INFORMATION STRATEGY

THE EXECUTIVE'S JOURNAL

Volume 11 Number 2 Winter 1995

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What Smokestack Industries Can Tell Us About Reengineering

James B. Ayers

Almost every organization, whether a high-tech manufacturer or a service business, is considering some form of reengineering in the face of heightened competition. This reengineering usually takes the form of radical restructuring of operations to reduce costs and improve service. Often, depending on the situation and the participants, it is also accompanied by large doses of new information technology. Manufacturing organizations endured these changes in the early 1980s and prevailed. This article discusses the possibility of applying manufacturing reengineering techniques to other industries to help them overcome the risk of failure.

In the early 1980s, many US manufacturers in so-called smokestack industries, or traditional mature companies, experienced similar pressures. Worldwide competition was forcing intense internal scrutiny and do-or-die overhauls of obsolete practices and structures. Now, manufacturers in industries that were not hard hit in the 1980s (e.g., aerospace-defense and service companies from fast food chains to banks) find they must duplicate what these manufacturers have done to become world class.

Why were the smokestack manufacturers the first to bear the brunt? The answer lies in the portability of products and the presence of foreign competition. Manufactured products cross national boundaries more easily than services, making barriers to national markets lower. Therefore, their products were exposed to lower-cost, higher-quality goods from offshore.

For most companies, the transformation has been long and difficult. But such experience offers lessons for reengineering in the 1990s. Which strategies worked? Which did not? Can the workable strategies be applied in other industries today?

To date, high-tech products and services have been more difficult to export. However, this is changing quickly. One successful practice is to apply the smokestack company's lean production principles to service operations and technology production. These include work cells, six-sigma quality, benchmarking, and self-directed work teams. The results are flatter organization structures and more rewarding jobs for workers.

With these models honed in domestic operations, exporting to developing markets is a logical next step. Citicorp's success in Germany is an example.' Citicorp has grown rapidly through the use of technology and close attention to customer service, capturing a major share of market from entrenched competitors.

But certain issues reoccur in undertaking re engineering-especially in a service company

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wanting to use an industrial model. In the Harvard *Business Review,* McKinsey & Company consultants recently pointed to some of the pitfalls in reengineering.[2] Among the ways to fail are inability to track performance after redesign and settling for the status quo-not really thinking radically enough.

Can manufacturing reengineering techniques apply to other types of business and help overcome the risk of falling short of goals? What is the role of computer technology? How important is it to success? Are there any methodologies that make the job easier? This article addresses these issues. It also includes case studies that illustrate how manufacturing improvement techniques help in service and professional service businesses.

The four dimensions

Manufacturers have learned that a reengineering solution must be complete. Partial solutions ignore vital elements of the environment that cannot be left out. Too often this is the case. For example, many manufacturers in the early 1980s were seduced by the promise of computer-integrated manufacturing (CIM). Not infrequently, companies spent tens of millions and more pursuing this technical fix. Consultants, vendors, and internal technicians touted the new technology to unknowing approvers.

A common reason for failure was that new technologies were overlaid on obsolete organization structures and procedures. In other words, the technical fixes were not complete. Ingersoll Engineers, the international manufacturing consulting firm, uses four dimensions to define a complete reengineering solution. When a manufacturer's change program has fallen short of its goals, one or more of these dimensions has, in most cases, not been addressed to the degree necessary.

The first dimension: Engineering

Engineering encompasses the tools and technology used by workers as well as the physical environment in which they work. In manufacturing, this includes facilities, machine tools, automation, workplace organization, and workplace layout.

In a service business, the same elements exist. For example, engineering issues include organization of service provider teams, the responsibility of each person in a process chain, the information systems available to them, and their interface with customers.

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Many services are making better use of technology. Examples include automated tellers, gas pumps, and often arcane voice mail menus. Engineering addresses the need for automation, the training needed to put it to work, and the accessibility of technology by providers and customers. A common mistake is to believe that engineering and the associated technology is the complete answer.

The second dimension: Logistics

Logistics is the brain and nervous system that controls the business. This covers resource allocation, day-to-day production planning, and movement of material or other product through the process.

Many of the most impressive gains of manufacturers have been in the area of logistics, especially changes that speed the flow of work. The result in manufacturing has been disappearing inventories, elimination of work backlogs, and major improvement in customer service. A characteristic of reengineered manufacturers is the 8:00 A.M. pro-

duction meeting where accountability for making goals is continually reinforced.

In service companies, managers are exploiting provider service models. These models parallel the type of control systems found on manufacturer's shop floors. Elements include work measurement, standards for customer service, and forecasts of work volume. These elements combine in the provider service model to set staff levels designed to deliver on commitments to customers.

The third dimension: Organizations and people

Most organizations assert that people are their most important asset. Many of these same organizations, however, do not tap the potential of their work force. The more innovative ones are applying creative concepts to flatten the organization and dramatically reduce costs.

In manufacturing and increasingly in services, the foundation of these new organizations is the cell-team. The cell-team is an autonomous group responsible for the full scope of the process. This places complete responsibility for customer satisfaction in a self-contained work group.

Financial measurement is undergoing a revolution in both manufacturing and service industries.

The results can be dramatic. Instead of filling a space in a long process, each team has beginning-to-end responsibility for the process, or at least a major segment. The team can place its own stamp on the work and be held accountable for profitability, quality, and timeliness. (See Sidebar on the next page).

The fourth dimension: Measurements and rewards

A consistent finding with many clients is that management gets what it measures. For example, manufacturers have for many years stressed factory labor productivity as a key index of performance. But this factor is only 5 to 10% of the total cost of most products, so it no longer has the importance it once did in profits or competitive position.

More important today are measures of quality, responsiveness, and speed in fulfilling customer expectation. These represent the critical success factors in the market and need to be the foundation for the performance management system.

Financial measurement is also undergoing a revolution in both manufacturing and service industries. A common strategy is the shift to activity- or process-based accounting, which provides important and relevant data for management.

Activity accounting, briefly, measures the costs of processes, not traditional cost centers, like departments. In traditional measurement, the widget that takes one hour of labor receives allocations of such overhead items as quality cost, management and control, and facilities-regardless of the actual requirement for these resources to make widgets. This distorts measurement if other products besides widgets are made in the factory.

Activity costing identifies more precisely what is needed to make widgets. Both direct and indirect costs are included. Activity costing is valued for the decision support it provides. Examples include pricing, product-service profit measurements, and capital budgeting. Activity accounting will be integral to a well-executed reengineering program; it specifically addresses one of the risks identified by the McKinsey survey.

Criteria for change design

In manufacturing, both products and processes must have a specification. The

The Cell-Team: A Social Structure for Getting Work Done

At the base of the lean manufacturing structure is the cell. Exhibit I illustrates the point. The cell is at the base; several cells comprise the focused factory, which is designed around customer segment requirements. Several focused factories comprise the enterprise. In this structure, the cell is rapidly pushing aside traditional functional structures.

In traditional terms, cells are counterintuitive. Traditional thinking uses a functional framework for organizing processes and enterprises. In this model, processes are divided into jobs with narrow scopes of responsibility, performed by specialists. Employees do little problem-solving beyond their specialty and take little ownership of customer service.

At Ajax Security, a security services firm, customer service was treated in this manner. "We are all responsible for customer service," stated the president when speaking of his functionally structured organization. If a customer called with a billing question, they talked to accounting. A service issue went to the service department. And so on. A new customer was sent a welcoming letter with a dozen department phone numbers to call depending on the issue.

The reality was that no one was responsible for service to customers, who quickly became frustrated from being passed from department to department. To respond, Ajax, which performed most of its customer service through complex communications systems, reorganized into cell-teams. The goal was to answer customer questions on the first call, with no hand-offs.

The implications of this goal proved to be profound. The security controllers who manned the phones starting taking all customer calls, bypassing the firm's switchboard. Controllers were given access to both the technical security monitoring and accounting systems. In many cases, skills and people had to be upgraded through the hiring process. For more complex inquiries about the operation of security systems, a technician crew backed up the security controllers.

The company reduced its customer service force by 20%. Field crew work also dropped significantly because of the increased problem-solving talent on tap. This brought further results, because solving a problem in the field costs 10 times what it costs over the phone.

specification provides the detail about the product or process-how it should look and work and what needs it fills. The following paragraphs explain a generic specification list that has been applied to lean manufacturing processes. This same specification set has also served with considerable success in service companies (see sidebar above).

Customer requirements

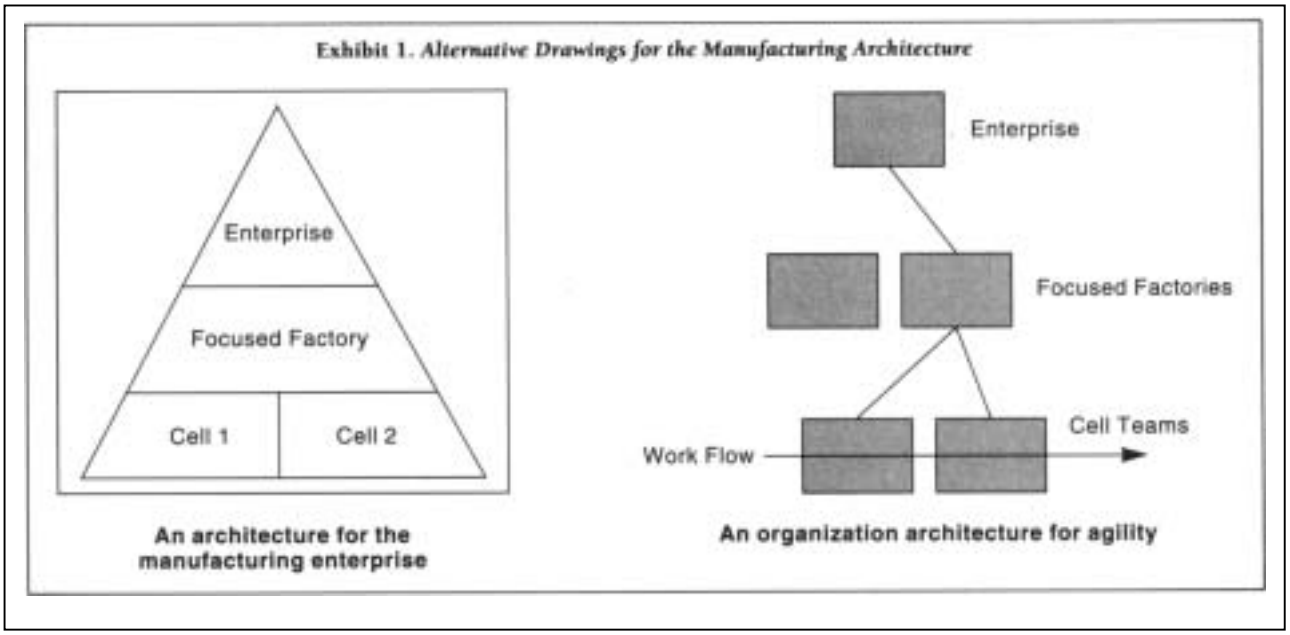
What are basic customer expectations for speedy, error-free, and cost-effective processes? There should be established, quantitative goals that are set before redesign begins. They should exceed nor mal customer expectations – usually reflected in standard industry practices. An excellent way to understand customer requirements, not surprisingly, is to talk to customers. But this happens less frequently than logic would indicate.

Flow

Is the flow smooth? Is it visible from start to end? Are there too many hand-offs? What effect do hand-offs and transfers of work have on quality, cost, and lead-time? In manufacturing, the cell-team simplifies flow because, once the product enters the cell, it does not leave until it is complete. Progressive service companies (see the case of Ajax Security in Sidebar 1) have applied the same concept to information.

Density

Density is the relationship of floor space for production to total space; it should be



80% or more. In high-density work areas, there is no place to put work aside and slow it down. Federal Express operates a high-density service system. Its few hubs process high volumes of overnight packages in precisely tuned operations set in a tight schedule.

Velocity

Velocity is measured by the ratio of hands-on time to total elapsed time; it should be at least 25%. Therefore, a manufactured part or a piece of paper that requires one hour of processing time should spend no more than four calendar hours in process. Again, Federal Express is a practitioner of high-velocity service delivery. From the time a package is delivered into its care, it is moving most of the time, taking advantage of precious minutes.

Employee motivation

Every process redesign must be tested for employee acceptability. An excellent process by other standards may be no fun for the employees involved. Making these employees responsible for the redesign is a way to ensure their satisfaction. A team structure, described later, is an effective way to ensure motivation is not lost in reengineering.

Cost effectiveness

The process must deliver products at a cost-competitive price to be effective. To test this, the redesign teams must understand existing process costs (this means an activity-based approach to measuring cost) and what cost is competitive in the market. (See sidebar on the next page.)

Implementation process

Some reengineering practices will ensure successful implementation. The principal themes are heavy cell-team member participation and early implementation on a pilot basis. Both signify management commitment to the change process.

Discovery-process selection

Deciding where to improve is as important as how a company goes about it. This is a senior-level decision. It is important to pick the right boundaries of a candidate process for reengineering. Too narrow a scope will have no impact. Too broad a scope will dilute the effort.

In general, fewer but larger process redesigns will bring the best results. One utility identified 22 separate processes in their customer service operation. Twenty two distinct efforts in what were overlap-

New Processes Require New Accounting

An obstacle to implementing change in manufacturing companies has been the state of management accounting. In particular, direct labor usually is burdened by a host of allocated overhead costs. This process produces costs used for pricing, investment justification, and performance measurement.

These practices leave companies open to all sorts of risks. Examples include being underpriced by a focused competitor, losing track of quality costs, and failing to understand and address important non-direct costs (e.g., material handling, logistics, and administration).

To respond, manufacturers and now, increasingly, service companies are turning to activity or process-based costing. This concept assigns what have been considered indirect costs to processes. Therefore, management has a better view of the cost of providing a service and what to charge for it.

In an application of process costing, Engineering Associates, a civil engineering firm, used process costing to construct cell-teams tailored to its target markets. Each business line, including design, surveying, and land planning, was expected to contribute the same percentage of revenue to corporate overhead and profit.

To accomplish this, each business unit cell--team was given broad latitude. This decision authority included billing rates, managing the mix of team skills, and base compensation.

This parted with a practice of uniform billing rates set by title, regardless of markets and value delivered to clients. Also, accountability for results shifted from hourly billing goals to team profitability. This left the teams in control of their destinies, able to achieve large returns for meeting goals and the power to act on their decisions.

ping processes would have accomplished little. In reality, the 22 processes were really activities within broader processes. A better alternative would be to identify the two or three broader processes, assign the activities to each, and reengineer them.

Picking processes for reengineering is like investing. Reengineering is a major investment in both financial and physical resources. A failure may put back improvement several years. Putting effort on the right process requires assessing the return on investment. This means selecting processes that are important to customers and that can be changed in a reasonable amount of time. A common trap is to spread reengineering over too many processes at once. Often, none will be implemented effectively.

Teams at three levels

The best projects combine internal and external talents. The outsider will challenge the norms and traditions of the insider, avoiding a common mistake in reengineering. The insiders, however, must live with the redesigned processes. Through their participation, the organization gains their expertise and ownership in the solutions. A structure to ensure that a program gets implemented will have these elements:

- Front-line team (the first level). This team is advisory to the design team. It includes people actually employed in the day-to-day process. They gather data, test implementation solutions, and advise the design team. In some cases, the design team may serve the role of the front-line team.
- *The design team (the second level).* This group performs the detailed redesign. It is from middle management with representatives from departments involved in the process. The middle levels of organizations are often the most resistant to change. The design team provides added credibility to the redesign solutions; they often must become evangelists for change.
- *The steering committee (the third level).* The effort is driven by a steering commit-

tee of senior management. This group sets policy and gives authority to design teams to make changes. On the steering committee is a process owner, an executive responsible for the changing and maintaining of the process.

The design team proposes changes to the steering committee. The steering committee authorizes changes. The front-line team tries those solutions. Early implementation will test the organization's ability to make it happen. Few projects fail for lack of good ideas. Most fail for lack of management will to implement. This structure does not ensure that implementation will occur; but it makes such failures less likely.

Preparing the infrastructure

Inevitably, companywide change is needed to make reengineering efforts effective, including organizational structure, compensation practices, and information systems. The program should continuously assess the need for changes as redesign occurs. Too often, however, reengineering projects are centered on one or more of these support areas. This is the case of the tail wagging the dog. The result, as the McKinsey survey shows, is little bottom-line improvement.

Benchmarking with the best

In manufacturing, there are recognized world-class performers. They are number one or two in their markets and often have received quality awards recognizing their focus on customers. Anyone undertaking change should visit these organizations. The best may not be in the same industry. Specifically, for service industry clients a company's representatives could regularly visit the best of world-class manufacturing companies.

Following a disciplined approach

A structured analytical procedure is the cornerstone of the implementation process. There are many variations in the steps, but almost all contain the following elements:

- *Describing the as-is.* To set the basis for improvement, a company must know how a process is currently performed. This description includes the how (i.e., what are the steps in the process?), the how well (i.e., is it competitive?), and the who (i.e., where in the organization is it done?).
- *Preparing a vision.* This step develops the process that meets the long-term business needs, unconstrained by existing organization, facilities, skills, and systems. This perspective is invaluable for setting goals for change. It also encourages radical rather than incremental thinking toward reaching the goal.
- *Implementing a plan.* The plan should reflect how fast and how far the organization can go in a given amount of time. It is important that implementation start early. Early implementation tests the ability of the organization to make change permanent. Action also brings an early return in better customer service and profit improvement. This makes reengineering self-funding, with savings more than paying any program costs.

Delay: The enemy of change

One final word about success in reengineering: the manufacturers of the early 1980s felt the hot breath of international competitors. Delay in changing meant capitulation. Today, many companies have similar motivation from foreign or domestic competitors. Some do not-at least as far as they are aware. Whatever the situation, success in change requires persistence. Delay will thwart the attainment of goal. When it comes to delay, the best advice is: don't.[1]

Notes

1. R.C. Morais, "Citi uber alles," Forbes, January 17, 1994, p.50.
2. G. Hall, J. Rosenthal, and J. Wade, "How to Make Reengineering Really Work," Harvard *Business Review*, November-December 1993, pp. 119-129.