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## **Making the Case for Knowledge Management: The Bigger Picture**

*Dale Neef*

Increasingly on high-value service opportunities and to maximize the way in which they employ their most creative knowledge workers, becoming learning organizations which provide a culture where increasingly responsible employees can flourish. To provide their workers with the knowledge necessary for growth and innovation, organizations must then devise both a cultural and technical infrastructure that will promote a free-flow of information and knowledge throughout the organization.

In order to understand how these two areas are related, we need first to understand the knowledge-based economy: What is it, and how do we know it is happening? Is it really new or unique? What are its effects and what does it mean to us? We begin by looking at four emerging trends now occurring in the global economy:

<b>Trend 2</b>	The reason that new computing and telecommunications technologies are so economically revolutionary in their nature is that they allow ideas in the form of techniques, research results, diagrams, drawings, protocols, project plans, chemical formulae, marketing patterns, etc. to be distributed instantaneously and in a comprehensive way to anyone, anywhere around the world. As a result, an interconnected global environment is emerging. This unbounded economic framework, in turn, provides organizations not only with vast new market opportunities, but also with an enormous potential pool of labor worldwide as improved communications and low-cost transport allow direct access to both high and low-skilled workers globally. But this trend has gone well beyond simply allowing advanced economies to take advantage of low labor costs in foreign countries. Developing economies (those
<b>A New, Globalized Market Infrastructure is Emerging Growing Global Competition</b>	

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that we used to think of as third world) themselves have rapidly adapted to the advances in operational techniques, automation, computing and telecommunications technologies and are quickly building a highly-competitive production infrastructure capable of manufacturing high-quality products at a fraction of the labor costs of the traditional advanced economies. Their success can be illustrated, in part, by looking at the tremendous growth rates that they have witnessed in the last several years. Since 1969, East Asias proportion of the worlds economic output has leapt from 4% to over 25%, with the average Asian national growth rate rising to 7.5% in the first quarter of 1997. In 1978, Chinas exports totaled only \$9.8 billion, but by 1994 their exports had shot to \$121 billionmaking China the eighth largest exporter of manufactured goods in the world. South Korean GNP has grown 177% since 1980, and Thailands GNP has risen 235% in the past twenty years.<sup>13</sup>

Moreover, this growth is not exclusively low-skill, low-wage labor. In many cases Asian education levels meet or exceed those of the traditional developed economies (the US was well behind several Asian nations, ranking 28th and 27th, respectively, in high school mathematics and science achievement tests), and the R&D and productivity investment rates are beginning to rival OECD levels.<sup>14</sup>

#### Side-stepping the First World

Accordingly, not only are new markets being opened up for consumer-based goods, but for the first time, these developing economies are able to contribute directly to the development of those goods at every stage of production, often in cooperation with other developing economies. Samsung, for instance, invested \$1 billion on TV sets and white goods production in Brazil and Mexico in 1996, and Hyundai just set up a \$500 million regional reciprocal manufacturing center in Brazil, Columbia, and Venezuela. As a result, much of the work that was once the exclusive domain of the OECD nations is now quite competently done in India, Singapore, Thailand, Latin America or Eastern



Europe at much lower labor costs.15

### A Global Marketplace

All of this means that for the first time in history products can be made and sold almost anywhere on the globe. Design and test elements of manufacturing can be accomplished in parallel, and the results conveyed electronically. Market trends can be sensed and responded to with much greater accuracy and speed. The entire supply chain, when organized effectively, can be accomplished globally, without boundaries, at a fraction of the cost it would require to complete in a single domestic economy subject to traditional high and low-skill labor supply and demand.

Transportation-based technologies have revolutionized the speed and cost structures of shipping goods around the world. New sea-going carriers, electronic scheduling, advanced port management and revolutionary new designs for the container-carrying fleet have combined with an ever-expanding air cargo fleet to criss-cross the globe 24 hours each day.

Since the 1950s, business in the U.S. has prospered, at least in part, because it thrived in a uniquely low-leveraged economic infrastructure where raw materials, low to medium skilled labor and the availability of capital meant that resources and labor were more abundant and less expensive than in other economies. Many economists now warn that within the next decade, those same characteristics, and therefore the traditional economic mainstays of the post-war Western economic miracle (automobiles, white goods, textiles, and even high-value electronics) may be permanently transferred to low-wage, developing economies. In advanced economies like the US, Sweden or Britain, low and medium-skill production will increasingly be either moved away to low-cost labor markets globally, or abandoned altogether, forcing a further shift toward the knowledge-based industries or services where advanced economies still retain a comparative advantage.

### Convergence and Productivity

One area of concern centers around the issue of convergence, where

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the US, in particular, seems to be falling behind other advanced economies in crucial measurements of productivity. The US now maintains less than 25-30% of world GNP a figure which has dropped dramatically from 70% post-war, and halved since 1960 when the US boasted over 50%.<sup>16</sup> In 1971, 280 of the largest 500 multi-nationals were American owned and based. Today the U.S. can claim ownership of only 157, while Europe has surpassed the US with 168 and Japan has moved from 53 to 199.<sup>17</sup>

Is there danger in convergence, or is it a natural evolution toward post-war equilibrium to be expected and encouraged? There is much debate about how quickly the gap is closing and what it will mean to the US. Many economists contend that despite strong growth and the appearance of a healthy economy, there are many indications that productivity levels in the U.S., particularly, are falling behind European and Asian nations. Part of the problem is that knowledge and service-based work which now makes up some 70-80% of the U.S. economy's output is notoriously difficult to measure or make more efficient. After all, security guards, doctors and lawyers by the nature of their work and pay structure, are peculiarly resistant to techniques that reduce cycle time or create broad productivity increases.

But the shift toward a weightless economy can only explain part of the productivity issue, and some economists believe that there are more sinister implications behind this trend. Although the service sector is larger in the U.S. than in Europe as a whole, many European and Asian nations are only marginally behind in the growth of services. More importantly, key areas of the American economy such as mining, petrochemical and construction have witnessed a steady decline, comparatively, in output per worker. Why?

It is a complex and ongoing debate, but one reason is almost certainly that the American public and therefore industry have failed to invest, both in terms of capital equipment and in terms of medium to long-range R&D. German families, for example, save about 15% of their annual income, the Japanese save some 20%,



while Americans, by comparison, save less than 5%. Because of notoriously high levels of consumer spending, over the past 15 years there has been very little available capital in America for making the key investments necessary in order to take full advantage of new operational technologies.<sup>18</sup>

A second reason, runs one school of thought, is that unlike most European and Asian countries, the trend in the U.S. is for less, not more, cooperation with government in terms of public-private, long-term economic planning. This, combined with unprecedented-high levels of consumption, a focus on short-term over long-term investment, an emphasis on military-based R&D, and the tendency of U.S. businesses to focus locally rather than globally, have resulted in an alarming trend which finds the U.S. falling behind.

#### Who Will Be The Global Police?

Finally, one of the most compelling problems arising from the unbounded, knowledge-based economy is that historically there has been little agreed international law governing such critical issues as anti-trust, CoPyright or patents. This international free-for-all market has resulted in a general hesitancy to distribute new products and services in emerging markets, and has meant tremendous losses for those who invest in new products only to see them reverse-engineered or CoPied outright in foreign markets. The scale of the problem is enormous. Up to 8% of all products and services worldwide are pirated with costs to the US alone estimated to be as high as \$200 billion annually. China, for example, is thought to have a market for pirated music (primarily CDs) worth \$168 million almost the same size as its entire legitimate music market in total.<sup>19</sup> Similarly, software piracy accounted for lost sales estimated to be as high as \$15 billion in 1996, with piracy rates emerging as high as 43% for Britain, 67% for Japan, and an amazing 94% for Russia.<sup>20</sup>

What does all of this mean to American business? For one thing, it means that in order to compete in the knowledge-based economy, U.S. organizations will increasingly have to begin functioning on a

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more global basis. Remaining confined purely to domestic markets is no longer a viable option for many companies. A good example of a company feeling the pressure of global competition is Chrysler, which has been forced for the first time in its history to shift away from its exclusive domestic focus and begin to join in international alliances which allow them to compete against more agile newcomers to the new worldwide automobile manufacturing industry.

It also means that organizations will need to reconsider their very organizational structure relocating service and production wherever customer and labor markets worldwide make it most cost-effective. In order to leverage and share ideas and techniques that bring efficiency and innovation to the company globally, organizations will need to create new patterns of communication that will help break down old cultural barriers and promote a much closer working relationship among groups of employees and business partners with similar skills and duties around the world.

**Trend 3:**  
Knowledge-based Growth Means an Accelerated Pace of Change  
Knowledge-based Growth Twists Classical Economics

Most contemporary economists agree that the knowledge-based economy has characteristics that may be very different from those found in traditional economic models, and although it is by no means certain yet that we need to scrap the fundamental tenets of economic theory that we have worked with for the past 200 years, changes in the global economy do challenge many of our traditional economic notions. In the past, it was usually a unique combination of land, labor and capital that gave a nation its comparative advantage. Today, things are different. As an ever-greater percentage of economic growth arises from the burgeoning knowledge sector, a nation's comparative advantage comes instead from its collective ability to leverage what its citizens know. Traditional factors of economic growth i.e. land, labor, capital, and indeed, to a large extent fiscal policies seem less relevant (if not obsolete) when seen in the context of a global, knowledge-based



economy.

Until recently, for example, landlocation, availability of natural resources, transportation advantages such as rivers or natural harbors were all part of the basis for economic development and success. Where something was done often dictated what was done. But traditional factors such as natural resources and raw materials are far less important now than they were just ten years ago. Not only are raw materials now an ever-decreasing proportion of the value of goods within the advanced economies, but modern extraction, production and transportation methods have meant that natural resource prices themselves have fallen some 60% since 1975 (and will probably fall 60% more in the next twenty years). This all makes traditional natural resource-based production much less profitable, and the natural advantages of land much less important.<sup>21</sup>

Physical assets, too, are less important. As the manufacturing base continues to shrink from the effects of automation, the workerless factory, JIT distribution techniques, outsourcing and relocation of plant to nations with lower labor costs, less and less physical plant of any sort is required in advanced economies. A similar trend can be seen in the service sector, where modern computing and communications tools tied together in an electronic environment have revolutionized the way in which companies view the need for physical assets. Many organizations now consist of little more than a sales force, a series of small coordinating management offices, and a series of distribution hubs. Office space has been rationalized with new hotelling techniques greatly reducing traditional office requirements. Many workers today are mobile and essentially nomadic, spending their time in airports or in hotels, working on laptops connected to virtual networks. Although innumerable social and personal difficulties arise from this new scenario, the fact remains that after several years of severe rationalization, organizations in the knowledge-based economy are maintaining only a fraction of the physical assets that they had in 1980, and land as a key factor for providing comparative advantage

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has been rendered virtually meaningless.

Similarly, the traditional notion of labor itself providing the means for retaining a national comparative advantage requires rethinking in the global, knowledge-based economy. Since the onset of industrialization the vast majority of employment (and thus national economic prosperity) in advanced economies has traditionally been found in low to medium skill, make or move type jobs, where virtually anyone could be trained to complete the work. In the past, labor was seen as a commodity much like any other as interchangeable as the assembly-line parts with which the employees worked and over the past fifty years advanced economies have come to expect a continued high standard of living to be gained from those low and medium-skill jobs. However, all of that is changing. Most employment in advanced economies is now within the service sector, and as labor-based manufacturing continues to be shed or outsourced globally, low and medium-skill work in advanced economies will become increasingly less well paid and more difficult to find. To make matters more difficult, unlike the low and medium-skill labor markets of the pre-1990s, inclusion in the highly-skilled labor force of the knowledge-based economy is unlikely to be automatic or universal. The transition from blue-collar to knowledge work is not an easy one.

The economic principles concerning capital, too, have changed dramatically. With the development of electronic currency trading and financial markets in major cities world-wide, capital is no longer restricted to local investment boundaries. With global capital markets exchanging some 1.3 trillion dollars every day, investment funds can be obtained quickly for development anywhere in the world.<sup>22</sup> The very nature of the concept of capital intensity where investment was once restricted only to those nations which had the indigenous wealth and infrastructure is no longer applicable. In 1995, an amazing \$170 billion in private capital was invested in developing economies, and between 1991 and 1995 total flows of foreign direct investment doubled to \$315 billion as American and European companies invested in low-wage nations such as Mexico, Brazil or China. Indeed, some 10% of US pension funds are



invested in Asia alone.<sup>23</sup> In the global, knowledge-based economy, capital investment is no longer restricted to wealthy nations. Global capital markets and their complex, interactive exchange networks make investment impersonal; unencumbered by national sentiment or long-term planning. Today, finance seeks out profits, wherever they may be around the globe.

#### An Ever-Accelerating Pace of Change

Finally, we also know that one effect of concentrating an ever greater number of our most-knowledgeable people on high-skill problem solving and the development of high-technology products (and paying them more to do it) is that the pace of change will continue to accelerate. Because knowledge-based business seems to grow under its own effect creating markets that never before existed, attracting and producing more innovation, unconstrained by land, labor or capital it is in large part unpredictable. The computer industry provides a typical example, where some 70% of revenue today comes from products which didn't even exist two years ago. Last year Sony introduced more than 5,000 new products.<sup>24</sup> Even at the national level a sharp comparison can be drawn between the four decades which it took for Japan to become a leading car and computer manufacturer and the little more than five years it has taken for Taiwan to gain a large share of the world's PC markets, or other new Asian Tiger economies such as Thailand and South Korea, for example, to develop highly-competitive automotive industries.

An entirely new level of volatility permeates the world economy today. In fact, of the Fortune 500 companies in 1955 (most of which were natural resource-based), 70% are now out of business. One of the most curious economic characteristics of knowledge is that it often makes previous goods, services and knowledge obsolete.<sup>25</sup> Entire industries may spring up, thrive and be eliminated in a decade, as knowledge-based growth continues to shorten product life cycles, compress development cycles, drive new product prices downward, and increase the competition for technical standards.<sup>26</sup> Just a few examples illustrate the enormity

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of technological improvement resulting from this focused commercialization of knowledge-based work over the past several years:

In agricultural, manufacturing and low-skill service sectors, machines are quickly replacing the need for low and medium-skill human labor. So extensive have the technological advances been in agriculture that the percentage of farm-based workers has dropped from 75% in 1900 to some 25% of the US working population after World War II. Farm labor accounts for less than 3% of employment in America today.<sup>27</sup> Similarly, in the realm of manufacturing, the scale of productivity improvement from automation is astounding. During the last 35 years the worlds largest 500 multinational corporations grew by some 700% in real terms (from \$721 billion in sales in 1971 to \$5.2 trillion in 1991) even while decreasing the total number of employees.<sup>28</sup> One good example of near-automated production is US Steel, which in 1980 employed 120,000. Today the company employs fewer than 20,000.<sup>29</sup> In fact, the percentage of the workforce involved directly in manufacturing in the U.S. has dropped from 33% post-war to less than 17% and may drop as low as 12% by the end of the decade. Some estimate that within 30 years as little as 2% of the worlds current labor force may be needed to produce all the goods necessary for total demand, world-wide.<sup>30</sup>

In high-technology areas such as computing and telecommunications, the pace of change is even more incredible. Communications and computing capabilities capturing, codifying and disseminating information and knowledge has improved exponentially in terms of speed and cost. Since 1975, the combination of global telecommunications and computing has increased its information-carrying capacity by over a million-fold. In telecommunications, new optic fiber network each wire smaller than the size of human hair are each able to transmit the data equivalent of the entire Encyclopedia Britanica in five seconds. In 1960, a transatlantic cable from the US to Britain could only carry 138 conversations at one time. Today new fiber-optic design allows for 1.5 million conversations simultaneously. The same



accelerated pace of improvement can be seen in the computing industry, where Moores Law (named after co-founder of Intel, Gordon Moore) predicts that computing power doubles every eighteen months (or quadruples every 30 months). Today's \$2,000 laptop computer is much more powerful than a \$10 million mainframe computer was in 1975, and a typical CD ROM can now hold 360,000 pages of text.<sup>31</sup>

All of this means that new demands are being made upon senior management within organizations to develop corporate agility—the ability to sense and respond to a constantly changing environment worldwide. In order to understand and react appropriately, organizations need to develop ever more sophisticated ways of sensing and responding to new trends in technology, competition or the marketplace.

**Trend 4:**  
The Rise of the  
Non-national  
Organization

One final aspect of the global, knowledge-based economy that should be considered is the growing influence of non-aligned multinational companies. As the world moves toward an unbounded global economy, organizations of all types are becoming more geographically decentralized, and thus less aligned with any particular nation than in the past. New regional agreements on tariff reductions, combined with growing market saturation for consumer goods domestically, have driven many companies toward global extension and the development of a more nonnational character, where cross-border operations extend into complex loose alliance networks of vendors, outsourcing agents, and distribution channels worldwide. The automobile industry, for example, has been one of the first major industrial sectors to be forced into true globalization, and even now are struggling with issues concerning global relocation, production overcapacity and the need to develop

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strategic alliances. A new breed of international conglomerates are beginning to emerge as large firms scramble to gain influence in this new global marketplace. The global economy can create strange bedfellows: IBM and Siemens, for example, are working together to produce a 16-megabyte chip in France. Daimler-Benz executives are in talks with Mitsubishi on joint ventures, and Ford completes joint production with Nissan while owning one quarter of Mazda. It all can be alarmingly complex, as William Grieder notes, when NEC and IBM both own equity stakes in Bull, the French computer company, which own a majority of Honeywell, and Honeywell is in alliance with NEC, which, of course, competes with IBM.<sup>32</sup>

Similarly, in the telecommunications field national giants are scrambling to align, creating new and alarmingly powerful non-national communications giants such as Concert (British Telecom and MCI), World Partners (AT&T and 16 other companies in 31 countries), and Global One (Deutsche Telecom, France Telecom and Sprint). As these and other telecommunications giants continue to emerge, it will mean that any activity that can be conducted through a screen and a telephone wirewriting software, secretarial services, airline revenue accounting, processing insurance claims will be able to be done without regard to geography or nation.<sup>33</sup> This trend is already well advanced, with some 100 American firms outsourcing their software code cutting overnight via electronic networks to India where programmers are typically paid less than 25% of the American rate. In fact, it is estimated that some 4 million virtual aliens are already employed directly in the American workforce, existing outside of nations borders, undercutting domestic labor rates, working in an ill-defined tax framework, connected only through a growing electronic communications network. Indeed, this global telecommunications infrastructure already essentially exists beyond the controlling powers of any single nation.<sup>34</sup>

If burgeoning markets and low-cost labor regimes are the pull which draws organizations into new global markets, the high tax rates and high labor costs which are now integral to the economic



framework of advanced economies are increasingly being seen as the push for companies to relocate. Nestle, a Swiss company, now has some 98% of its production capacity outside of their host nation. Similarly, Toyota is now over 70% non-Japanese, and Motorolas American employee level has declined to 56%.<sup>35</sup> This continued evolution toward truly global markets may mean that, for large-scale enterprises, it will no longer be possible to remain wholly domestic either in production or sales. In the next few years, as companies continue to become more and more global in nature, the traditional commitment to national prosperity and patriotism may increasingly give way to organizational loyalty.

#### Erosion of the Power of Governments

As a result, the very nature of the role of national governments in the global, knowledge-based economy is changing. In the past, a nations comparative advantage was based upon a combination of natural resources, labor, capital, and a balance of governmental, social and economic stability within its borders. National governments could monitor and to some extent control what goods were produced within their borders, what products and services were sold by their people, and how much money their citizens were eventually allowed to keep in the local currency. Indeed, internally, their ability to tax and control interest rates have been their two main tools for wielding influence and power over capitalist organizations and the economy as a whole.

However, our traditional understanding of economic activity which arose from the theories of Adam Smith, Alfred Marshall, or even John Maynard Keynes, was based on the idea that even accounting for import and export trade, every nations economy was essentially bounded. Borders could be sealed, taxes could be raised or lowered, tariffs imposed, duties focused on specific goods in order to provide incentives and punishments. Governments could assist indigenous industry through subsidies, grants for Research & Development or through advantageous trade legislation. Is this all still the case in the global, knowledge-based economy?

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Probably not. With the development of electronic communications, capital markets, advanced transportation and easily transferable technologies, the very nature of multi-national industrial ownership may change. In the future, governments will have less and less control over business as organizations become members of non-national conglomerates, deftly moving their assets and skills around the world in order to avoid any legislated pressures (such as labor laws or taxation) that governments attempt to place on them. After all, of the worlds largest economies in 1997, 50 were corporations. Sales revenues for General Motors alone were roughly equal to the combined GNP of any ten African nations, and yet even the Big Three American auto makers combined are dwarfed by the earnings of Microsoft. Within the next decade we may well find that the knowledge-based economy has undermined the very nature of the nation-state.

**Why  
Knowledge  
Management?**

So what does all of this require of organizations in the U.S.? Where do the changes taking place in the global, knowledge-based economy begin to create the need for knowledge management practices at the organizational level? It is Not a Feudal System Anymore

One of the most obvious and direct effects of the knowledge-based economy on organizational level knowledge management is that more and more positions within an ever increasing number of organizations require high-skill, knowledge based workers whose role in the firm and expected behavior is very different from those of past generations. Knowledge workersstrategists, designers, research scientistshave much greater responsibilities and span and control than production-based company employees had in the past. Firms today are beginning to realize that they dont hire the brightest people in order to have a cadre of intermediate managers



tell those employees what to do. Senior management is beginning to expect (or allow) knowledge workers to work more freely with colleagues in order to create innovative new products and operational efficiencies, and to take the initiative to put these ideas into effect.

In this regard, the legacy of downsizing and business process reengineering, too, have had unexpectedly positive (as well as the more obvious, disappointingly negative) effects. Hierarchy and strict union-based wage and responsibility levels have begun to erode as traditional roles have been eliminated, stretched or combined with other positions all allowing for greater individual responsibility and less of a command-and-control culture. The wide use of teams in BPR and process improvement efforts has given senior management newfound faith in the ability of skilled knowledge workers to understand, re-shape and improve their own work. Such empowerment has also lent increasing self-confidence to the workforce, who are becoming more highly educated, more independent and more willing to take on broader responsibilities in return for flexible workstyles and merit-based pay.

#### Technology and the Virtual Organization

The explosion in new computing and telecommunications technologies has meant that organizations that once saw themselves as a group of isolated and only loosely-related geographical silos can now communicate quickly and effectively with operations plants or business partners around the globe. New groupware technologies, browsers and powerful search-based databases mean that information which in quality and quantity terms that only five years ago would have been unfathomable can now be made available to employees of all levels, anywhere in the world. Many organizations are beginning to reorganize reporting lines and organizational structures not around traditional tasks or functional departments, but around communities of practice groups of people with similar jobs and similar or complementary knowledge and skill even though they may work in offices and plants on another continent. These new communications

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capabilities, in turn, have begun to break down long-standing cultural barriers and encourage the sharing of valuable experiences and best practice techniques. From this has emerged one of the most valuable tenets of knowledge management mobilizing organizational knowledge in such a way as to encourage sharing of lessons learned and prevent the recurrence of costly mistakes.

#### Competing in the Global Marketplace

Again, globalization and the pull of emerging consumer markets worldwide has combined with the push of the strategic shift away from manufacturing and toward high-skill knowledge work in advanced economies to change the very nature of firm strategy. For the first time in their history, U.S.-based organizations are being forced to reconsider their traditional, strictly American, presence. Growing global competition combined with vast technological and operational improvements in newly-developing economies in Asia, Latin America or Eastern Europe has forced firms to seek out low cost labor markets world wide, and to reassess organizational structures not according to geography but according to total cost-effectiveness.

#### Adjusting to an Accelerated Pace of Change

This unique combination of a new emphasis on knowledge-based business, the predominance of high-skill labor requirements, new computing and telecommunications technologies and an accelerating pace of change caused by knowledge-based growth, has essentially created the need for firms to organize and coordinate their information and knowledge sources in a way that allows them the corporate agility to be able to sense and respond to constantly changing trends and markets, to encourage creativity and innovation, and to help their knowledge workers to continuously learn and improve the productivity of their work.



## **Managing the Knowledge of the Organization**

For each organization then, the need to adopt Knowledge Management strategies and techniques becomes essential to retaining their competitive advantage. What are those key elements of knowledge management which make up the future knowledge foundation of sophisticated companies? Knowledge-based Strategy: First, in the knowledge-based economy organizations will need to re-think their global strategy, reassessing the cost effectiveness of plant and labor location, and organizing themselves in a way that will allow them to take advantage of the opportunities of newly-emerging markets and lower cost labor regimes. In advanced economies, they must increasingly focus on creating knowledge-based products which complement the emerging electronic marketplace, and work to develop the corporate agility to take effective action on informed decisions. Both these efforts require a conscious decision by senior management to develop a corporate strategy for competing in the world of knowledge-based business.

**Knowledge-based Process Planning:** In order to take advantage of the collective knowledge of high-skilled employees and to create process efficiencies particularly in areas such as new product design, testing or approval companies need to sequence their major processes not around traditional tasks or outcomes, but around the logical sequence of what needs to be known at each step.

Techniques such as knowledge process mapping can be combined with traditional process improvement and team-based learning techniques to gain enormous cost savings. Using a team-based Rapids approach to problem identification and solution, and then replicating those efficiency suggestions to their production sites around the world, Ford has, through a combination of cost reduction and creation of high-value ideas, created over \$230 million in savings. They estimate that this conscious effort to continuously gather and distribute leading practices will deliver some \$400 million in added value to the company in 1997, with as much as \$1 billion in total savings over the next five years.<sup>36</sup>

**A Knowledge-Sharing Culture:** Of all aspects of knowledge

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management, promoting a knowledge-sharing culture is probably the most important and the most difficult. In order to compete in the global, knowledge-based economy, firms today need to establish a knowledge management framework, based on strategic purpose and supported by employees from the first floor to the 23rd floor. In terms of program management, this means a firm-wide appreciation of the case for action, dedicated resource, strong and widespread leadership, and a company-wide campaign based on providing employees at all levels a shared understanding of the strategic goals of the company.

It also means using tools such as knowledge mapping to understand what knowledge is needed and available by whom and when, on a global basis. Key to this process is developing human networks of complementary skills and interests, or Communities of Practice, with knowledge workers being encouraged to share productivity-enhancing leading practices, new techniques, and lessons learned with colleagues worldwide.

**A Technical Support Infrastructure:** In order to capture, organize and transfer information and knowledge, organizations need to take advantage of the new computing and telecommunications technologies now available and develop a technical infrastructure capable of delivering information to employees worldwide. In fact, a recent Forester study revealed that nearly 55% of all Fortune 500 companies were planning on developing such a knowledge web in the next two years. Providing such a technical infrastructure also requires investment and standardization on key, but often politically sensitive, aspects of corporate IT such as common hardware, groupware and communications equipment.

**Knowledge Stewardship: Organizing and Distributing Corporate Knowledge:** With such an enormous capacity for information transfer available, it is critical for firms to develop a consistent and well-organized method for identifying, capturing, organizing, formatting and distributing information on the knowledge web. This means dedicated resources and clear methods for submitting, organizing and retrieving information electronically.



Content and Corporate Memory: Finally, as many firms are beginning to find, knowledge management is much more than just putting in a knowledge web delivery system. Knowledge requirements have to be identified. From the external world, firms need instant access and analysis to customer information, market trends, regulations, competitors activities, journals, and the location of subject matter experts for instant consultation. From within the organization performance information, key lessons learned, and sources of internal skills and expertise need to be identified. Finally, even with the best taxonomies and delivery systems, it is often necessary in order to make information relevant and meaningful for a subject-matter expert to place it in context. Accordingly, the need for customized, business research and analysis will grow with the complexities of the global marketplace and the ever-increasing capacity of systems to inundate with information.

**Conclusion** The conclusions reached through this research, then, are that the key characteristics of the new economic framework knowledge-based business, new technologies, unbounded globalization and the rise of the non-national organization have created the need for organizations to adopt the knowledge management techniques which are beginning to emerge among leading international companies. Knowledge management, therefore, is a logical and necessary response at an organizational level to the many and fundamental changes occurring within the global economy. Depending upon ones perspective, this transition can mean opportunity or Armageddon, but most economists agree that however difficult it may be to adjust to these new realities, it will be much more difficult to resist them. As comparative advantage (for nations, or, in the near future, non-national organizations)

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becomes increasingly dependent upon access to ideas, human capital and the ability to create innovative new products and services, understanding and adjusting to these new parameters becomes essential for survival in the global, knowledge-based economy.

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