Label of Origin: MADE *on* EARTH

Barriers to trade — language, education, buying power — are fast disappearing. No longer is it so important that a product was "Made in China," or Canada, or France. Labels of country of origin have been largely a matter of semantics for years. Now, with new trade agreements among nations, the only label that might make sense is "Made on Earth."

By Cesare R. Mainardi, Martin Salva and Muir Sanderson

THE WORLD OF international operations is changing. New markets are opening in China, Russia, India, Eastern Europe and South America. Regional trade pacts are expanding in Europe, North America and Southeast Asia. New information technology is changing the way business is being conducted. The net result is a more integrated world in which companies that can transform themselves into global production networks can gain significant competitive advantages.

Some companies have already had great success in using supply-chain management techniques to integrate manufacturing, distribution, marketing and sales. As a result, they have created substantial savings on inventories and costs and have improved service. So far, however, these

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Illustrations by Jim Dandy

efforts have been predominantly regional. What is needed is a global network, one that is more than a set of export facilities serving international markets with similar products and customers. Rather, a global network is a matrix of markets, warehouses and factories in which decisions on which product to send to which market from which factory are based on creating maximum value for the customer at minimum globa

Building a global p network starts with deve sistent design principles uct specifications; rest the company's global f and managing common es. It requires leveragin sources of supply; all product to plants wor based on economics an ket requirements, and re turing the organization modified incentives and formance measures, re ing relationships and c munication mechanism means actively manag differing customer spe fications and balanci production and demar seamlessly across th world. It involves recog nizing and overcoming the challenges imposed by transportation costs, tariffs and border restraints. It requires frictionless coordination among units, with formal mechanisms for sharing information and insuring cooperation.

As Exhibit I illustrates, managing a global network that encompasses the entire supply chain is quite different from merely having a set of regional operations around the world.

Why should companies develop global production networks? The answer, simply put, is to: 1) reduce overall costs through economies of scale and scope, 2) use these capabilities to make new market entry cheaper, easier and more effective, and 3) speed the transfer of knowledge across the

EXHIBIT I
ELEMENTS OF A GLOBAL NETWORK

Supply-Chain Element	From Regional Supply Chains...	...To Global Networks
• Product design and development	• Products tailored to local markets • Regions often use incompatible design standards and philosophical approaches	• Common standards and design principles • Clear delineation of common, re-useable design interfaces • Products tailored to local markets but based on modular designs
• Procurement	• Regional sourcing and transaction execution • Beginning global development of select commodity strategies	• Further global development of commodity sourcing strategies
• Product allocation and manufacturing strategy	• Plants traditionally produce to meet local requirements • Capacity and technology investments often duplicated in multiple locations with poor utilization	• Production location decisions based on production economics, logistics costs, duties and market requirements • Clear plant missions – Regional or local production – Export • Manufacturing strategy and technology decisions made in support of the revised allocation methodology and missions
• Supply-chain planning and execution	• Inventory management, forecasting and supply controlled locally • Regional or local optimization of production and inventory decisions with no reference to decisions made in other regions	• A global operations planning process to establish supply policies, capacity (tactical) and inventory plans within the guidelines of the operations strategy • A network of requirements-planning hubs with visibility to current inventory levels and all replenishment orders placed on plants • Monthly cross-functional tactical planning within and across the regions • An upgraded forecast process for capacity planning; increased pull where feasible
• Measures, incentives and organization	• Performance and manufacturing variances belong to a region • Cross-region volume and transfer price negotiations (ad hoc) • No measures, incentives, or organizational structure to promote cross-regional communication and interaction	• Product costing designed to identify the true cost of reallocating volume between factories • Production to explicit product sourcing plan and manufacturing strategy • Requirements-planning hubs execute transparent process within operating guidelines, supply policies and agreed-to tactical plans • Exploit measures, incentives, organizational bodies and policies to drive integration

Source: Booz-Allen & Hamilton

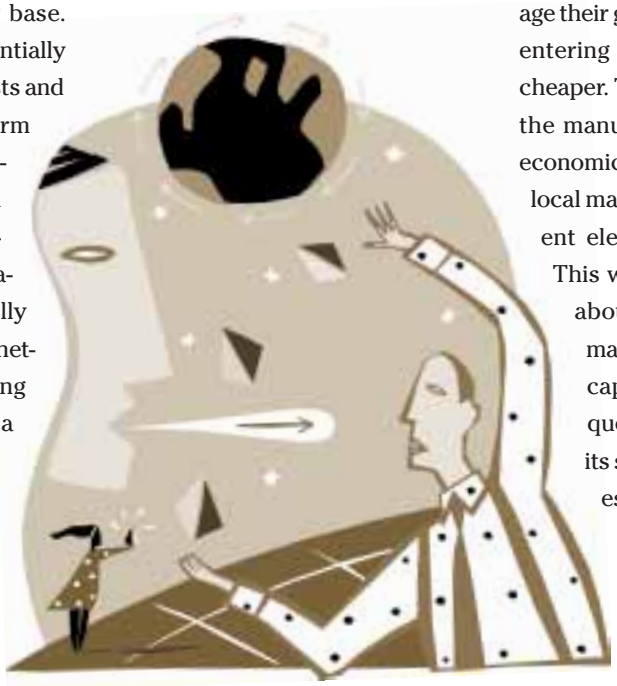
network and the entire enterprise.

ECONOMIES OF SCALE AND SCOPE

Many companies have already achieved benefits of scale by purchasing from a global supply base. They have been able to substantially reduce material acquisition costs and develop better and longer-term vendor partnerships by consolidating sources of supply and leveraging the combined annual buy. Yet these same companies can gain even more by fully leveraging a global production network — including rationalizing the materials purchased on a global basis by standardizing products, components or subsystems among regions.

Global networks allow companies to develop more comprehensive manufacturing and distribution strategies that optimize cost and service on a worldwide basis. In manufacturing, this leads to capacity rationalization (the closure of unnecessary facilities) or rational expansion (the optimization of new facility locations, size and utilization levels). Similarly, reallocating products to factories can lead to leaner plants, lower system complexity and improved customer service. One consumer products company, for instance, is enjoying more than $100 million in annual savings following the transformation of its operational functions from locally managed fiefdoms to a globally managed supply network. (The company, which we will call Company X, asked not to be identified, but details of its strategies appear in “Case Study: Turning an International Company into a Global Production Network,” page 49.)

Companies without a global distribution network over-invest, overspecialize and operate with warehouses that are not properly sized or utilized. Often, this results in separate country-based networks instead of networks that are better integrated and therefore better performing. Conversely, setting up a global distribution network can significantly reduce the total cost to serve and improve service. For example, Caterpillar Inc., the heavy equipment manufacturer, believes that its global distribution network is a source of competitive advantage. Deliveries of replacement parts are guaranteed anywhere in the world within 48 hours. A fully integrated global computer network allows Caterpillar to monitor its distribution system and constantly evaluate performance.



NEW MARKET ENTRY

Companies that can effectively manage their global supply chains will find entering new markets simpler and cheaper. They can better understand the manufacturing and distribution economics and balance them against local market requirements for different elements of the value chain. This will lead to better decisions about whether to install local manufacturing and distribution capacity or to import. Subsequently, the company can use its standardized global processes to develop capacity as rapidly and efficiently as possible.

Automotive component manufacturers have been forced to do this well. One example would be automobile seat systems. As vehicle manufacturers have installed assembly plants around the world, the seat manufacturers have followed to meet delivery requirements and to help the assemblers meet local-content requirements. Working with vehicle manufacturers, they have designed the factories around standard manufacturing processes to simplify building the plant, ramping up to full production and rapidly meeting just-in-time and in-sequence service requirements.

TRANSFERRING KNOWLEDGE

Superior knowledge transfer and

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cultural change across the enterprise are also significant benefits of global production networks. As internal organizations work more closely with each other — in fact, work for each other — productive interactions among staff become more common. Once the organizational and motivational infrastructure is developed to make networks truly global, knowledge exchange becomes more meaningful, practical and spontaneous. In short, global networks drive g communication, global planning global action.

The knowledge transfer can many forms: building a param model for setting staffing levels i ferent types of factories; identi best practices throughout the work; setting head-count and m al utilization targets for all fact and using the most appropriate n anisms to transfer the best prac

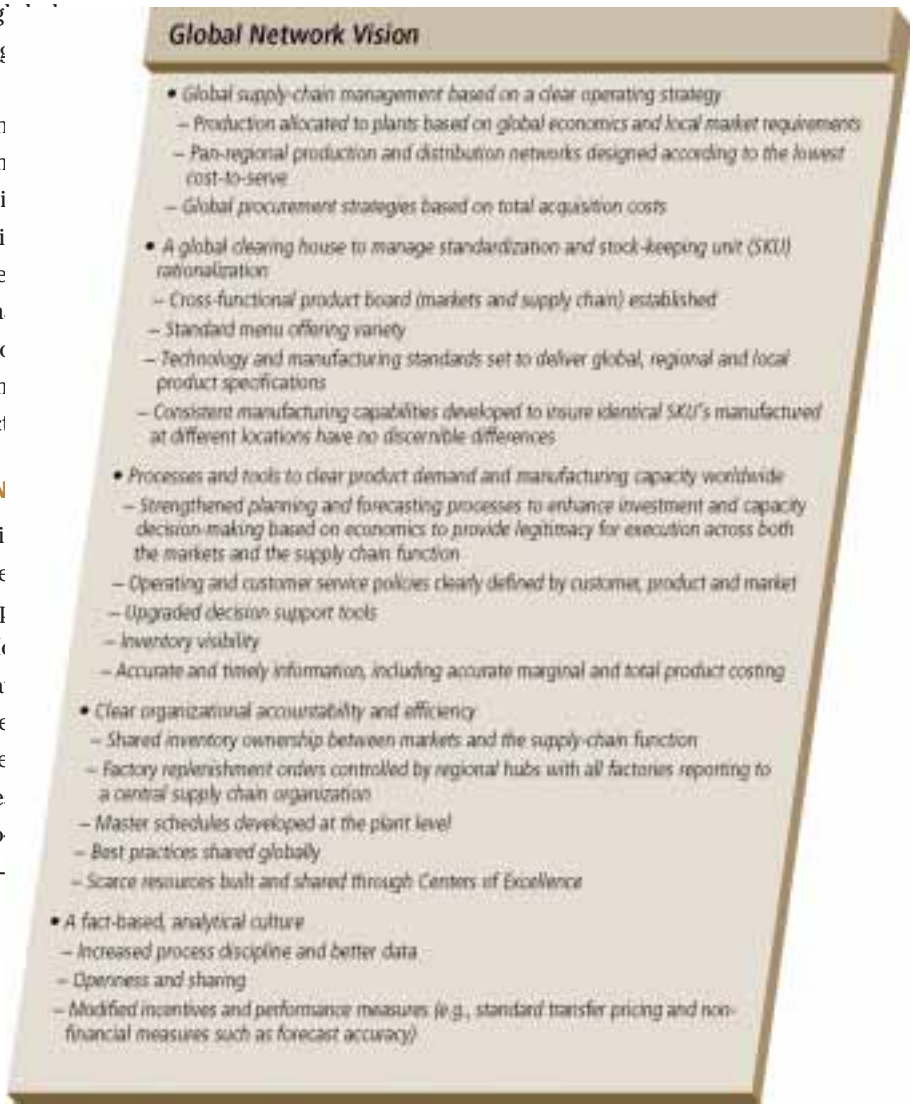
CREATING THE RIGHT VISION

The critical first step in buildi global production network is de oping an integrated and comp hensive management vision. M than a corporate mission sta ment, this global vision is an ope ations strategy built from a serie of real, competing alternative and based on quantifiable eco nomic analyses. In essence, management must identify the real value of a global network, in the process rethinking the whole basis for competition from product design through customer delivery. By building this vision, the company begins to redefine the linkages among its strategy, processes and systems; functional and regional organizations, and the global extended enterprise of suppliers, channel partners and customers.

A vision must also articulate the key principles and processes that will be used to manage the global network. (See Exhibit II.)

Finally, sufficient detail must be provided to make the statements tangible. This requires enough explanation to describe how life will be different at an operating level, based on a thorough understanding of industry

EXHIBIT II
ELEMENTS OF A SUPPLY-CHAIN VISION



Source: Booz-Allen & Hamilton

dynamics — market forces, industry cost structures, competition and economics — and the trade-offs that need to be made (for example, service levels versus cost-to-serve, product range versus cost of complexity). At a minimum the vision must include:

1. Decisions about network structure, asset utilization and vertical integration.
2. A definition of the value-added roles throughout the value chain.
3. A clear customer, product and market focus for each production and distribution site.
4. Standards of performance for cost, quality and service, including expected economics.
5. The identification of strategic processes and technologies.
6. A description of those capabilities necessary to systematically outperform competitors, including required knowledge, business processes, tools and technology.

Development of the appropriate vision must be championed by senior management. The vision that results must be cross-functional — including purchasing, manufacturing and distribution. A vision that is purely functional prevents or slows the development of truly global networks.

By definition, developing a vision requires leadership from the chief executive officer because the decisions made by top management will have significant impact on the cost structure, product design, number and location of factories and warehouses, and supplier selection. Only when these issues are resolved will the advantages of a global production network be realized.

CHANGING PERFORMANCE MEASURES

When building a global network, it is impossible to drive change if performance measures and, even worse, financial incentives are not aligned. In regional or local supply chains, manufacturing facilities are often measured by cost and volume variances so that reallocating products on a worldwide basis negatively affects these variances and hence causes resistance from local managers. Similarly, globalizing distribution networks may lead to regional personnel feeling that they are losing control of their inventories and hence service performance. These problems must be resolved during the development of the vision, often with the redefinition of performance measures in terms of service provided to other functions (for example, schedule adherence for manufacturing) and the sharing of measures across functions (for example, inventory performance).

When building a global network, it is impossible to drive change if performance measures and, even worse, financial incentives are not aligned.

Similarly, organizational structures can hinder the change. If employees still feel strong loyalties to a regional or national model, then they will resist the changes. This problem can be avoided by redefining management roles to better support globalization.

Company X (see "Case Study"), an international consumer goods manufacturer, supported the globalization process by forming a global supply-chain group based at headquarters. This group was responsible for designing and managing the global network and the processes needed to support it. Once these had been accepted by the organization, the group replaced local order-fulfillment centers with three planning hubs — in Switzerland, the United States and Hong Kong — to act as the interface among the central group, the regional markets and the production network. These hubs drive an integrated tactical planning process, support central strategic planning and place all production orders at the plant.

TRANSPARENT DECISION-MAKING

Building a global production network is a change of such magnitude that it will naturally encounter a large amount of skepticism. Furthermore, it is a task of such complexity that major errors can be made if the details are not fully understood. To overcome any problems, recommendations or decisions should be based on clear analyses that have been openly discussed by senior management.

Conducting the analysis openly forces the members of the organization to work together on a global

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Case Study: Turning an International Company into a Global Production Network

Changing a $4 billion international consumer products company into a smoothly functioning global production network is a bit like turning around a supertanker on a dime. You have to ask yourself, Should it be done? or even, Can it be done? The full answer for Company X, which asked not to be identified, took three years to implement, although significant benefits were realized in the first year.

Between 1990 and 1997, Company X enjoyed a 70 percent volume increase. It doubled its markets served to more than 70, and factories owned worldwide to more than 20. However, these operations were managed by country — and local practices held sway. Most network decisions resulted from elaborate cross-region volume and transfer-price negotiations.

Under increasing margin pressure, members of management began to question how they could gain greater efficiency from their supply chains. The company changed its manufacturing strategy by:

1. Creating a global supply-chain organization to manage plants and supply worldwide.
2. Completing an operations review that resulted in a global production network, supported by facility expansions and rationalizations.
3. Reallocating production to low-cost facilities across regional boundaries.
4. Changing transfer pricing and incentives to make the new structure work.
5. Implementing new supply-chain management processes and tools, including three regional order-fulfillment hubs.
6. Buying commodities globally.

The development and implementation of this strategy was a major undertaking, but savings greatly outweighed costs. Between 1995 and 1998, the organization reduced its non-material conversion costs by 14 percent and material costs by 10 percent. Despite the complexity of global management, export inventories were reduced by more than $100 million in a growing business.

DEVELOPING THE VISION

The first step was to understand what drives manufacturing cost; what kinds of facilities should be built and where, and how products should be allocated to these facilities. The economics showed that:

1. There should be only one fully integrated factory in each trade region because import duties outweighed manufacturing-scale costs that dominated distribution costs.
2. Where possible, the factory should be located in a low labor-cost country within the region, because wage differences alone create up to 60 percent variation in value-added cost per unit.
3. The appropriate degree of vertical integration and technology selection is determined by volume requirements and labor costs. For example, in a low-volume trade region, only an assembly facility is needed, while at high volumes a fully integrated facility is required.

To develop the overall manufacturing strategy, these economic factors had to be tempered by several so-called soft constraints: market perceptions of the quality

and cachet of different locations, government restrictions and other political, economic, infrastructure and supply situations. Despite these soft constraints, the company realized significant savings by rapidly and safely reallocating production exceeding 12 percent of total volume.

Based on this operations strategy, the company rebalanced its manufacturing footprint by :

1. Defining factory missions (for example, export, local, high volume, high complexity).
2. Closing three plants in Western Europe.
3. Expanding two facilities in Eastern Europe, one as a low-labor-cost export facility.
4. Expanding one plant in Asia to become a regional export facility while closing another.
5. Downsizing two plants in North America — focusing one facility exclusively on the Canadian market.
6. Reallocating products worldwide to low-cost plants.

It was evident, however, that ongoing management and improvement of the global network would occur only with fundamental changes in the organization, its incentives and supply-chain management processes. The company decided to address these issues with the creation of a global supply-chain management function to which most plants would report. This group worked to develop an overall vision, including ongoing processes and measures to insure that tactical as well as strategic decisions were made on a global basis.

An important building block was a clear articulation of organizational roles and responsibilities. A global-operations planning process shifted problem resolution to a senior management team instead of single functional managers, with key decisions resolved at a monthly meeting. In addition, a global clearinghouse was established to manage standardization and product rationalization. Processes and tools were installed to clear product demand and manufacturing capacity worldwide, and the organization shifted to a more fact-based, analytical culture to support improved decision-making. SB

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basis and provides the necessary legitimacy and transparency to overcome local agendas (it is hard to argue with facts in open forum). Also, analysis demonstrates how much value can be realized, thus setting a target for the organization and insuring that the "devil in the detail" is addressed up front rather than too late.

For example, Company X (see "Case Study," page 49), which was converting a set of country-based organizations into a global network, supported the change by transforming the way in which the organization made decisions. As part of this reorganization, the company:

1. Instituted a monthly planning meeting for senior management as the forum for making key decisions with a small central team responsible for producing the supporting analysis.
2. Allowed the country-based organizations to influence, but no longer determine, major supply-chain decisions (for example, inventory targets and production requirements).
3. Held specific top managers responsible for the execution of these consensus decisions after each meeting.

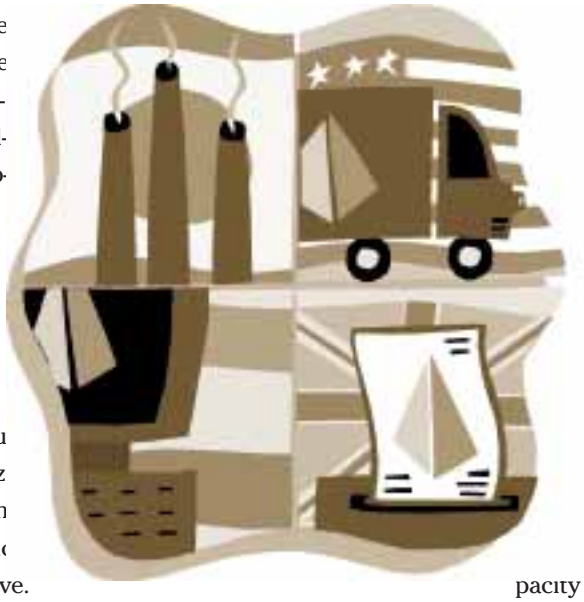
BECOMING GLOBAL

To gain the full benefits of the global network, a company must transform the way it serves its customers and change many of its business systems, including product design and development; procurement; product and manufacturing strategy, and supply-chain planning and execution.

1. Transforming product design and development

This aspect of the transformation

begins with consistent product specifications and design principles, although this does not require identical product specifications worldwide. Few products can be sold as-is throughout the world without compromising their acceptance in local markets. Even widely accepte consumer brands often require tailored packaging or modification. However, many products, even though they may appear different in different markets, can still share many common internal components. At the very least, products can share common design philosophies, standards and production procedures. Truly global organizations realiz that the commonalties amon products are, or could be, muc greater than others might believe.



Recognizing product commonalties often requires an innovative approach to segmenting product characteristics, processes, subsystems or resources. Once recognized, however, these commonalties can be leveraged to simplify business and manufacturing processes and to enable controlled customization. Companies adept at these skills understand the requirements of their customers, explicitly plan where customization should occur (and where it should not) and employ reusable modules to speed up the design process and simplify manufacturing and distribution.

Often these companies will use "last-stage customization" to introduce variation as late as possible into the manufacturing process to limit the disruption to the overall production system. Examples of such techniques include painting finished assemblies or applying end-customer labeling at final distribution centers. This type of common-product design policy for new products can be combined with an aggressive evaluation and simplification of existing offerings to radically transform a company's global product offering, lower costs, enhance innovation and prepare for global networks all at the same time.

An example is the Boeing Company. While aircraft are one of the most heavily customized products, Boeing has segmented all parts and processes into three groups: 1) basic and stable, 2) customer driven — previously defined, and 3) customer driven — newly defined. The third group drives all of the manufacturing complexity associated with customized products and actually accounts for only a very small percentage of parts. However, all planning systems were originally designed for "customer driven — newly defined" parts. By recognizing this and implementing separate processes for the three types of parts, Boeing is removing significant cost from its operations.

ransforming product ocation

e benefits of scale and scope n be realized only if the company has a process to allocate volume and resources to plants, warehouses and suppliers on a worldwide basis. ithout such a mechanism, the twork remains primarily reonal in nature. To do this effctively, a truly global company ust use processes and tools to ance product demand and capacity worldwide based on quantitative analyses of economics and market requirements. For example, companies must understand how manufacturing conversion costs are affected by differences in wages, scale, utilization and technology. The company must understand the impact of international transportation penalties, duties, tariffs and market restrictions and preferences, such as customs rules concerning country-of-origin determinations.

For instance, the Ford Motor Company considers the global implications of sourcing outside-purchased components. It weighs the benefits of global supplier factories against the duty penalties associated with importing products into the markets in which it assembles vehicles.

This analysis is combined with an derstanding of local-content requ ments to decide whether to enco age local production or source fro abroad.

3. Transforming supply-chain planning

It is impossible to completely manage and control a global network from the center because the data can never be collected and a alyzed rapidly enough to respon a specific situation. But it is also sential that everyone plans and executes in accordance with the global strategy. This paradox is partly resolved, as discussed earlier, by insuring that the organizational structure and incentives support the new strategy. However, this also requires transforming the supply-chain planning process. The key to this global transformation is to group processes by their relative strategic importance, assign them to the appropriate layers of the organization and then use guidelines and rules to link them together.

The strategic processes focus on setting the overall objectives and policies for the supply chain, building the strategy and then driving this down to a set of tangible choices, as described earlier. These objectives and policies then provide a framework — such as the balance to be maintained between inventory and capacity or the number of customer-service policies per market segment — for more detailed decision-making. This is work that should be carried out at the global center with input from the regional and local levels.

The next level of planning is tactical: deciding on a periodic basis how assets should be deployed to meet the objectives of the network (for example, sales and operations planning). Tactical planning can occur at different levels of the organization, depending on the circumstances. In some companies the number of factories and warehouses involved is sufficiently small that the work can be carried out at the center. As the number of facilities increases, the processes may need to reside at the regional or even the local level.

Once again the output is passed in the form of guidelines to the next level of detailed planning for the operational and executional processes. These are the day-to-day activities that take place at the factories and warehouses, such as scheduling, ordering and manufacturing. These processes by their very nature must be local.

By implementing such tiered anning and execution, the organi- zation is able to fully deploy the supply-chain strategy without hav- ng to build a costly but usually in- effective control hierarchy.

For example, the Gillette Com- ny, maker of grooming products, veloped a network strategy based production facilities using com- on processes to manufacture products whose technical specifications have been standardized throughout the world. This high degree of commonality allows tactical planning to take place on a daily basis with sourcing decisions based on exchange-rate effects and available factory capacity. Then, at the operational and executional level, the factories manufacture to request.

LEVERAGING INFORMATION TECHNOLOGY

Information technology is a critical enabler of global networks. However, if its role is misunderstood, it can also be one of the key reasons that companies fail to realize optimum benefits. Many companies attempt to use information technology to control the whole global network from the center. They often try to build a monolithic system that will provide real-time visibility into the schedules of each factory and continually update inventories in all their worldwide stocking locations. This often fails because data can never be made available with the accuracy and timeliness required for central decision-making on anything but the most strategic

issues. Usually the system introduction flounders as implementation takes far longer than planned, the complexity and costs continually rise and everyone claims that they cannot deliver the benefits until the system is fully in place.

For example, a consumer-goods company decided to use an enterprise resource planning (ERP) software implementation as the first step of a globalization program. Three years down the road the company is still struggling to develop the system as it tries to balance minimizing development costs for information technology with the continual requests for unnecessary, but specific and expensive, changes by the local country operations.

In contrast, best-practice companies avoid this problem by: carefully defining the global processes that need information technology support; using different information technology solutions to support these processes, and then interfacing rather than integrating the various solutions. Often, strategic decision-making can be supported by simple spreadsheet models or simulation packages; only certain processes, such as inventory planning, actually need a full worldwide information-technology network. Understanding this trade-off allows companies to better target their information-technology investment and achieve far greater returns in greatly reduced time frames.

For instance, a global agricultural and construction-equipment manufacturer that wanted to improve the efficiency of its global supply chain started by using a simulation package to help design its global network. Then it installed a tactical planning tool to work through the key supply and demand balancing decisions, and finally it gained the benefits of global information sharing. This approach achieved large benefits with reduced inventories and shorter lead times realized in stages.

A STEP-BY-STEP APPROACH

It is vital that a company build a comprehensive vision of the global production network first. This is crucial — not only to communicate the end objective but also to allow managers to make the appropriate trade-offs during implementation. However, it is equally important to realize that not everything needs to be globalized at once. The actual process for implementing the global network vision is usually evolutionary.

Initially, a company must decide where it is likely to gain the most benefits from globalization. Not all companies will gain the benefits of global networks in all markets. For instance, companies can realize economies of scale in purchasing and manufacturing only when: parts specifications are similar; procurement and conversion costs are a significant portion of the total value added; there are large cost differences between producing locations, and conversion cost savings are not lost in transportation, duty or inventory penalties. Spending some time analyzing the cost structure and building a few simple models to simulate the benefits of scale and scope should give an indication of where to start.

Provided the vision has been defined, global network capabilities can be introduced gradually — starting where they can generate the most benefits for the least effort. Companies frequently begin by globally sourcing common raw materials or components. In parallel, they conduct high-level assessments of global-capacity allocation and investment decisions. These actions often yield significant up-front savings that can be used to fund later network actions such as design and product specification changes and information technology investments. Other companies have started with the distribution network and use the inventory reductions as a means to generate cash to fund further initiatives. Some companies have decided to bite the bullet and start with a factory rationalization program to get the most painful steps out of the way first.

In time, all such actions support better production allocation and management practices, organizational changes and improved information processes. Eventually, such companies become fully globalized network organizations with extended enterprises among key suppliers and channel and industry partners; reusable modular designs; truly global capacity planning and supply-chain processes, and integrated management systems, incentives and structures. At that point their products truly are "Made on Earth."

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