organization. For this reason, it is of paramount importance that companies wishing to transform themselves into lean enterprises engage to the fullest extent in networking activities that will provide access to those pursuing similar goals.

Once a suitable benchmarking target has been identified, an advance visit by a member of the planning group may be well worth the effort; first data and impressions should enhance the productivity of the subsequent visit of the benchmarking team.

Constraints and Opportunities

Given the previous discussion of information seeking and organizational learning, we also have to be aware of the constraints that affect the preparation of the benchmarking visit. In particular, the formulation of goals is defined by the current state of awareness of organizational performance and needs, which may hinder the acquisition of information outside the scope of awareness of the team members. It is therefore important to include open-ended opportunities for dialogue between members of the benchmarking team and the benchmarked organization in the planning of the encounter. Too close attention to preformulated goals during the visit may lead to an overly restrictive focus. Similarly, it is advisable to ensure the relevance of benchmarking information by visiting more than one host. This is a simple form of triangulation that provides quality indicators and protects the benchmarking company from adopting practices that are only locally successful. The notion that there is a ''best practice organization'' has been specifically challenged in the literature (Wiarda and Luria 1998).

In his general model of information use, Choo (1998) distinguished a system orientation from a user orientation in information seeking. Whereas the system orientation assumes that information has the character of an external object, the user perspective emphasizes the importance of the interpretive relationship between information and seeker, and it also takes into consideration the situational dimensions of this activity. Interpretation provides relevant meaning to the information, and the same information item offers a variety of subjective renderings to different seekers, or even to the same seeker under different circumstances. The productivity of a benchmarking excursion hence may depend not only on who is sent out, but also on whether it takes place during normal work periods or at times when the benchmarked process is undergoing change. Senior managers at the Toyota plant in Georgetown, Ky., believe that the best time to study the Toyota Production System is not during normal operations, but when a model change is taking place on the shop floor (K. Kreafle, personal communication, June 10, 1999).

Benchmarking Protocols

Benchmarking preparations also include decisions about creating or selecting suitable organizational learning tools, in particular benchmarking protocols. These are variously advocated in the general literature (Basu and Wright 1996), and recently significant work was conducted on benchmarking the lean enterprise.

In February 1998, the Society of Automotive Engineers, Warrendale, Pa., and the Best Manufacturing Practices Center of Excellence at the University of Maryland, a collaboration of the university with the U.S. Navy and the Commerce Department, created a joint venture, the Automotive Manufacturing Initiative. In initial research with leading companies in the automotive sector, lean operating systems were identified as the most important process issue by 77% of the respondents (Trent et al. 1999). The writer participated in the formulation and subsequent testing of this first lean enterprise transformation benchmarking instrument. A total of 52 target components were developed, organized into four areas: (1) management and trust; (2) human factors and people concerns; (3) information management, supplier and customer relationships, and product and organizational issues; and (4) process and flow. In their totality, these components provide points of measurement that allow a comprehensive assessment of both existing practices and those observed in the benchmarked organization.

On September 30, 1999, the new standards *SAE J4000*, ''Identification and measurement of best practice in implementation of lean operation'' (SAE 1999a), and *SAE J4001*, ''Implementation of lean operation user manual'' (SAE 1999b), and a research report, *SAE RR003*, ''Best practices in lean operation among manufacturers'' (SAE 1999c) were introduced at the Southern Automotive Manufacturing Conference and Exposition in Birmingham, Ala. (information on these instruments is available through the SAE web site at ⟨www.sae.org⟩). Anticipated uses include self-assessment, strategic planning for the lean transformation, transformation monitoring, assessment of supplier operations, development of education and training programs, and compliance

gaining with the continuous improvement requirement of *QS-9000*, respectively *ISO-9000*. Independent experience with the use of these instruments is not yet available.

Benchmarking Team

The final element in the preparation phase is the selection of the benchmarking team. Although benchmarking can be undertaken successfully by individuals, various benefits accrue to benchmarking teams. These benefits result from members' multifunctional expertise and general team effectiveness factors (Knuf 1998a). The various levels and kinds of competence of the team members must be understood and balanced and their assumptions about the task made clear. All team members must commit to the common goals defined by the planning group and guide each other through open dialogue and mutual supportive feedback.

Understanding the social character of information seeking makes a strong case for the multifunctional benchmarking team. While one team member observes processes on shop floors or in offices, another seeks to gather financial data, a third studies technology, and yet another spends time in the human resources department evaluating training or incentive and reward programs. Subsequent collating and integrating of these diverse information sources yields a much more comprehensive and coherent picture, which the exclusive focus on a single aspect could never provide to an organization seeking to transform itself.

But apart from their various professional qualifications, the position of benchmarking team members in the communication network of the organization must also be considered in their selection. The work of Allen (1977) clearly suggests that individuals who are information gatekeepers in their own organization (those who read more widely, have a broader range of personal and professional contacts, and are able to communicate complex technical information effectively to others) should be given preference in such an assignment. By selecting them to serve on the benchmarking team, the organization assures that it is represented by those with the greatest appetency for information and at the same time increases its chances that any new knowledge will be disseminated effectively (Knuf 1998c). Using a multifunctional team may also prevent the collection of primarily specific, practice-oriented data—a known preference of engineers seeking information (Taylor 1991)—and ensures that deeper and background knowledge is also acquired.

Asking Questions

Many aspects of information seeking during the benchmarking visit have already been described. Two practical recommendations are added here. The ways in which newcomers to organizations seek information also may be helpful in conducting a successful benchmarking exercise. Recent research has emphasized the value of proactive tactics (Miller and Jablin 1991). These include (1) asking overt and direct questions; (2) gathering information through indirect questions or by eliciting information through hinting; (3) targeting third parties instead of primary sources; (4) testing existing limits of organizational rules and then observing the reaction; (5) embedding information seeking in natural conversation; (6) observation, and (7) surveillance, that is, making sense of larger areas of observed behavior. In much of this behavior, attention to organizational narratives also has been most productive (Knuf 1992; Foreman 1995).

It is clear, then, that much information can be obtained by asking the right questions during a benchmarking visit. But what if we do not know which questions are right? Here it is useful to differentiate hypothesis-scanning and constraint-seeking approaches, both of which can be productive (Mosher and Hornsby 1966), in asking questions and in the practice of benchmarking in general. Hypothesis scanning is suitable when experiences are already partially available (at least in the form of educated guesses) or if the benchmarking situation provides hints and suggestions, for example, through displayed information. Hypothesis scanning is characterized by somewhat random interrogative stabs at the subject under inquiry; its outcome is not certain, of course, but experience may receive occasional support from luck. In contrast, constrain seeking is a suitable strategy in open-ended situations or with new problems that demand considerable intellectual processing. Alternatives are hierarchically narrowed down until they yield the desired information. Although demanding, this process is typically quite efficient when conducted well. Of course, competent information seekers will know how to switch between these two strategies to best effect. At some point they tend to move from constraint seeking to hypothesis scanning, at least in the final phase of seeking positive confirmation.

CRITIQUES OF BENCHMARKING

Benchmarking is not a universally supported form of organizational learning and means for transformation. Some critics question it on the grounds of principle, whereas others, including Womack and Jones (1996), have specific reservations about benchmarking the lean enterprise, a practice they essentially dismiss as a waste of time unless it is needed to persuade fickle managers.

One of the systemic shortcomings of benchmarking is that any observation made by the visiting company is completely meaningful only in the context of the benchmarked organization. Every organization has a complete system of practices that have grown historically and locally, and hence any partial selection endangers successful implementation. Although some practices may be borrowed without losing their integrity, a smooth interface with the local practices of the benchmarking organization may not exist or may be difficult to achieve (Reinertsen 1999).

Among the general critics, Senge (1990, p. 23) pointed to some inherent problems associated with benchmarking as an organizational learning process. Senge identified as the core dilemma of organizational learning that

''we learn best from experience but we never directly experience the consequences of many of our most important decisions'' (emphasis deleted). This problem is exacerbated in external benchmarking, where the consequences of the lean implementation that the benchmarked company itself may encounter over the long term are not visible to the visiting team. The issue here is that of focus, for visits are short. It is important, therefore, to explore the experience of the lean enterprise in as much historical depth as possible. In this regard it may even be necessary to talk to employees who witnessed the beginnings of the transformation but who have since left the benchmarked company. This would be advisable particularly where the transformation process is described as not having presented major challenges.

A second reservation also originates in the work of Senge. Of the ''laws of the fifth discipline,'' (Senge 1990, p. 57), the first is that ''today's problems come from yesterday's 'solutions.' '' Applied to benchmarking, we can elaborate this caution: Tomorrow's problems come from today's solutions. Indeed, in benchmarking, today's solution is also someone else's solution. The attempt to transfer such a solution to the benchmarking organization always encounters uncertainty not only from its present status, but even more so from its unknown future. In this respect, benchmarking is again shown to be an inherently retrospective activity, although it is undertaken to change the future of the benchmarking organization. In a sense, then, by looking at the solutions of others to their own problems, we are walking into our own future back first. However, the same can be said of any other form of sense making—caution is indicated in any case!

A third issue has to do with ownership. The practices benchmarked are not owned by the benchmarking organization. In transfer they are separated from their roots, leaving behind the capabilities and knowledge basis that define their learning curves. When they are introduced into the benchmarking organization, they must be presented in formats that make cultural sense to its employees and planted in an educational soil that supports their further growth. Otherwise resistance derives promptly from the not-invented-here syndrome that claims the irrelevance or inappropriateness of the innovation. Lack of integration will also lead to failure, as will an attitude of ''import and forget.'' Benchmarking is hence no panacea but only the beginning of organizational learning; success comes to those who persevere.

CONCLUSIONS

At the end of this discussion of benchmarking we return to a theme broached earlier, collaborative learning. In his investigation of *The origins of virtue*, Ridley (1998, pp. 264–265) reminded us of our fundamental human need to cooperate:

> The roots of social order are in our heads, where we possess the instinctive capacities for creating not a perfectly harmonious and virtuous society, but a better one than we have at present. We must build our institutions in such a way that they draw out those instincts. Preeminently this means the encouragement of exchange between equals. Just as trade between countries is the best recipe for friendship between them, so exchange between enfranchised and empowered individuals [substitute: organizations, J.K.] is the best recipe for cooperation. We must encourage social and material exchange between equals for that is the raw material of trust, and trust is the foundation of virtue.

Cooperation is the core of the lean enterprise. Equals meet to work and learn. Hierarchies become dysfunctional and are replaced by networks of mutually supportive roles. Leadership pervades the organization wherever people are. Every practice is routinely examined for its potential to yield improved value. An exciting new world? Yes. The better *is* the enemy of the good.

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