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From Productivity to Innovation:

Proceedings from the Second International Conference on Technology and Innovation for Knowledge Management

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Dr. Serafin D. Talisayon, Philippines, served as the volume editor.

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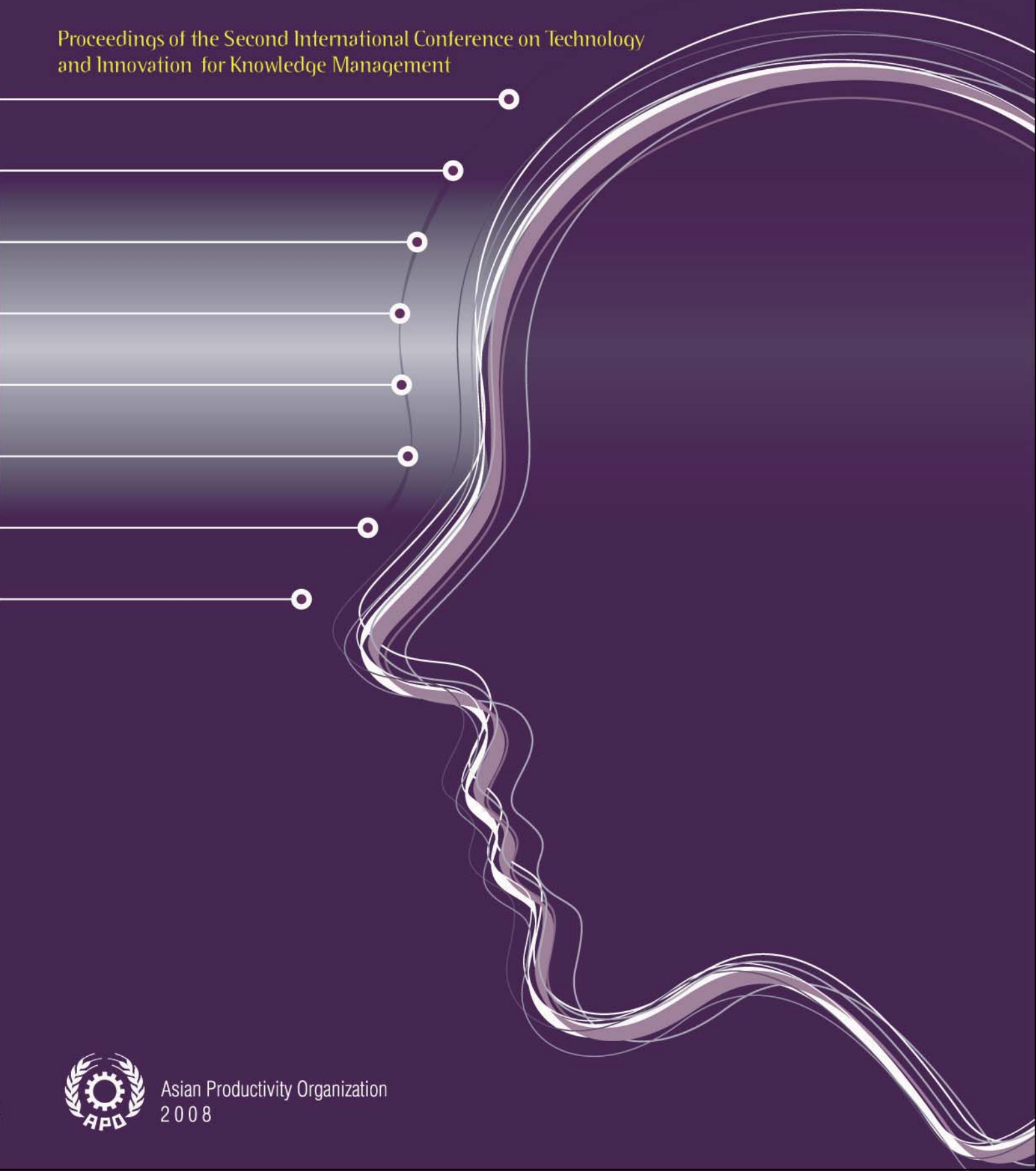

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Opening Session

Welcome Address

Pradeep Singh
Director General,
National Productivity Council

It gives me great pleasure to welcome you to this Second International Conference on "Technology and Innovation for Knowledge Management."

As a country's economic growth enters the era of the knowledge economy, the rapid generation of information as a result of advances in all fields requires equally fast information analysis and use. The globalization of knowledge, it would be readily recognized, has preceded and is indeed almost a condition for a globalized economy. In this era, knowledge management (KM) has become the key to national growth and competitiveness. Considering the importance of the subject in the growth of developing economies, the Asian Productivity Organization (APO) and various national productivity organizations have identified the subject as a special area for the development of expertise and services.

As a part of the project on "National Competitiveness in the Knowledge Economy," sponsored by the Ministry of Communications and Information Technology and the Government of India, the National Productivity Council (NPC) of India organized the First International Conference on "Knowledge Management for Productivity and Competitiveness" in January 2007. The conference was attended by over 150 delegates and made valuable recommendations for follow-up by various stakeholders. This Second International Conference on "Technology and Innovation for Knowledge Management" has been organized by the NPC jointly with the APO as a major event coinciding with the NPC's 50th anniversary. The conference focuses on technology and innovation as the two main pillars supporting the knowledge economy. This conference is also supported by the Indian Institutes of Technology, Roorkee and Madras, and the International Management Institute, New Delhi.

I welcome the Honorable Minister of State for Industry, Mr. Ashwani Kumar, who has very kindly consented to inaugurate this conference. He provides able guidance and support for the productivity movement and also plays an important role in furthering the movement by guiding government policies to help the Indian industry sector to face the challenges of the new knowledge economy. His agreeing to be present at this conference has given the right signals of support and encouragement to all of us.

I also welcome Mr. Ajay Shankar, Secretary of the Department of Industrial Policy and Promotion (DIPP) and Chairman of the NPC, to this event. The Secretary has played a very active role in

guiding and providing continuous support for a re-positioning of the Council in its effort to reinvent itself and take up new challenges.

I am grateful for the major support provided by the Asian Productivity Organization in organizing this conference and sponsoring the participation of international delegates as well as well-known international resource speakers. I welcome Mr. Mukesh D. Bhattarai, Director of the Research and Planning Department of the APO, who is representing the Secretary-General of the APO here.

I also welcome Mr. Brijesh Kumar, former Director General of the NPC and former Secretary (Information Technology), under whose chairmanship this conference has been meticulously planned, organized and executed.

Finally, I welcome all the international and national speakers and delegates to this conference, the guests and the members of the media, and I look forward to intellectually stimulating deliberations during the conference.

Thank you very much!

Opening Session

Congratulatory Message

Shigeo Takenaka

Secretary-General,
Asian Productivity Organization

Read by

Mukesh D. Bhattarai

Director, Research and Planning Department,
Asian Productivity Organization

I am honored to convey my hearty congratulations to the National Productivity Council, India, on the auspicious occasion of its 50th anniversary. This is a proud milestone for the NPC and a cause for celebration. It is unfortunate that I am unable to attend.

Since its establishment in 1958, the NPC has made significant, lasting contributions to the socio-economic development of India by promoting productivity. As a founding member of the APO, it has also contributed immensely to the development of the productivity movement in Asia and the Pacific by sharing its experiences, best practices and expertise with other APO member countries.

I am delighted that the NPC is hosting the Second International Conference on "Technology and Innovation for Knowledge Management" in conjunction with its 50th anniversary. The conference theme is very timely as the economies of APO member countries and in the rest of the world are becoming more knowledge based. Unlike some 50 years ago when the productivity movement was born, productivity has become more dependent on knowledge as the key to innovation, competitiveness and growth.

In the knowledge era, it is vital that we strive collectively to raise the level of productivity of knowledge workers to meet the new challenges brought about by the latest developments in all sectors of industry and society. Hence, knowledge management (KM) has become increasingly more important to APO member countries and, for the same reasons, it should be of interest to every organization represented at this conference.

Our experience suggests that, although it is easy to talk about KM, it is not necessarily as easy to practice it. This is in a sense compounded by the fact that there is no single right way to implement KM in an organization. Thus, to assist member countries, and especially small and medium enterprises (SMEs), in the practice of KM, the APO commissioned an expert group on KM to develop a simple framework and a practical approach.

I am glad that, after some five months of work, the expert group is now ready to detail the framework and approach that they have evolved to this conference. The APO welcomes your feedback so that we can finalize the APO approach to KM and make it available to all the member countries.

I would like to extend my best wishes to the NPC and its staff as they celebrate their Golden Jubilee and hope that the conference is a great success.

Thank you.

Opening Session

About the Conference

Brijesh Kumar
Chairman,
Conference Advisory Committee

It is well recognized that sustained growth and productivity are the fundamental requirements for achieving higher standards of living and for enhancing the economic competitiveness of any country. In the emerging knowledge economy, productivity growth will increasingly depend upon innovations and upon investments in the information and communications technology sector and in the development of human capital. Productivity movements all over the world are now rightly focusing on the need to create, adopt and gain from their knowledge capabilities.

Considering the importance of the proper management of knowledge resources in achieving the national goal of becoming a global leader in the knowledge economy, the Ministry of Communications and Information Technology, Government of India, sponsored a project that would encourage research studies in this area to help identify the policy measures that need to be taken by the government. The project is being jointly executed by four institutions: the Indian Institutes of Technology, Roorkee and Madras, the International Management Institute, New Delhi, and the National Productivity Council of India. The project methodology includes research, dissemination of information and the organization of symposia and conferences. This conference is part of that project.

The National Productivity Council organized the First International Conference on "Knowledge Management for Productivity and Competitiveness" in January 2007 in association with the Asian Productivity Organization (APO) and the International Society for Professional Innovation Management (ISPIM) and supported by the partner institutions of the project. That conference was attended by about 150 national and international delegates, who were addressed by over 30 speakers from different function specializations. The conference revealed several major issues for further study and exploration.

The present and second conference entitled "Technology and Innovation for Knowledge Management" is a logical sequel to the issues identified by the first conference. Incidentally, as already pointed out, this conference also coincides with the 50th anniversary of the NPC and the productivity movement in India. I would like to congratulate the organization and all the people associated with it on this occasion. As India is poised to become increasingly integrated into the global economy, it is essential that it utilizes the tools and techniques of knowledge management to further more inclusive and sustainable development.

The APO has already identified KM as a focal thrust area and is helping the national productivity organizations in its member countries to develop their capacities to offer consultancy and training services and to introduce KM techniques towards improving the productivity of various enterprises. The APO has supported this conference in a big way by sponsoring the participation of a large number of international delegates and by inviting a number of well-known international experts to share their knowledge with the attendees.

This conference aims to share with the delegates the results of various research and dissemination undertakings that have been carried out by a range of organizations and to deliberate on policy issues that need to be pursued. The conference will also provide an ideal platform for identifying the tools and techniques required for a more appropriate utilization of technology and for the proper promotion of innovation in organizations. The conference aims to create a network of KM practitioners who can continue to interact and contribute to the development of a knowledge productivity society long after the end of this conference.

The conference is being attended by international and national delegates from governments, productivity organizations, various industry sectors, academic institutions, and research and voluntary organizations. This intermingling and knowledge churning among the various and diverse knowledge stakeholders, I am certain, will bring out interesting suggestions and recommendations for further follow-up.

I once again welcome all the participants and request you to participate actively in the conference and contribute to its success.

Thank you.

Opening Session

Special Address

Ajay Shankar
Chairman,
National Productivity Council

It is a privilege for me to be associated with this event on the 50th anniversary of the National Productivity Council (NPC). Our founding fathers were great visionaries. Way back 50 years ago, the concept of this organization was a little ahead of its development path. At that time, India was a very young nation struggling with many problems of extreme deprivation. Even then, they still had a vision that India would one day be at the forefront of industrial society. That vision of our leaders resulted in the birth of this organization. We also appreciate the Asian Productivity Organization's character as an Asian organization in which the countries of Asia work together to further improvements in productivity. In fact, India's first Prime Minister, Pandit Nehru, had a great vision of Asian solidarity in 1947–8 and that idea was again ahead of its time. Now it is commonplace to talk in the international jargon about the rise of Asia and the Pacific and the spirit of productivity and cooperation.

Today, the world recognizes the rise of Asia, and it is the key to this rise of Asia that is the theme of this conference – namely, technology, innovation and knowledge management. In fact, early in India's history, before the Industrial Revolution, India accounted for one-third of the world trade total. Owing to a number of problems, India is still struggling to raise 300 million of its people above the poverty line. If the Indian people are to overcome these difficulties, it will be through the three pillars of technology, innovation and knowledge management. To the extent that India succeeds in implementing these three pillars, it will be able to succeed in its objective of providing a better quality of life for its people. How quickly it can master these three pillars will determine the speed at which it achieves these objectives.

The NPC is perhaps even more relevant today than when it was founded 50 years ago, because Indian industry is taking off, competition is taking off and technology is taking off. It is now that Indian industry and institutions will need the services of the NPC. It is only fitting and appropriate that this event has been organized by the NPC on the occasion of its 50th anniversary, its Golden Jubilee year, on the theme of technology and innovation for knowledge management.

I wish the conference success.

Thank you.

Opening Session

Inaugural Address

Ashwani Kumar

Honorable Minister of State for Industry,
Goverment of India

May I have the pleasure of complimenting the National Productivity Council of India and the Asian Productivity Organization for choosing an excellent theme for this international conference? The entire global economy is today poised to herald the era of fast economic growth in the 21st century. It really owes its enduring success to three pillars, as embodied by the three themes of this conference today: technology, innovation and knowledge management.

The National Productivity Council can legitimately lay claim to ensuring India's competitiveness through novel arbitrage when compared not only with the other developed countries of the world but also with the lesser developed countries. India has been informed that its cost of productive labor per hour is US$1.20, in contrast to US$2.10 in the lesser developed countries and in the developing countries of Southeast Asia. So, even when it compares itself in terms of productivity with the low-cost developing countries, India can legitimately be proud and, I think, a very large part of that credit must go to organizations such as the National Productivity Council.

India knows that, in order to achieve the standards of European productivity at 20% of European costs, the bricks-and-mortar economy of India has to become sustainable in terms of economic growth. It needs to ensure productivity through innovation, through knowledge management and through the adaptation and assimilation of technology.

Quite clearly, it is technology that will be the driver for the future. India's quest for more advanced technology must be continued more vigorously and this is the reason India has, in the recent past, liberalized its foreign direct investment regime as a vehicle for technology transfer. Our Ministry has taken the initiative to align India's intellectual property law and regime with international standards and international expectations. The underlying bases were, of course, the need to focus on innovation, and innovation dictates that the possibilities of the commercialization of technology will not be realizable without a purposive, effective and enforceable intellectual property regime.

Two principal initiatives that will complement the relevance of the themes of this conference have been undertaken by the Indian government: the progressive changes in intellectual property policy, and making foreign direct investments more open, by making them more as a conduit for technology transfer and by inviting foreign capital as an enticement for technology

transfer and vice versa. I think India is poised to claim its rightful place in the community of nations. India today is finally on the road towards a more highly developed global politics and also the international high table as far as economic development and growth are concerned. A country with over 10 billion people and a trillion-dollar economy is no ordinary achievement. India has been able to achieve this in a manner that is consistent with its commitment to human rights, to its libertarian institutions of democracy and to inclusivist growth.

India is proud of its achievements: 9% GDP growth per annum in a country of 100 billion people. This is possible only because of the collective resilience of the Indian people. I think India's human resources and knowledge resources really are something that it has been able to leverage to its advantage.

Many, many years ago at international conferences held in different parts of the world, India's population was cited as its biggest disadvantage. Today, the very same people applaud India's human resources and applaud the ability of this great country to leverage its resources and to catapult the nation to the ranks of the global economies. Therefore, the time has come when India must actually treat its knowledge assets as crucial to giving the Indian economy the competitive advantage that it must possess.

In an era of globalization, there can be no compromises over India's competitiveness both in terms of the price and quality of its products and in terms of the productivity of its assets. India has often been told that, compared with China, India leads in terms of skills-based manufacturing. I quite agree. It has also been told that, compared with China, China leads India in volume-based production. I wish this were not true and, in order to dispel this perception, India will need to devise new mechanisms. It will need to harness technologies and skills to raise its productivity to global standards. There is still a lot to be done in this field – India has done well but it needs to do more. And that, ladies and gentlemen, is the challenge that India is determined to face and overcome with the support of organizations such as the National Productivity Council and the Asian Productivity Organization.

I am indeed delighted that the prestigious National Productivity Council is now being spearheaded by Mr. Pradeep Singh, an officer of very high rank in the Government of India. I have no doubt that, under his leadership, the NPC will be able to take such other initiatives as are necessary. With these few words I compliment and commend the organizers of this conference for having taken the lead in refocusing on three extremely important subjects: technology, innovation and knowledge management. In the lexicon of economic management, one way or the other, these three subjects are taken up either individually or collectively. Thank you once again for inviting me here to do the honors this morning, thank you for your participation and thank you for your patience. Thank you very much indeed.

Opening Session

Vote of Thanks

U. S. Singh
Deputy Director General,
National Productivity Council

It is my proud privilege to propose a vote of thanks at this Second International Conference on "Technology and Innovation for Knowledge Management," which is jointly organized by the Asian Productivity Organization (APO), Tokyo, and the National Productivity Council (NPC), India. The Honorable Minister very clearly emphasized the need for knowledge management, particularly in a globalized and liberalized era in which productivity is one of the essential requirements for a country's competitiveness, survival and growth.

In 2007, at the International Productivity Conference in Bangkok, the Secretary-General of the APO mentioned that quality control and quality management tools and techniques are not going to be the competitive tools and techniques of the future. They are only the bare minimum requirements for survival and growth. If an organization is to survive, grow and progress, it has to create value, and value creation is possible only through the process of innovation, for which knowledge management is essential.

This is what the Honorable Minister of State for Industry Ashwani Kumar has emphasized and I think this conference will be deliberating on the various aspects of KM implementation, particularly in the thrust area of the small and medium enterprise sector, which is also an important sector for India's competitiveness in the global arena.

I thank Minister Ashwani Kumar, our chief guest, for kindly inaugurating the conference. Sir, your presence here is highly encouraging because it has made possible the discussion of various issues. We are really grateful to you for taking the time to participate in this event, and for your encouraging words in support of the work of the productivity movement.

I also thank the Honorable Minister for blessing us on the 50th foundation day of the NPC and supporting us in our activities. I thank the Secretary of the Department of Industrial Policy and Promotion, Mr. Ajay Shankar, and the Chairman of the Conference Advisory Committee, Mr. Brijesh Kumar. From the moment Mr. Kumar took over the position of Director General of the NPC, he manifested a keen interest in the welfare and progress of the NPC, and his strong leadership guided the evolution of the NPC into the future.

My sincere gratitude particularly goes to APO and especially the Secretary General, Mr. Shigeo Takenaka, for their support in jointly organizing this conference, sponsoring the participation of

international delegates and the international resource speakers and providing APO publications for distribution to the attendees of this conference. We are happy to note that APO chose India as the venue for deliberating upon applying the APO knowledge framework for implementation in the SME sector. It is to be emphasized that without the active support of the APO Secretary General and his team – Mr. Mukesh D. Bhattarai, Mr. Kamlesh Prakash and Ms. Mitsuko Eshita – this conference would not have been possible, or not at this great scale. Thank you very much, sir.

My thanks also go to the Ministry of Communications and Information Technology and the Department of Industrial Policy and Promotion, the Ministry of Commerce and Industry and the Government of India for sponsoring and supporting this conference, and to the supporting institutions – the Indian Institutes of Technology, Chennai and Roorkee, and the International Management Institute, New Delhi – for taking an active part in this conference and for sharing their project experiences with the delegates.

I thank also Mr. Brijesh Kumar, who was instrumental in setting up this project as well as providing guidance in his capacity as Chairman of the Conference Advisory Committee. I also thank the very esteemed committee members for their contributions. I thank all the resource speakers, both those from abroad and those from India, who will be sharing their experiences in this conference. I thank all the international and national organizations for sponsoring their delegates to come to this conference and the delegates for coming long distances to attend this event. My sincere thanks are due to the NPC's Director General, Mr. Pradeep Singh, who guided us in all our projects and services. I also thank the management of Scope and the members of the media and press for their active support.

Last but not least, let me thank my NPC team members for working hard to make this event a big success. Thank you one and all.

Technical Session I:

Setting the Tone

Chapter 1

Back to Basics: Strategies for Identifying, Creating, Storing, Sharing and Using Knowledge

Dr. Ron Young
Chief Knowledge Officer,
Knowledge Associates International, UK

I would like to present some of my most recent developments, thoughts and ideas concerning technology and innovation for knowledge management. I shall start by quoting the late Professor Peter Drucker:

> *The most important, and indeed the truly unique, contribution of management in the 20th century was the fifty-fold increase in the productivity of the manual worker in manufacturing.*[1]

This is, indeed, a great achievement and a great accolade for the development of management science. Drucker goes on to say that,

> *The most important contribution management needs to make in the 21st century is similarly to increase the productivity of knowledge work and the knowledge worker.*

Herein lies our challenge. How can we dramatically increase the productivity of knowledge work? The answer is to implement effective knowledge management at all levels, for individuals, teams, organizations and communities, locally, nationally, regionally and even across the globe.

I shall first give my definition of knowledge management, then present the case for going "back to basics." After providing some simple strategies, I shall finish with a few words about the future of knowledge management as I see it unfolding around the world.

Knowledge Management Defined

"Knowledge Management is the discipline of enabling individuals, teams and entire organizations to *collectively* and *systematically* capture, store, create, share and apply knowledge to better achieve their objectives."

1 Peter Drucker, *Management Challenges for the 21st Century*, New York: Butterworth-Heinemann, 1999.

Although there is nothing new in managing knowledge per se, there is something totally new about doing this "collectively" and "systematically" by using new strategies, knowledge processes and knowledge communities/networks, coupled with supporting and enabling technologies. This has never been possible before and, for those organizations that implement effective knowledge management strategies, the benefits can be substantial. The benefits to the organization can be highly strategic and transformational, as well as operational.

So what are these new strategies, processes, networks and technologies that have enabled a new and much better way of knowledge working?

First of all, the new technologies have provided us with tremendous potential. Web-based technologies, especially the new Web 2.0 Social Computing technologies, now enable us to search the world and better know what the world is searching for; allow us to self-publish, through blogs and websites, and share knowledge with the world; and enable mass collaboration through wikis, as inspired by pioneers such as Wikipedia. Through the blogosphere, we can now capture our new learnings, insights, ideas and opinions, and much better know and influence what the world is thinking and feeling.

In many ways this is simply astounding! Add mobile and permanently attached wireless working technologies and we have the potential dramatically to increase knowledge working and fulfill Peter Drucker's productivity challenge. But are we doing that now? Is knowledge management simply about using these new communication, collaboration and knowledge-sharing tools and technologies?

Back to Basics

If we consider for a moment our progress over the past 30 years, we will conclude that knowledge workers are even more confused, even more stressed and less proactive in achieving objectives, in fact, probably totally reactive to the incessant daily demands. People are suffering even more so from e-mail overload, information overload, attention overload, new application overload and new initiative overload!

Why is this? As remarkable as the new technologies are, they provide only potential. They need to be enabling new knowledge processes and knowledge communities. These new knowledge processes and knowledge communities need to be strategically aligned to the objectives of the organization. Most importantly, they need to be aligned to the principles of organizational success. We need to go "back to basics." We need to remind ourselves, from time to time, and teach each new management generation what these "principles" are. Technologies change over time. The principles are timeless. Timeless business principles are to my mind "business wisdom."

So my formula for effective 21st-century knowledge working is to restate the timeless and changeless business principles in the modern context and then align and apply the best of the emerging and changing strategies, methods, processes, tools and technologies. This will result in extraordinary performance and value.

Our problem seems to be that we seize on the new technologies too fast. This is like putting the "cart before the horse." So I shall restate the timeless principles in the context of knowledge management, and then look at the best-aligned strategies for identifying, creating, storing, sharing and using this knowledge.

Timeless Business Principles

A principle should be equally applicable to an individual, team, organization or community. In other words, it should apply to all sizes of organizations, all types of organizations and be applied anywhere. Principles are beyond time and space.

In the 1980s I first learned from Claus Moller, an international management guru from Time Manager International in Europe, that there are at least three timeless principles, or "evergreens," for organizations: productivity, relations and quality (see Figure 1.1).

> *For how long do you think senior management will be interested and absorbed in finding better ways to increase productivity? The answer is, for ever, of course. Productivity is an evergreen.*
>
> *For how long do you think senior management will be interested and absorbed in improving relations, that is, relations with customers, employees, suppliers, partners, in fact all the key stakeholders? The answer is, for ever, of course. Relations is an evergreen.*
>
> *For how long do you think senior management will be interested and absorbed in developing quality, that is, product quality, service quality, team quality and even personal quality? The answer is, for ever, of course. Quality is an evergreen.*[2]

Figure 1.1 Timeless Business Principles.

Figure 1.2 KM Aligned to Productivity, Relations and Quality.

These "evergreens" must be perennials in the boardroom agenda around the world.

But what underpins these evergreens? Fundamentally, it is knowledge. It is strategic and operational knowledge for increasing productivity, improving relations and developing quality that underpins everything that the organization does. Knowledge management strategies must be aligned to productivity, relations and quality. Why? Because all senior management are ultimately interested in increasing sales and/or service, reducing costs and optimizing the delivery of value and/or profit (see Figure 1.2). This is what effective productivity, improved relations, developing quality and knowledge management deliver.

There is no rocket science here! This is, surely, common sense. But it is not as common a practice around the world as it could or should be. We need to go "back to basics" from time to time.

2 Claus Moller, "Organisational Emotional Intelligence (OEI)," Claus Moller Consulting, 2005; http://www.clausmoller.com/get_attach.php?id=13.

Strategies for Identifying, Creating, Storing, Sharing and Using This Knowledge

Identifying Knowledge

I remember working with a container port in Asia, which certainly had the best operational knowledge and the best logistics knowledge in Asia. They were world class. They thought that codifying this logistics knowledge was all that they needed to do to practice effective knowledge management.

But when we worked together, they realized that effective knowledge management is also about transforming themselves to meet future customer needs. Although they were the best in moving containers on/off ships and this had served them well in the past, this was not good enough for surviving the future. They needed to know why customers would wish to use containers and what they would put in them, for the future. They needed to transform from operational to customer-focused knowledge management.

The key question to ask, when embarking on a knowledge management initiative, is:

> What key areas and types of knowledge, if they could be much better managed, would make a *big difference* to achieving and/or exceeding the organizational objectives over the next few years?

Identifying key knowledge for the future is critical to successful knowledge management.

Creating Knowledge

People often say to me, "we would like to be a more creative and innovative organization."

When I look around most organizations, I see no shortage of new learnings, new ideas or new insights. They are bubbling up all around. The problem, I believe, is not so much a shortage of new learnings, ideas or insights, but a shortage of the "collective and systematic" methods, processes and tools that are needed to capture them or to do anything meaningful with them. Most organizations practice what we call "episodic learning" and "episodic innovation." What is the point in trying to review a project 6 or 12 months down the line? By then, most of the best ideas and learnings, which tend to happen at the beginning of the project, are already forgotten!

Effective knowledge management can provide new and innovative daily and weekly processes that take the organization from episodic learning and innovation to continuous learning and innovation. Learning or regular after-action reviews can answer the questions:

- What were the objectives?
- What did we actually achieve?
- Why were there differences?
- What can we learn from this?
- What can we do better next time?
- What actions could we take?
- Can we celebrate progress and successes?

Storing Knowledge

Storing knowledge is the easier part. The Web has radically and fundamentally changed the economics, processes and tools of knowledge. In fact, storing is too easy. What is more difficult is deciding, from all the choices, the best strategy for storing knowledge.

Sharing Knowledge

Sharing knowledge is the most difficult part. We are told that 70% of the knowledge management effort is culture. That is not to say that the strategies, processes and technologies are less important. It is simply to say that they are relatively easy to implement.

There are several strategies for bringing about a naturally flourishing knowledge-sharing culture. Let me simply make a few points about a "virtuous process" towards a natural knowledge-sharing culture.

- *trust* is the lifeblood of any organization – people naturally work together at their best when they trust one another;
- when there is sufficient trust, people will naturally *communicate* and naturally *collaborate*;
- this leads to increased natural *learning*, at all levels;
- learning increases confidence and competence and this leads to natural *knowledge sharing*.

I call this the natural Trust-Communicate-Collaborate-Learn-Share Knowledge model (see Figure 1.3).

But beware. The other side of the coin is that there is no trust or not sufficient trust (see Table 1.1). If unattended to, this leads to a vicious downward spiral of doubt and fear.

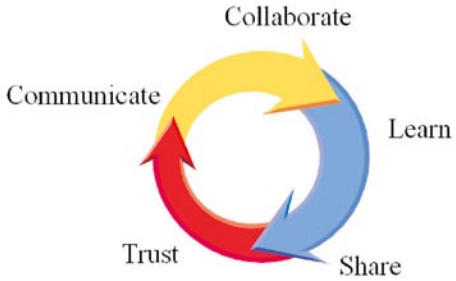

Figure 1.3 The Virtuous Cycle.

Table 1.1 Fear vs. Trust

Protective of ideas and knowledge	Open and sharing with ideas and knowledge
No loyalty	High loyalty
Short-term and impatient	Long-term and patient
Disrespectful and political	Respectful and supportive
Individual and isolated	Interconnected by networks and teams
Independent	Interdependent
Non-communicative and "one way"	Open, frequent communications and "two-way" feedback
Uninformed	Informed
Feel no responsibility	Feel responsible
Disempowered	Empowered
Scarcity mentality	Abundance mentality

Using Knowledge

So, if we apply all the best strategies, processes and tools to identify, create, store, share and apply knowledge, are we practicing effective knowledge management? Unfortunately, not.

What is the point of being more knowledgeable, if we never use it or do not apply our knowledge effectively?

The most important step is to effectively apply the best knowledge to achieve your objectives. This is where effective and highly productive knowledge working really pays off.

The Future of Knowledge Management

Although there are some who believe knowledge management is a fad, I firmly believe that senior management will always be interested and absorbed in better ways to create and apply knowledge. The term "knowledge management" may be misleading or may even go out of fashion in certain parts of the world. However, knowledge always has been, and always will be, a critical resource and can be the most strategic asset for any individual, organization, region and, of course, for the entire planet. Knowledge working is also very eco-friendly and provides the opportunity for everyone to improve their quality of life.

I agree with the global knowledge evangelists and knowledge capitalists who see knowledge as THE wealth creator for the 21st century. To survive and to succeed, and to develop and grow in a sustainable global knowledge economy, we need to become, as quickly as possible, knowledge-driven organizations in a knowledge-based society.

Semantic Technology and the Meaningful Web 3.0

I started by quoting the late Professor Peter Drucker and his challenge substantially to increase the productivity of knowledge working. I now quote his grandson, Nova Spivak, CEO of Radar Networks in San Francisco. He says:

> *Semantic Web 3.0 is about making all this technology and content [on the Web] smarter – by adding semantics to the data and by adding more smarts to applications so that they can do a better job of helping humans.*[3]

I like the notion of the Web becoming increasingly more helpful, as an intelligent assistant, to humans, so that we can spend more time doing what only humans can do best – being more creative and innovative. Effective creativity and innovation promise true sustainability. The source is infinite. Our challenge is to make knowledge management one of the key drivers of creativity and innovation.

Even NASA, in its 25-year knowledge management roadmap, has recognized the importance of making knowledge management principles part of its culture now, and is looking for the development of knowledge systems to collaborate with experts by 2025.[4]

The Next 10 Years – Key Challenges

Building on the words of Peter Drucker, Claus Moller and Nova Spivak, I would suggest the following key challenges for the next 10 years:

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3 Nova Spivak, "Does the Semantic Web = Web 3.0?," 2006;http://novaspivack.typepad.com/nova_spivacks_weblog/2006/11/does_the_semant.html.

4 NASA, "Knowledge Management Roadmap;" http://km.nasa.gov/whatis/index.html.

- substantially increase the *productivity* of knowledge working at least 50-fold;
- exponentially develop global knowledge-sharing networks and relations;
- dramatically improve quality;
- enable continuous radical knowledge creation and innovation;
- provide leadership aligned to the timeless principles;
- apply the best principle-driven strategies, tools and technologies.

If you are interested in my work, you may wish to read my knowledge management consulting blog and visit my website, which is committed to Open Source Knowledge Management:

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Chapter 2

Technology and Innovation for Knowledge Management

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Introduction

In this new economy propelled by knowledge, the capacity of firms to use innovative technology and to adapt to new organizational changes or methods plays a key role in establishing industrial leadership and enhancing the competitiveness of nations. Although there is no dispute about the role of knowledge management, the relationship between competitiveness and its enablers, such as scientific research, industrial innovation and technological and organizational change, is a debatable issue. Therefore, establishing an operational linkage among the enablers of competitiveness and their integration into the existing national system through effective knowledge management has become not only a focus area in academic research but also a priority on the agenda of policymakers across the globe. In this worldwide phenomenon, India cannot afford to be a mere spectator but needs to be an active participant in evolving innovative technique(s) or model(s) for knowledge management.

The First International Conference on "Knowledge Management for Productivity and Competitiveness," organized by the National Productivity Council (NPC) in January 2007 in New Delhi, has already created the basis for further research by identifying the issues that need to be addressed for managing knowledge for India's welfare. Some of the issues that require urgent attention are listed below:

- a coherent theory to integrate philosophical, economic and technological perspectives;
- developing innovative organizations;
- human factors in KM;
- establishing university-industry-government alliances to develop national innovation systems;
- enabling rural people to utilize the rural knowledge centers set up for their skill building and information empowerment;
- deploying data collection based on geographical information systems for rural policy planning;
- incorporating KM in governmental processes and in project-based organizations;
- harnessing knowledge for innovation;
- establishing an Internet portal on KM;
- publishing a KM journal;
- training knowledge officers;
- creating enabling environments for knowledge generation and protection;
- intellectual property rights protection.

Technology and innovation for knowledge management are the two parameters that will essentially be able to mould the positive impact of the above steps towards achieving a "knowledge-oriented society" in the near future. However, all policy recommendations need to be developed keeping India's current socio-economic scenario and future mega trends in mind.

India's Economic Performance Scorecard

The level of economic growth of a nation plays a significant role in providing a favorable environment for innovation and technological development. Table 2.1 compares India's economic performance with that of China (its nearest competitor) and the USA (a developed nation). India's overall competitiveness rank is 27th out of 55 economies ranked by the Institute for Management Development (IMD) in the *World Competitiveness Yearbook*.[5] The USA is number one and China, at 15th, is way ahead of India. Inadequate and poorly maintained infrastructure is mainly responsible for India's low competitiveness. In business efficiency, however, India has out performed China in recent years.

Table 2.1 India's Economic Performance Scorecard vis-à-vis China and the USA

Indicators	India	China	USA
Overall competitiveness ranking, 2007	27	15	1
Economic performance ranking	10	2	1
Government efficiency ranking	33	8	19
Business efficiency ranking	19	26	6
Infrastructure ranking	50	28	1
Gross domestic product (PPP), 2006 (US$ billion)	4,127	9,758	12,826
Gross fixed capital formation (as % of GDP)	37.10	43.30	19.60
Real GDP growth (%)	9.20	10.70	3.30
Real GDP growth per capita (%)	7.46	10.12	2.31
GDP growth per capita (US$)	726	2,040	44,255
GDP growth per capita (PPP)	3,652	7,424	42,857
Current account balance (% of GDP)	–1.42	8.47	–6.47
Balance of trade (% of GDP)	–6.61	6.62	–6.66
Export of goods (% of GDP)	14.65	36.14	7.83
Growth in export of goods (US$) (%)	20.81	27.18	14.50
Import of goods & services (% of GDP)	29.70	33.20	16.80
Trade to GDP ratio [(Export + Import)/2GDP]	26.62	36.30	13.78
Direct investment flows abroad (% of GDP)	0.19	0.50	–0.10
Investment flows inward (% of GDP)	0.90	3.53	0.80
Government budget surplus/deficit (% of GDP)	–4.00	–0.41	–1.58

Source: IMD, 2007.

The Indian economy is already experiencing the results of the economic liberalization process that was initiated in 1991. The country has no doubt benefited from trade deregulation, high inflows of foreign direct investment, falling transportation and communication costs, and an increasing rate of technological change. The planning and implementation of economic reforms are nothing but effective knowledge management by India's policymakers.

The positive impact of the economic reforms can be seen across all sectors, namely, agriculture, industry (especially manufacturing) and services, which experienced growth rates of 2.7%, 10%, and 11.2%, respectively, during 2006/7. India's gross domestic product (GDP) for the

5 IMD, *World Competitiveness Yearbook*, Institute for Management Development, 2007.

four years 2003/4 to 2006/7 grew at an impressive rate of 8-9%. In 2006/7, the contributions of agriculture, industry and services to GDP were 18.5%, 26.4% and 55.1%, respectively.[6] The growth rate of India's manufacturing sector increased from 9.1% in 2005/6 to 11.3% in 2006/7. However, the second and third quarters of 2007/8 showed a marginal decline in the growth of the manufacturing sector, which may slightly bring down the rate of growth in GDP for 2007/8. However, one need not be pessimistic about India's future prospects because the fundamentals of the Indian economy are quite strong.

India's Preparedness for Innovation and Technological Development – Education and Research

Reviewing India's preparedness for innovation and technological development is essential before discussing in detail the significance of innovation and technology for knowledge management. Table 2.2 depicts India's preparedness in comparison with that of China.

The tremendous growth in Indian information and communication technology (ICT) has further provided an impetus to India's integration with rest of world. This has not only enabled quick access to information by knowledge workers but also reduced the time and distance involved in global, social and economic networking. However, it is interesting to note from the IMD survey that people with information technology (IT) skills are readily available in India but the number of communication technology workers (both voice and data) is not sufficient to meet business requirements. Although funds are available for technological development, technological regulations need to be more supportive of business development and innovations. The legal environment for the development and application of technology also needs to be improved.

It is encouraging to note that Indian youth are very interested in science, which is also emphasized in schools. However, as one goes up the ladder of higher education, India's performance is not so satisfactory. Around 24% of university degrees are given in science subjects. This clearly shows that the Indian education system is not able to cater to the requirements of the country. This may be due to either a lack of adequate higher education institutions or a lack of qualified faculty members, or the opportunities available after receiving a degree in science are not as lucrative as for other degrees (for example, the MBA). Often there is a combination of more than one specific cause. This is also reflected in the attitude of Indians towards basic research, which is quite poor compared with developed economies such as Switzerland (8.27, rank 1), Singapore (8.12, rank 2), the USA (7.67, rank 3), Germany (7.21, rank 5), Malaysia (6.96, rank 8) and Japan (6.77, rank 13).[7] The result is an acute shortage of R&D personnel and a low level of research in the country. Further, because intellectual property rights are not adequately enforced, the number of patents granted to residents is as low as 695, against 16,700 in China during the period 2003-5.

It will not be possible to develop India's innovation system without bringing about the necessary changes in the present educational system. Public expenditure on education needs to be substantially increased to finance higher education. The university-industry linkage needs to be strengthened to convey innovations from the laboratory to the market. Unless the knowledge of India's researchers is utilized for the nation's welfare, India's competitive advantages will remain confined within the four walls of the research centers.

6 *Economic Survey 2006–2007*, Ministry of Finance, Government of India, 2007.

7 IMD, 2007. Note that IMD computes scores as weighted sums of a basket of other indicators, normalized to a maximum scale of either 10 or 100.

Table 2.2 Preparedness for Innovation and Technological Development: India vs. China

Indicators	India	China
Education system		
Public expenditure on education, 2005 (% of GDP)	3.2	3.1
Public expenditure on education per capita, 2005 (US$)	20.9	45.6
Pupil:teacher ratio in primary education, 2004 (ratio of students to teaching staff)	40.20	19.98
Pupil:teacher ratio in secondary education, 2004 (ratio of students to teaching staff)	32.43	18.65
Educational system, 2007 (IMD Survey: "Meets the needs of a competitive economy")	5.73 (16)	4.73 (27)
University education, 2007 (IMD Survey: "Meets the needs of a competitive economy")	6.07 (20)	4.98 (28)
Language skills, 2007 (IMD Survey: "Meets the needs of enterprise")	6.93 (14)	4.65 (37)
Qualified engineers, 2007 (IMD Survey: "Availability in the labor market")	7.57 (3)	3.70 (53)
Knowledge transfer, 2007 (IMD Survey: 'Between companies and university')	4.70 (27)	3.98 (38)
ICT system		
Investment in telecommunications, 2005 (% of GDP)	0.56	1.14
Fixed telephone lines, 2005 (per 1000 inhabitants)	45	266
Mobile phone subscribers, 2005 (per 1000 inhabitants)	81.6	299.0
Computers per 1000 people, 2006	19	56
Internet users per 1000 people, 2006	61.70	103.59
Broadband subscribers per 1000 people, 2005	1.17	28.68
Communication technology, both voice & data, 2007 (IMD Survey: "Meets business requirements")	7.67 (32)	7.74 (31)
Information technology skills, 2007 (IMD Survey: "Readily available")	8.75 (7)	5.81 (51)
Public and private ventures supporting technological development (IMD Survey, 2007)	5.73 (30)	6.43 (20)
Development and application of technology, 2007 (IMD Survey: "Supported by legal environment")	6.57 (27)	6.44 (29)
Funding for technological development, 2007 (IMD Survey: "Readily available")	6.37 (19)	4.12 (42)
Technological regulation, 2007 (IMD Survey: "Supports business development and innovation")	6.60 (23)	6.25 (29)
Innovation system		
Total expenditure on R&D, 2005 (% of GDP)	0.84	1.33
Business expenditure on R&D, 2005 (% of GDP)	0.19	0.91
R&D personnel per million population, 2004	119	708
Scientific & technical journal articles per million population, 2003	12.00	22.65
Patents granted to residents, average for 2003–5	695	16,700
Science degrees, 2002 (% of total first university degrees)	23.47	57.40
Science in school, 2007 (IMD Survey: "Emphasis on science in schools")	6.63 (4)	5.98 (8)
Youth interest in science, 2007 (IMD Survey)	6.73 (3)	5.94 (7)
Intellectual property rights, 2007 (IMD Survey: "Adequately enforced")	5.29 (32)	5.40 (31)
Scientific research, 2007 (IMD Survey: "Supported by legislation")	5.73 (28)	6.08 (23)
Basic research, 2007 (IMD Survey: "Enhance long-term economic development")	5.30 (31)	6.58 (17)

Sources: IMD, 2007 and World Bank, 2006.
Note: IMD computes scores as weighted sums of a basket of other indicators, normalized to a maximum scale of either 10 or 100. For survey findings, the factor ranking of the country is given in parentheses.

Technology for Knowledge Management

ICT has provided the careers and the binding force that have enabled knowledge to reach all parts of society (whereas, in earlier times, ICT was considered to be an exclusive preserve of the privileged in society). The developments in ICT over the past two decades have been tremendous and their penetration to grassroots levels can be gauged from the numbers of mobile phone users in the country. The knowledge management process and its uses have made significant changes to the way technology is designed and utilized by different cross-sections of people from various walks of life.

The impact of knowledge management technology varies enormously from situation to situation. Several technologies recur in many knowledge management programs, partly because they are

generic and pervade many core activities and processes. Some of these technologies are well established over a sufficiently long period of time whereas new ones are constantly appearing, giving a wide choice to the implementer.

With the market demanding much of knowledge management solutions, some software firms are now re-labeling their products and approaches – for example, information management as knowledge management, databases as knowledge bases, and data warehouses as knowledge repositories. However, true knowledge management solutions involve not simply new labels but knowledge-enriching features, which include the addition of contextual information to data (Where was this information used? What factors need to be considered when using it?). Some other knowledge-friendly options for such software technology should be:

- using multimedia, e.g. adding video clips or voices to databases of best practices or problem solution databases;
- providing annotation – adding informal notes to individual data items; using MAPI-enabled software, where a document or file can be sent with a forwarding note by e-mail;
- qualifying information – giving details of the originator; users adding comments about the quality of the information;
- providing links to experts – a "click" button to contact an expert by either e-mail or phone (GIGA, for example, lets its client access global experts through its website).

Information and communication technologies are an important ingredient of virtually every successful knowledge management program. An ever-wider range of highly effective solutions are coming to market, including a new generation of artificial intelligence solutions, new types of document management systems and various collaborative technologies such as the Internet. The successful implementation of these technologies will depend, as always, on giving appropriate focus to non-technical factors such as human factors, organizational processes and culture, the multidisciplinary skills of hybrid teams and managers, and the already existing knowledge repository of prior learning – providing, of course, that it is well structured and accessible and gives access to critical expertise.

Innovation for Knowledge Management

Human beings have evolved as the sole managers of the global destiny through their sheer ability to be creative, which is the only quality that differentiates them from other living species. Creativity has been the hallmark of the competitiveness of knowledge-centered corporate firms.

When information is ubiquitous and is no longer a source of competitive advantage, it is the innovative use of that information (via knowledge) that differentiates people, companies and nations. Innovation may become the basis of all competition in the future. According to Peter Drucker, "innovation is the means by which the entrepreneur either creates new wealth producing resources or endows existing resources with enhanced potential for creating wealth."[8] Most innovations result from a purposeful search for opportunities, which are found in unexpected happenings, incongruities, process needs, and industry and market changes.

8 Peter F. Drucker, "The Discipline of Innovation," *Harvard Business Review*, 63(2), 1985.

When growth is associated with innovations, it leads to higher living standards and a reduction in poverty. India, where a large part of the economy is still contributed by the informal sector, innovative activities are by and large concentrated in small islands of excellence. There is an urgent need to spread the innovative spirit across all sectors and the whole workforce for larger benefits.

A recent World Bank study has suggested that India's innovation strategy should encompass the following:

- Focusing on increasing competition as part of improving its investment climate, supported by stronger skills, better information infrastructure and more financing (public and private).
- Strengthening its efforts to create and commercialize knowledge, as well as better diffuse existing global and local knowledge and increase the capacity of smaller enterprises to absorb it – if all enterprises could, with least cost, achieve national best practices based on knowledge already used in India, the output of the economy could increase more than five-fold.
- Fostering more inclusive innovation – by promoting more formal R&D efforts for poor people and more creative grassroots efforts, and by improving the ability of informal enterprises to exploit existing knowledge.[9]

The importance and practices of innovation for knowledge management through three relevant types, namely, strategy innovation, democratic innovation and inclusive innovation, are discussed in the next section.

Strategy Innovation

All businesses are vulnerable, to some degree, to competitive pressures in the dynamic marketplace, making their futures uncertain. A start-up company with a website and access to cheap manufacturing capabilities overseas could replicate products at lower prices and steal a large market share, whereas a global Goliath could apply its considerable resources and technologies to offer customers more than anyone else.

Corporations that mould their business strategy to have innovation as the baseline have been able to provide greater shareholder value and sustain the business over longer periods despite disruptive technologies posing major challenges. When digital photography technology threatened to disrupt the traditional market supremacy of the Kodak Company, its corporate managers took innovative steps to strategize a smooth change-over from its traditional film-based market leadership to digital products and services, thus sustaining its business relevance and competitiveness.

According to Michael Porter, "Strategic fit among many activities is fundamental not only to competitive advantage but also to the sustainability of that advantage. Positions built on systems of activities are far more sustainable than those built on individual activities."[10]

9 World Bank, *Unleashing India's Innovation – Toward Sustainable and Inclusive Growth*, ed. Mark A. Dutz, 2007.

10 Michael E. Porter, "What Is Strategy?" *Harvard Business Review*, 74(6), pp. 61–78, 2000.

Strategy innovation is a process of applying innovative thinking to the entire business model of a company, not just to its products or inventions. It is the process of finding a way to "change the rules of the game" so that a company's products, competencies and assets provide it with a competitive advantage in the marketplace.

The strategy innovation process starts with the future scenario and then plans backwards. To be successful, the search for new business opportunities cannot be constrained by today's corporate conditions or today's market conditions. A strategy innovation is always future oriented. It must be able to transcend today's conditions and imagine what is possible in the future. After identifying the potential new business opportunities of the future, the planning process works backwards to identify the key strategic milestones to get there. If India wishes to enter the league of global economic giants in the coming decades, it has to innovate its strategies by identifying future mega trends that will guide the competitiveness of knowledge economies.

Democratic Innovation

Innovation has often been cited as predominantly the property of manufacturers of goods and services. It is a fact that many large corporations such as IBM, Motorola and 3M have been carrying out research and development to identify innovative products and markets, and in the process improve the productivity of their corporate performance and provide cost effectiveness to their customers. Of late, however, the sheer magnitude of the size and scope of world markets makes it impossible to identify all customer needs in advance, and even giant multinationals have failed to make their innovations satisfy all customer desires.

An alternative mechanism of democratic innovation is emerging where customers at the grassroots level, who do not have high purchasing power, can instigate innovations in the use of existing products or force large companies to innovate and produce low-cost products for their consumption owing to their sheer size and volume. The much-reported conversion of washing machines into "lassi-churning machines" is a noteworthy example of such democratic innovation processes. Similarly, many fast-moving consumer goods (FMCG) are produced and sold in low-quantity sachets to cater for the low purchasing power of village consumers.

As consumers and lead users develop and test their innovations in their own user environments, they learn more about the real nature of their needs. They then often freely reveal information about these innovations. Other users also adopt these innovations, comment, modify or improve on them, and in turn make public what they have done. All of these freely revealed activities by lead users offer manufacturers a great deal of useful information about both the needs embodied in solutions and the nature of their markets. Thus the user-developed prototype greatly simplifies the manufacturer's developmental process because it no longer needs to understand customers' needs accurately. Instead, it has the much easier task of replicating the function of user prototypes that users have already demonstrated as being responsive to their needs. For example, a manufacturer seeking to commercialize a new type of farm equipment and coming upon a prototype machine developed by a local farming community need not understand precisely why those innovators want this product or even precisely how it is used; the manufacturer needs only to understand that many farmers are willing to pay for it and then reproduce the important features of the user-developed prototypes in a commercial product.

Inclusive Innovation

As more than 60% of the Indian population falls into the lower income groups, the fruits of high-end innovations often do not filter down to their level. Hence, it is important to

promote "inclusive innovation" so that they are brought into the fold of beneficiaries of the changing economy. The Indian government's objective of promoting inclusive growth as a national agenda also points to the urgent need for inclusive innovation to be promoted as a national strategy. There is also a need consciously to encourage inclusive innovations by harnessing, increasing and redirecting formal innovation creation efforts. Examples are the National Innovation Foundation's Repository and the Honey Bee Network, which has secured more than 50,000 grassroots innovations and traditional knowledge practices from over 400 districts of India. There is also the requirement to support grassroots entrepreneurs who can promote and diffuse innovations for commercial gain. The Rural Business Hubs promoted by the Ministry of Panchayati Raj (local self-government) are an example in this direction. Finally, mechanisms need to be evolved to help informal enterprises and institutions absorb innovative capabilities already established and practiced elsewhere.

Unleashing India's Innovation Potential

The recent study by the World Bank has identified the structures and processes required to unleash India's innovation potential[11] (see Figure 2.1).

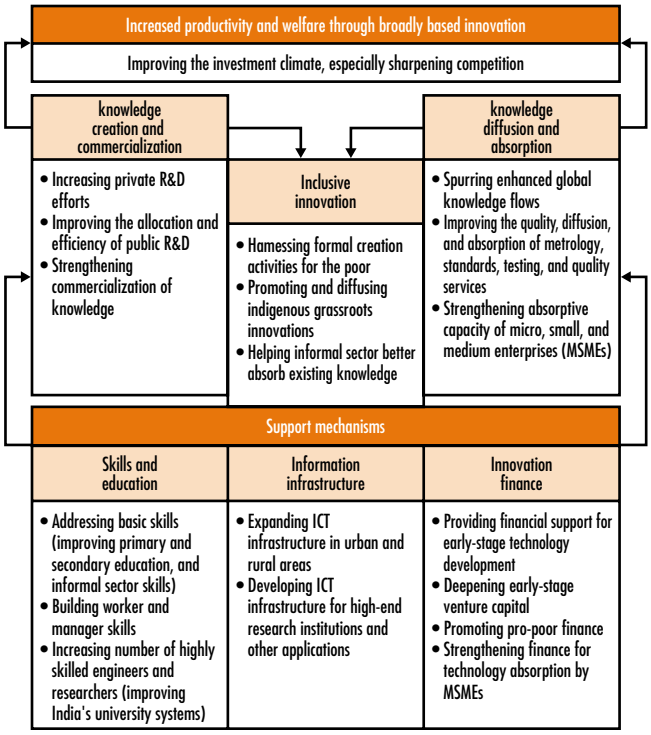

Figure 2.1 Unleashing India's Innovation Potential.
Source: World Bank, 2007.

Achieving the Benefits of Technology and Innovation

It has been well established that human, organizational and cultural factors are the ultimate determinants of success. ICT solutions for knowledge management involve, in essence, social

11 World Bank, 2007.

computing and therefore need such an approach. Various studies have identified that successful knowledge management implementations typically share the following characteristics:

- clear vision and leadership – a solid appreciation of the contribution of knowledge to the achievement of strategic objectives and how IT can help;
- coordinated working through multidisciplinary teams – including information managers, facilitators, business experts and technologists;
- active user involvement in developing solutions that enhance knowledge activities;
- well-designed processes that engage humans where their contribution is best and allow them to interact with technology where it can complement human efforts; an organizational process that does not consider applying best knowledge (and updating it) is an incomplete process;
- active learning and experimentation – because knowledge is always dynamic, there is no such thing as a finished requirement specification; solutions continuously evolve and adapt;
- a knowledge-sharing culture – people fundamentally want to share information and experiences, and organizational systems are managed to motivate such behavior.

Conclusion

In this chapter, an attempt has been made to bring out the major knowledge management issues that will need to be harnessed in the fast-changing and fast-growing Indian economy. Technology and innovation will be the crucial players in the knowledge economy in order to achieve India's national objectives.

Chapter 3

A Strategy for Library Networking in the Knowledge Economy

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Introduction

Knowledge-based networking implies that knowledge is acquired not just by creation but also by a transfer of knowledge existing elsewhere. Networking for knowledge sharing caters to the global thirst for information, builds up awareness among the change agents or those who can exert external pressure, and encourages informed and active participation of individuals. Further, it creates a mechanism that enables the articulation and sharing of local knowledge, with a potential for further enrichment of this information as it passes through the network users. Benefits include more efficient and targeted development interventions, less duplication of activities, low communication costs and global access to information and human resources.

Knowledge-based networking rests on the strong belief that communities have knowledge and expertise that need to be synergized with the existing information, in the context of decision-making and initiating judicious action. Just as the knowledge gap needs to be bridged between developing and industrial countries, so too there are gaps within a country. A strong knowledge base bridges the gap between the communities and between development professionals by initiating interaction and dialogue, new alliances, interpersonal networks, library networks and cross-sectoral links among organizations so that "useful knowledge" can be shared. This chapter discusses the sharing of information through library networks.

Definitions of a Library Network[12]

- A library network is broadly described as a group of libraries coming together with some agreement to help each other with a view to satisfying the information needs of their clientele.
- The Intergovernmental Conference on Science and Technology for Development (UNISIST II) working document (Intergovernmental Conference on Scientific and Technological Information for Development, 1979) defines an information network

12 This and the next three sections are based on Jebaraj and Devadoss, 2004.

as a set of interrelated information systems associated with communication facilities, which cooperate through more or less formal agreements in order to implement information-handling operations to offer better services to users.

- The National Commission on Libraries and Information Science, in its National Programme Document (1975), defines a network as two or more libraries engaged in a common pattern of information exchange through communications for some functional purpose.

Objectives

- To explore the current status of each library with respect to their holdings and networking facilities and capabilities for expansion;
- To promote and support the adoption of standards in library operations;
- To coordinate with other regional, national and international networks for the exchange of information and documents;
- To generate new services and to improve the efficiency of existing ones.

Network Development in India

Some factors that are responsible for the development of library and information networks in India are:

- the report of the working group of the planning commission on modernization of library services and informatics for the seventh five-year plan, 1985-90;
- the National Policy on Library and Information Systems document (1986), accepted by the Ministry of Human Resource Development, Government of India;
- the report on national policy on university libraries prepared by the Association of Indian Universities (1987);
- the UGC report on information systems for science and technology under the Department of Science & Industrial Research, Government of India, which has been vigorously promoting an integrated approach to library automation and networking.

Limitations in Network Development

Limited resources have been one major barrier to satisfying the growing informational needs of users. A network may fail in the early stages if there is no proper planning or if adequate funds are not available. Moreover, a common memorandum of agreement signed by the participating libraries at the institutional level is essential for the success of a network venture. On a more practical level, catalog data must be in a standard, machine readable form for them to be shared and exchanged. And, finally, a continuous flow of external assistance is crucial for the network's survival.

A Strategy for Library Networking

The librarians or representatives of all the Indian Institutes of Technology (IITs) and the Indian Institute of Science (IISc), Bangalore, were asked to list strategies for networking under three time-frames:

- goals that can be achieved in the short term (say 6 months' time);
- goals that can be achieved in the medium term (6 months to 1 year);
- goals that are long-term objectives (in 1-2 years).

Short-Term Goals

1. To update all holdings – both books and journals (print and online) – electronically and put them on the website. To get around the problem of limited manpower/staff, a project mode, an internship mode, a roaming team and outsourcing were suggested.
2. To strengthen the existing system of sharing resources. An agreement to be arrived at between libraries on the time taken to process an inter-library loan facility – a staff member to be identified in each library for contact and current information, a courier service to be contracted and insurance cover for the books to be taken out. Some books are extremely expensive and some books are out of print and cannot be replaced. Document delivery is an important component.
3. To conduct a user survey in all IITs and IISc to find out the nature and level of networking among libraries that faculty and students require.
4. To conduct a skill development workshop for identified staff from each IIT who will play important roles in the process of networking.
5. To set up a virtual terminal of other IIT libraries in each library (with the possibility of regulated sharing/access).
6. To put forward a note for discussion on library networking in the Directors' meeting.

Medium-Term Goals

1. To scan and make available at least the abstract of all theses electronically – this can be done in a phased manner.
2. To try and obtain a log-in for users (limited access).
3. To facilitate mega data harvesting.
4. To convince higher management levels to recruit technical staff.
5. To strengthen and maintain a separate server.
6. To consult with lawyers and obtain clarifications on copyright issues in sharing resources electronically.
7. To ensure "federated" searches.

Long-Term Goals

1. To create a union catalogue.
2. To create and update a repository regularly.
3. To provide an ATHENS log-in for all users.
4. To digitize textbooks
5. To have a regular exchange of people (staff of the library).
6. To participate in a national repository
7. To aim for world networking.

Conclusion

As a summing up of these ideas, the short-term goals were addressed first. It was suggested that a quick user survey could be conducted, for which IIT Madras was to prepare a short questionnaire, circulate it for comments and ensure feedback and compilation. The other achievable goals will be taken up gradually.

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Question-and-Answer Session

Moderator:

Raj Datta

Vice-President for Knowledge Management, MindTree Consulting

Question: I am happy to note that you have taken up "wisdom." This is the first time that a knowledge management seminar has addressed the term "wisdom" in a formal manner. Can you please further expound on "wisdom"?

Ron Young: I do not profess to know what wisdom is. Many people have told me many things about wisdom. Some people say it comes with age but some people talk about the "wisdom of children." Thus, I am not too sure where to start in the context of knowledge management. What I have learned is that we have given a lot of attention to how we can formally capture, store and share our knowledge. However, we have not paid as much attention to the application of the best type of knowledge. Therefore, I would like to suggest that we look at wisdom as being more about the best application of knowledge. I think there is wisdom in the things that we have seen and heard in this conference. We have heard about the wisdom within an organization. I think that the challenge to us all is how to continue to teach the basic principles about knowledge and wisdom to each generation, just as it is important for us to keep reminding ourselves what they are. To me, wisdom is about being more proactive in knowing where we are going and in doing what is best in a given time.

Question: We have already put many systems in place, but what we have experienced is that most people – say, about 90% of scientists – are very reluctant to share their knowledge, not only their tacit knowledge but also their explicit knowledge. So my question is: what can we do so that people will communicate what they have learned and share their knowledge?

Ron Young: Sharing is a virtuous cycle and you have to have all its components in place before it can happen. Also, if an organization decides beforehand what are the best or the key areas of knowledge that it wishes to share and if it has the enabling processes in place whereby people can capture their learning and insights as part of the work that they do – they do not have to exert a special effort to share – then people will share their knowledge. If the act of sharing takes some special effort, then the sharing will not happen. Twenty years ago, I would capture my learning and my ideas only on a piece of paper. Now, I write a book using a computer. I am still doing the same thing. I am still writing down what I have learned. I am still writing out my new insights about things but now I do it almost automatically; it has become a product of what I do, which is sharing. So, while I am not doing anything differently, technology is facilitating my sharing of knowledge. Thus, if an organization identifies some key knowledge areas and gives people the tools that will help them work better and as a by-product also naturally share their knowledge with others, then that will bring about a more trusting organizational environment. If knowledge management is considered as something new and needs extra

effort to be imposed on people, it will fail. The challenge for us is how to help people realize that knowledge management is part of their daily work.

Question: I come from the Department of Agriculture. I looked at the list of delegates and I find very few people from the agriculture sector attending this conference. Let us say that 80% of a country's GDP comes from agriculture. I would like to bring to the notice of this conference that knowledge sharing is lacking in agriculture. We are not able to educate our farmers or to share the knowledge that is there with other farmers. One of the participants said that many of the scientists do not share their knowledge. Most industries do not share their knowledge. We need to digitize knowledge. It has also been said that we need to put money and human resources into this effort. Another thing is that this has to be done using the local language so that the local people can understand what is being said. They do not understand the language of the scientists and the experts. What can be done to address these problems?

G. S. Krishnan: I am afraid that I will not be able to give you direct solutions to these problems. Nevertheless, there are many different islands of excellence such as local innovation networks, self-help groups and activists. The government has made some efforts in this direction but they may not be to the extent you expect the knowledge economy to be. I agree that there are very few people from the agricultural sector present at this conference, despite our efforts to bring them here. I think that it is necessary to take the knowledge awareness to them. Then it may be possible for them to arrive at solutions by themselves through democratic and inclusive innovations. There is no need for a top-down approach if you are able to bring this awareness to them. The subsequent ideas and solutions would then come from themselves. I think this should partly answer your question.

Raj Datta (Moderator)**:** That would entail social interaction, a peer-to-peer social interaction?

Question: You mentioned something about the challenges over the next 10 years and about the best strategies, tools and technologies. Can you expound more on this?

Ron Young: One of the things that we have to do is to review critically the new technologies that come along and see what role they will play in enabling us to carry out our initiatives better. The strategies will depend on the technologies, which continuously change or develop. I have no idea what the technologies will be in five years' time. I think nobody really knows about this today. All that we do know is that they are going to be rapidly changing. I think that we should really make sure that we look at these technologies and not just react to them. Almost everybody in the world will be reacting to them but we can be more proactive by linking them to the best strategies, and the best strategies always have to be linked to the objectives of the organization. Based on what an organization wants to achieve, we then ask whether these technologies will help us to do things better. If not, we should not do it. We have to be constantly aware and proactive.

Question: In an organizational context, can you elaborate more on who is a knowledge worker and what knowledge work is?

Ron Young: I think the point that Peter Drucker is making is that more and more of us in the future will be earning our money as knowledge workers. While we are not necessarily called "knowledge workers" now, what we are already doing is taking in information and turning it into knowledge, and we are applying that knowledge to what we are doing. Everybody is doing exactly this; we are already into the knowledge society. I would hate to think that we would be saying to someone "you are a knowledge worker" and to another "you are not a knowledge

worker." Everybody is a knowledge worker. What we are now realizing is that, in a knowledge economy, most of our income and most of our future growth will be dependent on the way we create and apply that knowledge as individuals, as teams, as organizations, as nations.

Raj Datta (Moderator)**:** I just want to summarize and to mention a few points or themes that seem to be emerging from the discussions.

First is the fact that knowledge management should be a holistic undertaking, which Ron identified as the integrated creation, storage, sharing and use of knowledge. From a holistic point of view, we also have to start looking at not just the processes but also the practices. So we look at these practices, policies, technologies and culture.

Another theme that emerged is strategic innovation, which is really trying to break all the rules. In many cases, the innovation is moving from the ground up. The creation of a social microcosm to make tools, or some types of bottom-up innovation, was mentioned. An example of this is the Honey Bee Network, which I think is a fundamental consideration in terms of innovation itself. People-centricity in knowledge management strategies came out very clearly in a couple of talks. People-centricity is not just about inspiration and motivation. It is very common to say that knowledge management is people-centric. I think that very often the brain is looked at primarily as the means for production. Not many people ask the question, what am I doing to make the brain more productive? Knowledge management is about how to make people more productive through better use of their talents and the development of more creative minds.

The other theme that came out is networking. We talked about all kinds of networking. In addition to a networking of institutions and libraries, we touched upon the whole concept of social networks, where sociology plays an important role. In technology, the NASA strategy of looking at autonomous agents interacting with people is one aspect of socialization that may perhaps take place in the future.

Finally, the whole concept of the soft aspect or of culture came up in different ways across the three presentations. Ron mentioned trust and a trust-based approach to building a culture or enabling a culture change in an institution or organization. I think that this is very important. The use of communication – as in the virtuous cycle that Ron showed – itself can create a trusting environment, which can then enable change within the organization.

Technical Session II:

Technology and Innovation

Chapter 4

Global Knowledge Management Trends

Dr. Rory Chase
CEO, Teleos, UK

In this paper I would like to look at the characteristics of world-class knowledge organizations, focusing especially on the themes of "Technology, Innovation and Productivity," and to try to draw examples from organizations that are acknowledged leaders in the world.

Over the past 10 years, Teleos has been studying and surveying organizations at a global level, at the regional level and, indeed, at the national level in countries such as India and Japan to identify those organizations that are leaders in the knowledge economy. Teleos seeks to ascertain the organizational characteristics that make them leaders.

MAKE Framework

First of all, one needs a framework or some sort of a measurement system to identify and benchmark organizations. In 1997, Teleos spent over a year and a half looking at the then leaders in the knowledge economy to try to identify those characteristics that seem to be inherent in the very best organizations in the world. We were able to identify eight common characteristics:

1. creating an enterprise knowledge-driven culture
2. developing knowledge workers through senior management leadership
3. delivering knowledge-based products/services/solutions
4. maximizing enterprise intellectual capital
5. creating an environment for collaborative knowledge sharing
6. creating a learning organization
7. delivering value based on customer knowledge
8. transforming enterprise knowledge into organizational wealth

The first characteristic is a knowledge-driven organizational culture. It is the culture that the organization has been able to create over the years that has transformed it into a knowledge organization. The second characteristic is the presence of knowledge leaders, especially those who are able to develop and train knowledge workers. The third area is innovation, or new product development. The fourth is managing intellectual capital, including structural capital – the relationship between capital and human capital. The fifth area is the ability to collaborate and share knowledge across the entire enterprise. The sixth is organizational learning, the ongoing ability to enable all employees or knowledge workers to learn. The seventh area is being able to create value from customer knowledge. This is not just customer satisfaction but using customer knowledge to develop new processes, new products and new services. Then we took these seven characteristics and considered them as inputs. The output is the ability of the entire organization to transform knowledge into shareholder wealth or capital gains for commercial companies. If the organization is a non-profit or a public sector organization, it is the ability to take that knowledge and create societal wealth.

If you take these eight characteristics, the result is a general framework for the "most admired knowledge enterprises" (MAKE) (see Figure 4.1). The bottom three elements are those I call the foundation stones. For quite a while, we were of mixed opinions as to whether it is the culture of the organization or knowledge leadership that is the fundamental cornerstone. More and more, I have come to the conclusion that it is probably knowledge leadership that is the cornerstone. It can take an organization decades to create the culture to enable it to become a knowledge-driven organization. It can also take quite a long time for an organization to lose that capability. On the other hand, a knowledge leader or a group of senior executives can readily change the culture; they can create it or destroy the organization very rapidly. So, my particular opinion at this point is that it is the knowledge leaders who are probably the most critical factors in creating a knowledge-driven organization.

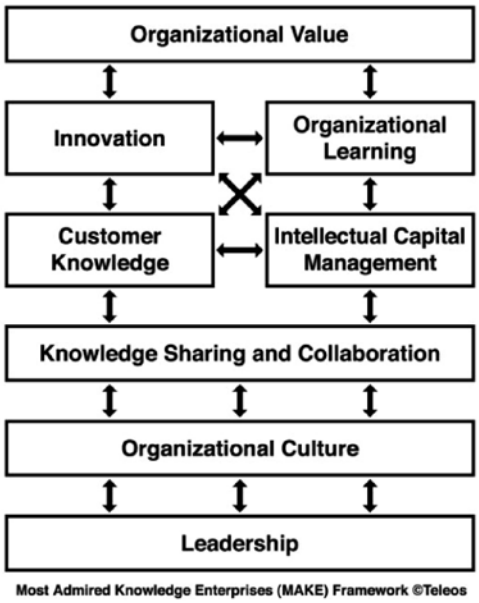

Figure 4.1 MAKE Framework.

The third foundation element is knowledge sharing and collaboration. Much of information technology (IT) and a vast array of tools or techniques are in this box. Yes, there are communities of practice, there are the various abilities to communicate and collaborate, but it is a very much an IT structure.

The four elements that sit above the foundation come in no particular order (this is indicated by the arrows moving back and forth between all of them), but certainly we have identified innovation, organizational learning, the managing of customer knowledge and the ability to manage intellectual capital.

At the very top of the chart is organizational value. This chart actually moves from the bottom to the top because we believe that the foundation stones are required actually to create value for an organization. The other thing is that the boxes may look just so, but they are not. The boxes can grow; the boxes can shrink. If the boxes of leadership, learning, innovation and collaboration grow, then the box on the top, organizational value, can get bigger and bigger.

Inversely, an organization can actually lose knowledge. It can become less valuable. It can still grow, but be declining. This is something that is common to the best organizations in the world. They have the ability continuously to improve, to grow, to become better, but growth is very difficult to sustain over long periods of time.

Study of MAKE Winners

In this section I will show how knowledge management has moved across the world (see Table 4.1). We did our first study at a global level in 1998. The North American companies comprised 74% of the final list that year. This is not surprising because the concepts of knowledge management were first formulated in North America in the early 1990s. By the time we did our study in 1998, they already had at least 5–10 years' experience down the line. We included nine European countries in the study. The MAKE companies in many of them were actually

companies that had affiliations or worked with US companies, so that they were importing knowledge management principles from North America. There were very few Asian companies in our first study and very few that we can call global.

In 2007, we conducted another study. Table 4.1 shows that the percentages had changed dramatically. North America still had the most finalists but now Asia and Europe were closing the gap. What this tells us from a trend point of view is that Asian organizations in particular have been very good at benchmarking or transferring best practices. In some ways, there is now a level playing field with the North American and European organizations. There was only one South American organization in the 2007 list. The continent has been very slow to take on board knowledge management principles. Brazil is considered to be the lead country in South America. Note that the number of global finalists grew from one to seven.

Table 4.1 MAKE Finalists and Winners, 1998 and 2007

	1998		2007	
Region	**No.**	**%**	**No.**	**%**
MAKE finalists				
Asia	2	4	12	24
Europe	9	20	12	24
North America	33	74	18	36
South America	–	–	1	2
Global	1	2	7	14
MAKE winners				
Africa	–		–	–
Asia	–		4	20
Europe	4	20	4	20
North America	16	80	8	40
South America	–	–	–	–
Global	–	–	4	20

What we are finding is that organizations need not necessarily be multinational or international in order to take on global characteristics. They have no one headquarters. They may not even have one chief executive officer. They are more often operating as a federal organization. Again, we see this as a trend over the next 5–10 years. Organizations will take on more and more global characteristics, in the process losing more and more of their national or regional characteristics.

Every year, from our finalists, we select the top 20 organizations to be the winners. It is clear that knowledge management is becoming a driving force for many organizations around the world.

Table 4.2 MAKE Winners, 2007

Global	**Asian**	**North American**	**European**
Accenture	Astra International	Air Products	BP
Apple	Eureka Forbes	APQC	Mondragon Coop Corp
BP	Honda	Caterpillar	Ericsson
BBC	Infosys	Fluor	Nokia
Ernst & Young	Larsen & Toubro ECD	Google	Norsk Tipping
Fluor	Singapore Airlines	Hewlett-Packard	Rolls-Royce
GE	Samsung SDS	IBM	SAP
Google	Sony	Microsoft	Royal Dutch Shell
IBM	Samsung AIT	Raytheon	BBC
Infosys	Satyam Computer	US NASA	
Intel	Tata Consultancy		
McKinsey	Westpac Banking		
Microsoft	Toyota		
Nokia	Tata Steel		
Royal Dutch Shell	Wipro		
Samsung Group			
3M			
Toyota			
Wikipedia			
Wipro			

In my opinion there is no right or wrong way to implement knowledge management. There is a set of principles underlying all knowledge-driven organizations. But, as can be seen from the list of 2007 MAKE winners in Table 4.2, they come from the service, manufacturing and public sectors.

How Some MAKE Winners Implement Knowledge Management

What we find is that the very best organizations customize their strategy and their approaches to work within their particular environment. So, if you are in manufacturing, you construct KM on a manufacturing basis; if you are in services, then services. If you are in the public sector, it takes a different sort of mechanism to make knowledge management work.

The **Samsung Advanced Institute of Technology** (SAIT) is the central R&D division of the Samsung Group of companies, and has about 1000 scientific researchers. It was established in 1998 with a very simple goal: that its research center would be one of the top five industrial research centers in the world by 2005. That might sound simple but, given that it was benchmarking against General Electric, IBM, 3M and AT&T Bell Labs, this was an extremely ambitious goal.

It is also interesting that **3M** became a winner in North America, although it was at a later time. The 3M and the Samsung approaches were quite different, which just illustrates that there is no right or wrong way to approach the matter. Samsung decided that it would use process-driven tools and techniques, including Six Sigma, After Action Reviews and a whole series of methodologies to manage its innovation. Samsung believed that one can manage innovation and worked on this principle when tackling the design of projects, working through projects and funding projects. 3M, on the other hand, has a long history of innovation but in a much freer environment. From 3M's point of view, the scientists had the time to work on their projects. They were given the opportunities to create new markets. Interestingly, about four years ago, 3M appointed a new CEO who had worked for General Electric in the United States, and he brought Six Sigma to 3M. He said that 3M needed to have a more disciplined innovation capability. After four years, 3M's innovation capability actually decreased. 3M had set a goal of having 35% of its products less than five years old. However, at the end of this four-year period, only 25% of its products were less than five years old.

What this says is that, in cultures where innovation is given more latitude and more freedom, things will work better without very strict process-driven controls. On the other hand, if your company, like Samsung, is coming from an electrical engineering consumer product world where there is a lot of quality control and process control, the marriage of knowledge management and Six Sigma can work very well. So people in innovation and research groups have to be very clear about how their organization operates before they attempt to integrate some type of knowledge management into their operations.

Singapore Airlines is one of the world's favorite airlines. The interesting thing about Singapore Airlines is that airplane travel is often thought of as being quite dull and stressful. The business is not of a very high technical nature, in the sense that an airplane is highly technical but this is about all. Yet Singapore Airlines has consistently tried to exceed customer expectations. It was the first airline to buy the new Airbus 380, which has the latest in-flight entertainment system. So, even in fairly basic industries or even the business sector, there are opportunities to innovate, to introduce new products or to bundle with knowledge products to make it successful.

Several Indian companies made it to the Asian winners list in 2007. Again, this was not necessarily

on information technology alone. When comparing the European winners with the Asian winners, which were mostly manufacturing companies, it is noticeable that the European winners tend to be more broad based, comprising a combination of manufacturing and service organizations.

The three European organizations that I would like to pick out might not be very familiar. Of course, the **British Broadcasting Corporation** probably is familiar, but it scored very highly in innovation, which might be surprising because it is a radio and television company. But actually, in terms of the creation of new programs, the BBC is one of the best companies in the world for its idea generation, its brainstorming, its lateral thinking and its ability to take programs and to adopt them to particular cultures in the various regions in the world. So a company that one would not think of as being innovative scored very high in the innovation category in 2007.

The **Mondragon Cooperative Corporation** is a company based in Spain that is made up of worker groups. It started in the automotive industry and has expanded to over 100 different companies. It scores very, very high in knowledge workers' collaboration, team working and skills. As a cooperative, it has to survive by working within the organization and with other organizations. Mondragon is a very good example of a large organization that has been very successful at transferring best practices and best knowledge.

Norsk Tipping has only around 700 employees, which illustrates the fact that an organization does not have to be large to be a successful knowledge-driven entity. Norsk Tipping is part of the government of Norway. In fact, it is the part of the government that runs the national lottery. There is a charter in Norway that prescribes that any money gained by the national lottery, by gaming, is then put back into health, education and science in Norway. So the objective of Norsk Tipping is to maximize the amount of money that Norwegians gamble away every week, so as to attract as much money as possible for good state causes. The unique thing about Norsk Tipping is that it scored highest worldwide in the intellectual capital management category. It is focused on improving lottery games and this means animation and electronic gaming techniques – all things that involve not only high technology but also creativity. Annually, for the last several years, Norsk Tipping has undergone an intellectual capital management audit. It takes the matter so seriously that it looks at all of its intellectual capital and tries to identify gaps; it then plans strategies to improve on those areas. There are only maybe 100–150 companies in the world that conduct rigorous and detailed intellectual capital management audits. One the few in India is MindTree Consulting.

Among North American winners in 2007, there was a wide range of organizations, some high tech and some low tech. The **US National Aeronautics and Space Administration (NASA)** is on the list. One interesting thing about NASA is that, under United States federal law, it is required to practice knowledge management. After the Challenger Shuttle disaster, there was an investigation and one thing this found was that NASA had not actively recorded and transferred its best practices and lessons learned among its personnel. So, as part of its subsequent budget authorization, it was required to demonstrate to the US officials that it was practicing knowledge management. As far as I know, it is the only public organization that has that requirement. The second interesting thing about NASA, and this may be true of several organizations on the list, is that about one-third of NASA's workforce will retire within the next five years. These are people who build satellites and rockets. They plan how to get people into space and how to bring them back. These are people in critical positions and most of their knowledge will be gone with them within the next 5–10 years. So NASA has established a very strong program to retain the knowledge of its retiring workers. But certainly in the United States, Western Europe and Japan, large segments of the workforce will also be retiring quite soon and it is becoming a greater imperative to capture the experiences and knowledge of these workers before they leave the organization.

NASA's approach is one way to capture the knowledge of experts. Most experts will say they are too busy and they do not have the time. What NASA has done is to assign young knowledge workers, young engineers to the older, more experienced ones. It is almost like an apprentice program. The younger engineers follow the experts around. They ask questions; they record what they learn. So, in a sense, the experts are teaching the young apprentices how to do things. The younger workers are not only learning things but also sharing things about others in the organization.

Another organization on the list of winners that I want to mention is **Wikipedia**. Wikipedia is the first global winner that was not a company or a public sector organization. In a sense, it is a community of practitioners, comprising thousands of people working together to create and share knowledge. I think this illustrates that this social networking type of organization is now coming to the fore. It is not a for-profit organization; it is not run by a government. It is just groups of individuals organizing together for a particular reason to do something. I suspect that this is going to be a trend, and more and more organizations like this may start to appear as having best practices in knowledge management.

I just want to mention briefly where the winners came from, because there still is a pecking order of very competitive areas where one tends to find the most winners (see Table 4.3). It is not surprising that the computer hardware, software and IT sector has had the most winners in the 10 years that we have done our studies. The professional services and consulting sector, which comprises almost pure knowledge workers, has also produced many winners. Electronics, electrical manufacturing and other high-tech industries that require a lot of knowledge are third on the list. Oil and gas exploration companies come in fourth among the winners. As one goes down the list, there are more winners but fewer of them in their various categories.

Table 4.3 Global MAKE Winners, by Business Sector

Business sector	No. of winners
Computer hardware, software and IT solutions	9
Professional services/consulting	6
Electronics and electrical manufacturing	5
Oil and gas exploration and services	4 each
Diversified manufacturing; financial services; motor vehicle manufacturing; networking equipment; pharmaceuticals	3 each
Chemicals; Internet searching services and portals	2 each
Construction and engineering; consumer products; media; mining and mineral extraction; public sector; retail; semiconductors and equipment	1 each

One of the things that I take as a challenge is to try to get more organizations to become best practice exemplars. Role models and leaders are needed to encourage others in the business sector to compete and to adopt these practices. Even after 10 years, knowledge management at the very highest level is seen as a competitive advantage by only a few. Other organizations have not yet understood, after all these years, that knowledge is the key differentiator when it comes to competing in the global economy.

Financial Returns from KM

People often ask "Does knowledge management really pay?" One can see "pay" in terms of quality; one can see "pay" in terms of cost reduction. But does knowledge management really pay? After 10 years of study, I can say that it definitely does pay. It is a differentiator and it is a competitive advantage. A term that we use often is "total shareholder return." Now, this

is applicable only to companies with publicly traded stocks – it does not cover all companies – but we use it as a guide. What "total shareholder return" means is, if I buy 100 shares of a company's stock and I re-invest all the dividends, as the stock splits and grows it increases in value. What we have found is that the very best knowledge organizations in the world create wealth and create shareholder value. They become wealthy twice as fast as their competitors. We have studied competitiveness, productivity, efficiency and effectiveness and that ratio tends to hold true: twice as effective, twice as efficient, twice as competitive and twice as productive as a similar organization in their own business sector. So I think it is a goal that one should strive for, because certainly you will beat your competition by two to one. You will be a bigger, better and wealthier company. Looking at the public sector and the non-profit sector, if your organization can be twice as effective or twice as efficient, then you are going to deliver a higher standard of living and more social value to your citizens.

Table 4.4 Rates of Return of 2007 MAKE winners vs. Fortune 500 companies

Metric	2007 Global MAKE winners	Top 500 company median
Total return to shareholders, 1996_2006	22.4%	11.0%
Return on assets, 2006	12.8%	3.7%
Return on revenues, 2006	13.6%	6.4%

Table 4.4 shows the metrics for the global winners in 2007 compared with the median of the top 500 companies. The Fortune 500 median is 11.0% for total return to shareholders, whereas the global MAKE winners scored 22.4%. So, for every US$100 invested in General Electric, the return was US$122.40. As regards the return on assets or return on revenues, the ratios are 3:1, 4:1 or 2:1, all of which are much larger than can be accounted for by statistical variation. They are definite advantages when adopting knowledge management.

Table 4.5 MAKE Winners' Scores by Knowledge Dimension

Knowledge dimension	Asia	Europe	North America
Organizational culture	7.94	7.85	8.25
Knowledge leaders	7.91	8.04	7.76
Innovation	7.90	7.98	8.01
Enterprise intellectual capital	7.75	8.10	7.86
Collaboration	7.82	7.86	8.03
Organizational learning	7.84	8.14	8.02
Managing customer knowledge	7.73	7.71	7.66
Transforming knowledge into wealth	7.87	8.57	7.89

Table 4.5 shows some of the MAKE winners' scores by knowledge dimension. Even though there are Asian winners in the MAKE studies, there are still gaps that can be improved upon. Across the board, the North American companies with 15 years of knowledge management experience still have some advantages in certain areas. From 1995 to about 2000, most of the companies' efforts were focused on collaboration and knowledge sharing. Between about 2000 and 2005, most of the companies' efforts were in innovation technology. More recently, organizations are looking more at intellectual capital management. This seems to be the new differentiator for some of the top and leading companies.

Global Trends

Everywhere in the world, there is difficulty in developing knowledge workers. We may need a new definition for who they are. We also need to do better at training knowledge workers, giving them skills and competencies to be more effective.

We are also noticing that the ability to innovate is now seen as a core capability. If a company is not innovating, if it is not developing new products or in some way combining products and services, it will fall behind. Change is equal to innovation in the world.

The third global trend is, as I have pointed out, that Europe has an edge in intellectual capital management. The Scandinavian companies, in particular, have spent many years working in this area. I think Asia and North America have some way to go to catch up on not only the theoretical understanding but also putting things into practice. Again, there are opportunities to manage customer knowledge, not just customer satisfaction but actually working with customers to customize and develop new products and services to respond to their needs or requirements.

We find that Brazil and China are now moving from traditional quality control and cost control to more intensive knowledge-driven business strategies. Probably we will have our first Chinese global MAKE winner by 2010. Chinese companies are moving very rapidly and they realize the advantages of knowledge and of creating knowledge-driven organizations. They understand innovation and, like India, I think there will be a considerable increase in the pace of change there.

We predict that, within the next three to four years, there will be three to five global leaders in each of the major business sectors. Thus there will be three to five global car manufacturing companies, three to five major telecommunication companies, or three to five major steel companies. What does that say? First of all, it means that there is also going to be the same number of companies that will not survive. It is the companies that are addressing the knowledge issues – such as Mattel and Tata Steel – that are going to survive in the metal fabrication sector, for example.

At the regional or national level, again I think that there will be fewer organizations competing at the top level. So, if your organization has not adopted knowledge management and wants to be in the top tier of organizations, this is going to be a greater challenge because there are already companies working 5–10 years ahead to put together the foundations to create their success strategy.

And, as I said before, Wikipedia represents one new type of global MAKE winner where individuals participating in global communities are creating knowledge.

This brief overview of the world of knowledge management shows that the opportunities certainly are there, but it requires hard work. It takes an average of five years for an organization really to begin to become a competitive leader; on the other hand, the benefits of having an advantage of two to one in efficiency, effectiveness and quality make it well worth it.

Chapter 5

HAWK-i, Holistic Analysis for Working Knowledge and Implementation

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The objective of this chapter is to understand data structures, identifying patterns that explain dissimilarities and likenesses among objects and their cluster groupings. The hierarchy and structure are the two fundamental principles underlying the process of grouping objects and detecting themes that bind or separate.

Overview of Current Methods

Multiplicity of Methods and Algorithms

Stijn Marinus van Dongen states in his thesis:

> *Conceptual confusion. Different disciplines use different concepts and different wordings, so cluster–related research has yielded a plethora of methods and concepts.*[1]

Dongen then quotes Jardine and Sibson:

> *Terminological confusion and the conceptual confusions which they conceal have loomed large in the development of methods of automatic classification. Partly this has arisen from the parallel development of related methods under different names in biology, pattern recognition, … linguistics, …. Partly it has arisen from failure by mathematicians working in the various fields to realize how diverse are the problems included under the headings "classification", "taxonomy" and "data analysis".*

He notes "the elusive nature of the problem."

> *There is no obvious step immediately transforming the loose formulation of the problem into a strategy for solving it. It is sometimes said that there are as many cluster methods as there are cluster analysis users.*

1 Stijn Marinus van Dongen, "Graph Clustering by Flow Simulation," doctoral thesis, University of Utrecht, 2000, http://igitur-archive.library.uu.nl/dissertations/1895620/inhoud.htm.

The Multiplicity of Sophisticated and Complex Visualization Techniques

Alain Morineau writes:

> *Never before has data been generated at such high volumes as it is today. Visual data mining is an approach to deal with this growing flood of data. The aim is to combine traditional data mining techniques with information visualization methods to utilize advantages of both approaches.*[2]

The many methods of visualization (see Figures 5.1–5.5) do not provide a synthetic image, allowing the analyst to view all the information and navigate from an overall view to a sub-set or to a detailed cell.

Stephen Few, from Perceptual Edge, writes:

> *We are overwhelmed by information, not because there is too much, but because we don't know how to tame it. Information lies stagnant in rapidly expanding pools as our ability to collect and warehouse it increases, but our ability to make sense of and communicate it remains inert.*[3]

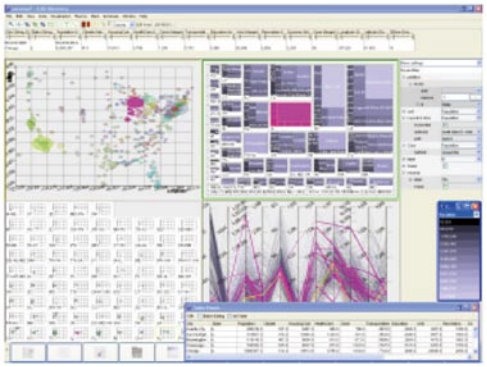

Figure 5.1 Vast Choice of Visualization.

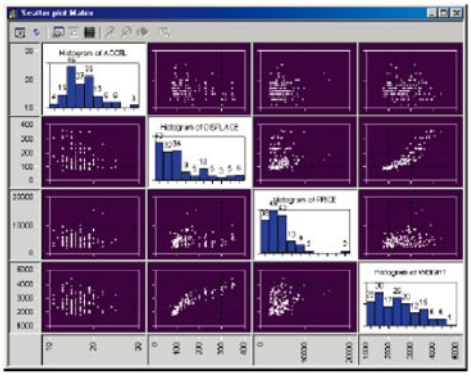

Figure 5.2 Scatter Plot Matrix.

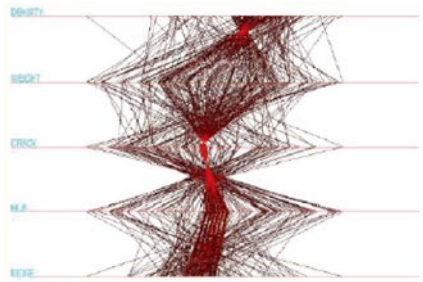

Figure 5.3 Parallel Coordinates.

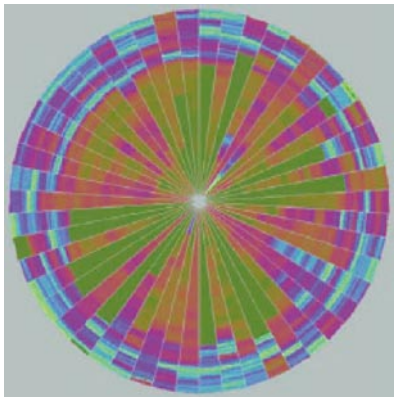

Figure 5.4 Circle Segments.

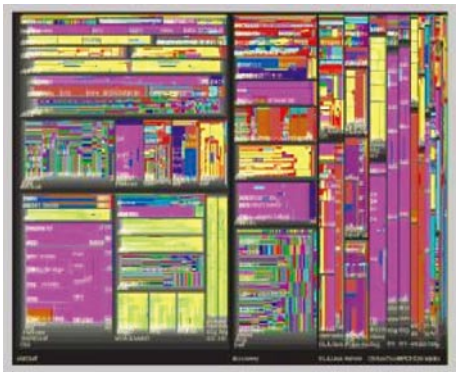

Figure 5.5 Treemaps.

2 Alain Morineau, "Visual Data Mining: The Case of VITAMIN System and Other Software," *Revue Modulad*, No. 31, 2004, p. 100, http://www-rocq.inria.fr/axis/modulad/archives/numero-31/morineau-31/morineau-31.pdf.

3 Stephen Few, Perceptual Edge, http://www.perceptualedge.com/.

The challenge lies in developing tools to reveal structure and hierarchy in data, and to communicate them.

The Reorderable Visual Matrix: The Missing Link

The Three Fundamental Levels of Reading

Jacques Bertin's Reorderable Visual Matrix (RVM) is the only visualization allowing three different levels of reading: overall, sub-set and individual cell.[4] Bertin's RVM equips the analyst to organize indicators efficiently, thereby highlighting patterns and trends that would otherwise be hidden. The visual matrix replaces mathematical logic by visual logic. The result is immediate, effective visual communication. Information is "seen" in a manner conducive to rapid classification.

Reordering the Information

RVM 1 (Figure 5.6) shows products A, B, C… present in countries 1, 2, 3… In this form or in its graphic form (RVM 2), the analysis is almost impossible. But if we move country 2 and product D, we reveal groups with similar characteristics (RVM 3) and reduce 25 individuals to three groups. This image transformation – by swapping lines and columns, on the basis of the universal principle of proximity and similitude – defines the RVM, the basis for the graphics matrix theory. Permutations are symbolized in RVM 4.

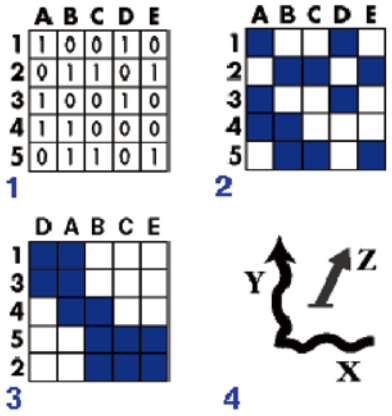

Figure 5.6 The RVM.

Data can be transformed into informative graphs, by questioning maps and diagrams. Figure 5.7, which shows meat production in five European countries, can be questioned in three ways:

- in X: this meat, which country?
- in Y: this country, which meat?
- in Z: highest percentages, where?

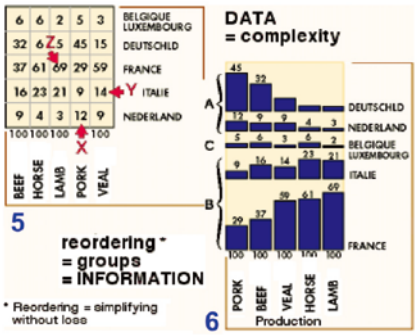

Figure 5.7 Why This Language? Levels of Perception.

The brain best retains one cell, at most seven; far fewer than the 25 present in this simple example.

Comprehension Requires the Integration of the Complete Set of Data

The data must therefore be reduced to a small number of like groups. The fundamental question is: which groups comprise X and Y? RVM 6 (see Figure 5.7) gives us the answer by reorganizing the lines and columns. The 25 units form two groups, A and B, with an opposed structure. *This is the first piece of information.*

4 Jacques Bertin, *Graphics and Graphics Information Processing*, translated by W. Berg and P. Scott. Berlin/New York: Walter de Gruyter, 1981.

Country C is an exception, conforming to neither group. C is an important, decisive element because it bears a similar weight in both the groups. *This is the second piece of information*.

On its own, this is inadequate. Clustering or pattern recognition methods must be integrated to reorganize the image; a symbolic representation of objects must be used to produce either a geographical or a symbolic virtual map.

Cognitive Approach Linked to Visual and Statistical Analysis

For the Process of Discovering a Visual Structure

In consonance with Bertin's RVM theory, Goldfarb et al. present a new approach to the process of visualizing data structure, "based on the inductive learning model":

> *It is important to stress that the foundations of vision lie "outside" vision proper.*
>
> *An immediate and very natural question is: How do vision processes capture the structure of objects? We believe that the structure of image has to play … the driving role. . . . [T]he structure of objects should be captured through the extraction and representation of image structure … The image is represented at different resolution levels and such a representation "defines" the image structure.… [T]he goal of vision is to determine this combinative image structure which captures the combinative object structure.*
>
> *The triad of image structure, the corresponding mathematical structure, and the (combinative) structure of objects is precisely what computational vision should be about.*[5]

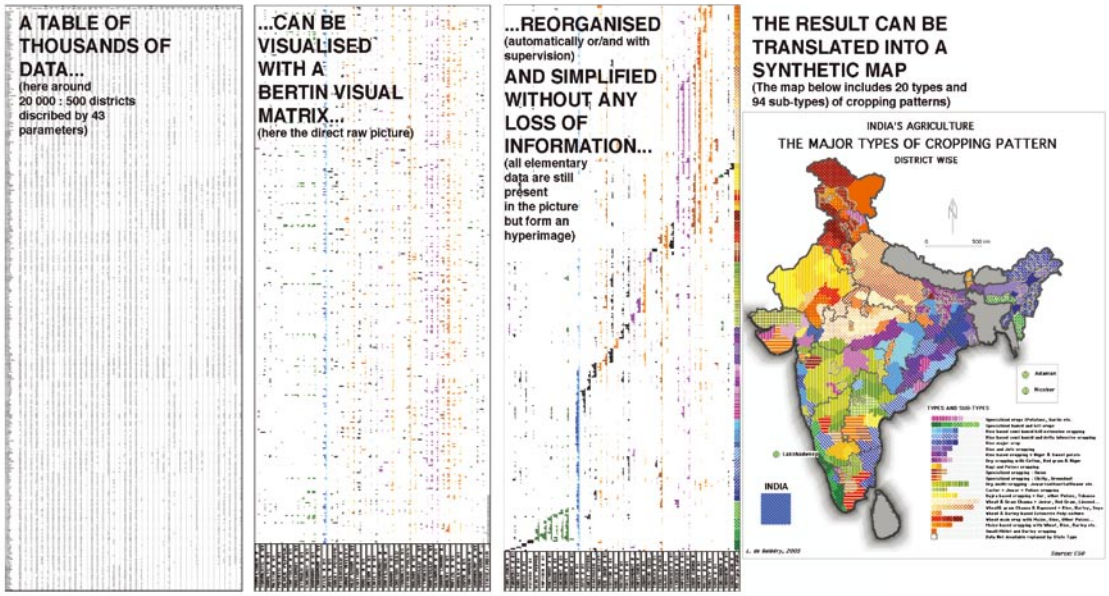

Figure 5.8 Example of a Large Data Set Reorganized with RVM.

5 Lev Goldfarb, Sanjay S. Deshpande and Virendra C. Bhavsar, "Inductive Theory of Vision," Technical Report TR96-108, Faculty of Computer Science, University of Brunswick, April 1996.

For Statistical Analysis

Presenting ViSta (Visual Statistics System software), Young and Smith. state:

> *The Cognitive Modes are:*
> 1. *Structural – when the analyst is constructing, maintaining or revising the data analysis;*
> 2. *Exploratory – when the analyst is exploring the data and generating hypotheses;*
> 3. *Confirmatory – when the analyst is confirming hypotheses.*
>
> *The analyst's cognitive mode changes according to what the analyst is doing during the data analysis. The profile of cognitive modes depends on the analyst's level of expertise. We identify four types of analysts: novice, competent, sophisticated and expert. The sophistication level alters the profile of cognitive modes. Novices would spend the most time in structure mode, while sophisticates and experts would spend the least time in it. Different computing environments are needed for the different levels of sophistication.*[6]

Conclusion

No one method is better than another. Only a combination of methods can provide answers. Instead of yet another algorithm or method, we propose a combination of existing methods.

No single answer exists for group formation because all real data sets contain outliers and transition objects, indicating movement between well-defined groups. These will be classified differently depending on the algorithm chosen.

Based on the analyst's domain knowledge, transition objects can anticipate present and future trends, outlining risks and potentials. Strategies and action plans can be defined accordingly.

HAWK-i: Holistic Analysis for Working Knowledge and Implementation

The Stakeholder as Analyst

The demystification of existing specialized tools would broaden their use among planners and common users.

The HAWK-i project recognizes that effective planning, forecasting and monitoring require an understanding of complex real-life situations and problems. The failure to do any of the above activities properly is usually due to an incomplete assessment of the situation.

HAWK-i aims to make the most of current tools, as well as new tools developed for the project, thereby creating a handy prescription tool. To diagnose a situation, the information and data on it must be simplified and clustered. The groups can then be understood through intra- and inter-group relationships. Associations and causal relationships are thus identified.

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6 F. W. Young and J. B. Smith, "Towards a Structured Data Analysis Environment: A Cognition-Based Design," in A. Buja and P. A. Tukey, eds, *Computing and Graphics in Statistics*. New York: Springer-Verlag, 1991, pp. 253–79.

The Process

HAWK-i will also emphasize the identification of edges, transitions and fuzzy boundaries because they may presage emerging trends, assuming importance over time. One can then adumbrate potentials and possible risks.

The insights can be used to formulate strategies and policies for future action plans and pertaining variously to the fields of research, business and governance. Models of the proposed project have been accepted at various levels in large government departments and enterprises. Their adoption by the Irrigation Department of Andhra Pradesh was presented in our 2007 paper, "Visual Matrix for Dynamic Relationship and Spatial Analysis."

Stakeholders and Their Needs

Stakeholders are frequently excluded from planning and implementing the very projects that affect them. HAWK-i aims to be a tool accessible to non-specialists while still delivering expert aid in data analysis, knowledge management and decision support. The combination of these two qualities of the tool will, we hope, cause a paradigm shift where stakeholders will be active in decision-making and project implementation (see Figure 5.9).

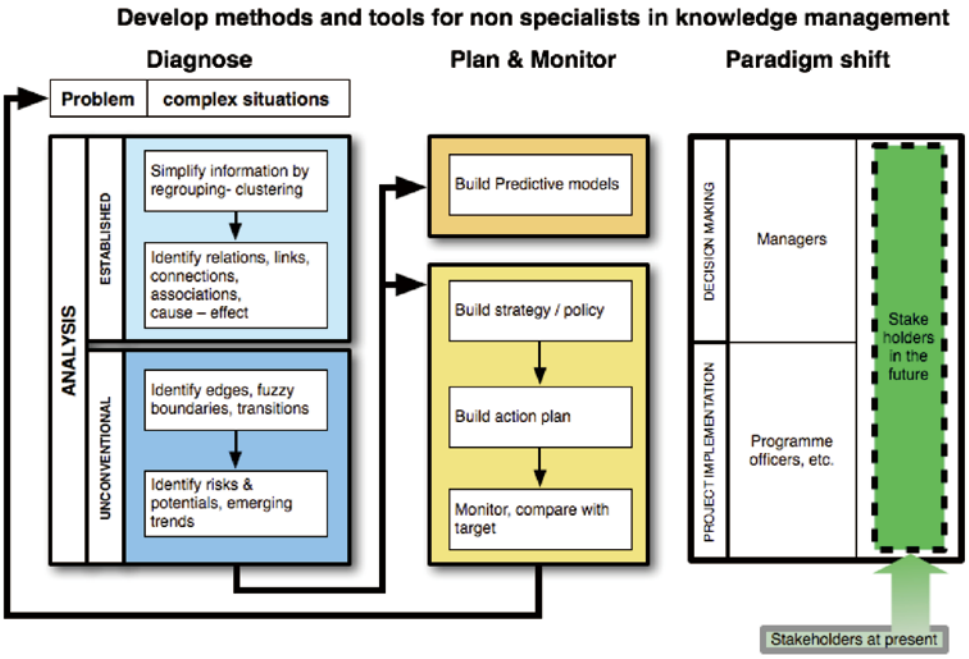

Figure 5.9 Developing Methods and Tools for Non-Specialists in Knowledge Management.

Chapter 6

Case Study: Knowledge Management in Wipro

Ved Prakash

General Manager and Head – KM,
Wipro Technologies

Wipro Technologies, the technology services division of Wipro Limited (NYSE: WIT), is a global provider of consulting, information technology (IT) services, outsourced R&D, infrastructure outsourcing and business process services. Wipro delivers technology-driven business solutions that meet the strategic objectives of Fortune 1000 customers. With over 27 years in the IT business, Wipro is the world's largest outsourced R&D services provider and one of the pioneers in the remote delivery of software services. Wipro's key differentiators include end-to-end services, an adaptive, knowledge-driven engagement model and an obsessive focus on quality in every aspect of service delivery.

Wipro delivers high business value to its customers through a combination of process excellence, quality frameworks, knowledge leverage and service delivery innovations. Wipro is the world's first PCMM, CMM and CMMi Level 5 certified software services company and the first outside the USA to receive the IEEE software process award. Wipro is the first service company to apply the Six Sigma, lean manufacturing and factory model concepts to software engineering.

The company employs over 80,000 people belonging to 49 nationalities worldwide, serving over 690 customers through 52 development centers and 12 near-shore centers spread across India, Japan, China, Eastern Europe, France, Austria, Sweden, Germany, the UK, Brazil and the USA.

Since 2003, Wipro Technologies has experienced impressive growth in revenues, profitability and market capitalization. Over the last decade, the company has grown its revenues at a compounded annual growth rate (CAGR) of 25% and profit after tax at the CAGR of 46%. In the fiscal year 2007 (ending March 2007), Wipro's revenues stood at approximately US$3.4 billion. Wipro's growth is the result of a single-minded focus on customer satisfaction, quality, developing people and providing innovative value-for-money knowledge-enabled software solutions.

Wipro's philosophy in dealing with its stakeholders is based on a foundation of enduring values. Over the years, the core values have not changed, even though the company has constantly rearticulated them to keep them relevant to the changing times. These values guide Wipro in all its transactions and relations. They define what Wipro is and what it means to its stakeholders. Wipro calls this the "Spirit of Wipro."

The Spirit of Wipro is the core of Wipro. It is rooted within the company and it is aspirational, thus making it futuristic. The Spirit of Wipro means manifesting an *intensity to win, acting with sensitivity* and being *unyielding about integrity* all the time.

Knowledge Strategy

Wipro Technologies launched a corporate knowledge strategy in September 2000. Earlier, it had knowledge management (KM) initiatives in isolated pockets – mainly collaboration, re-use and knowledge sharing in smaller groups within the business units or project teams. One of the main drivers behind an organization-wide knowledge strategy was that Wipro grew rapidly between the years 1998 and 2000. During those years, the company doubled the number of its employees.

During this same period, customer projects were becoming increasingly more complex. Simultaneously, customers were demanding shorter delivery periods. In addition, the project life cycles were shrinking. With this rapid growth, the demand for access to information increased rapidly. Wipro realized that, unless it adopted a formal approach to its enterprise-wide collaboration and knowledge-sharing needs, it might start falling behind its competitors.

What drives Wipro's KM initiative is the importance of aligning the knowledge strategy to its key business drivers. The company identified the business drivers by talking to people within the organization and by trying to understand the most critical problems that it wanted KM to address. They were:

- *Competitive Responsiveness* – Wipro's ability to respond quickly to market opportunities by leveraging its collective knowledge;
- *Collaborative Work Culture* – working as a collaborative team, sharing best practices and avoiding reinvention or repeating mistakes;
- *Shorter Time to Market* – shortened product and project life cycles;
- *Capturing Tacit Knowledge* – minimizing losses owing to attrition and mobility.

This effort evolved into Wipro's initial KM vision:

> *"To be an organization where knowledge capture and sharing is the way we work, offering customers speed-to-deploy as well as innovative products and services focused on their needs, and offering employees an environment of continuous learning and productivity improvements."*

The articulation of its KM vision led to the formation of a core team to plan and develop the vision. A core KM team consisting of 12 knowledge managers representing core business units (verticals) and specialist expertise groups (horizontals) was established. The knowledge managers helped develop KM processes, procedures and applications. They implemented these applications in their own work environments. They also evangelized KM, by lecturing on KM and conducting training programs within their own business groups in line with the specific needs of the group. Another dedicated team comprising a project manager and four programmers supported the knowledge managers by developing, customizing and implementing KM applications.

The core KM team began by creating the logical building blocks that could be used to address the KM needs of Wipro. Next, the KM team addressed the technology- and people-related issues. Wipro's KM strategy framework consisted of the following three pillars:

- infrastructure (an IT infrastructure that includes technologies, tools and applications);
- business processes (through which the knowledge life cycle is managed);
- an extended KM team (people who evangelize, develop and support KM initiatives).

The extended KM team includes contributors (subject-matter experts and authors), editors, reviewers and users.

In keeping with the culture of continuous improvement, Wipro recently revisited its knowledge management vision, given the changing overall business environment. Wipro was prepared for both reformulating the existing vision in a slightly new form as well as starting out on a brand new path. The visioning exercise per se involved bringing together senior managers and KM champions to look at how KM could help achieve Wipro's business and operational objectives. The exercise was facilitated by a senior organizational behavior and development consultant and led to the framing of a new KM vision. The new KM vision retains some of the old vision's flavor while at the same time giving it an inspirational tinge and adding a focus on the exchange of knowledge and the inclusion of entities (customers and partners) associated with Wipro. The new KM vision reads thus:

> *"Be a globally admired learning organization that enables the seamless exchange of knowledge across our diverse workforce, partners and customers, thereby fostering innovation and efficiency."*

Today Wipro has a dedicated core team of 34 knowledge managers at a central level aligned with different business units and functions, and a team of five to support the technology platform. In addition, each business unit has dedicated or part-time knowledge officers at different levels to facilitate KM activities further.

Figure 6.1 The KM Identity.

Knowledge Approach

After Wipro identified the business drivers and started evaluating tools and technologies, it created a roadmap of milestones to implement the KM vision. The first steps were focused towards getting the basic KM strategy, its framework (see Figure 6.2) and infrastructure in place. The KM vision was further developed into more manageable objectives:

- people are the primary assets and it is necessary to capture and leverage people's know-how and know-what;
- increase the transfer of individual knowledge to the organization;
- link people who have the requisite tacit and explicit knowledge with those who need it;
- leverage organizational knowledge – bring the right information to the

Figure 6.2 The KM Framework at Wipro.

right people in a context that addresses their challenges;
- increase collaboration opportunities – enrich the exchange of tacit and explicit knowledge among people;
- share best practices across the enterprise, to be able to learn from failed efforts and to provide a platform for knowledge re-use and innovation;
- limit upfront investments and put existing infrastructure into use.

Over the years, Wipro has implemented several applications to institutionalize KM in meeting these objectives through the KNet, Wipro's Knowledge Network platform.

Connecting People to Content

Induction. When people join the organization, they undergo a comprehensive induction program. Part of this program includes a compulsory module on knowledge management. Topics include the basics of KM, the need for KM and how the organization benefits from KM. The company also has application-specific programs, training programs and orientation programs, during which the KM team conducts sessions for people on how to use the various KM applications.

DocKNet. DocKNet is a repository that houses documents of various types (case studies, white papers, training materials, templates, etc.) that pertain to every conceivable technology and domain that Wipro works with and also various process documents. This repository is one of the most convenient ways to communicate and talk about technical matters with the rest of the technical community in Wipro. Thousands of Wiproites visit this portal every month and contribute/use information from there. There is a plethora of instances where sales support components from the repository are used to cut down on the time it takes to respond to proposals. In general, the time saved has been in excess of 30% of the total time taken to prepare the proposal.

War rooms. These virtual workspaces are used for time-bound and task-oriented activities such as proposal preparation and framework conceptualization. Almost all proposals that involve the participation of geographically dispersed employees go through the virtual workspace to become more efficient. Learning gained from the activity is captured and categorized before the activity is wrapped up, enabling the sharing of knowledge gained through its lifetime.

Re-usable components. The re-usable components repository aims to eliminate the redundant development of functionalities and hence contributes towards the realization of business benefits. The repository allows employees to share components developed to ensure shorter time-to-market periods for subsequent similar projects.

Project knowledge database. The project knowledge bank provides access to historical project information captured since the time Wipro embarked on its quality journey. Using this, project managers are able to locate similar projects that have already been executed and learn from previous experience.

Process knowledge base. Wipro's deep knowledge and expertise in quality processes and techniques have been captured and made available in a centralized knowledge base called VelociQ. This is the place to go for all the procedures, templates and guidelines related to project management. This repository also defines the project-level KM-related activities (re-use, use of best practices and expertise, and so on) supported by audits, checklists, reviews, templates and deliverables.

Customer knowledge. In order to manage customer knowledge, the business development group and business units have restricted sites within the KNet as well as a customer relationship management application that allows globally dispersed teams to function collaboratively.

Connecting People to People

Communities. KNetworks, Wipro's communities application, facilitates the setting up of special interest groups that promote and fuel the common passions among employees across technical, domain and functional areas. Also, this allows a free exchange of experience and expertise within the groups, enabling a tacit knowledge exchange system.

Expert locator. KonNect, Wipro's expert yellow pages, has profiled a list of self-registered experts across the organization. Employees in need of help are able to resolve issues in a time-bound manner by looking up experts from the repository and contacting them. It has helped build bridges between people in need of expertise and people who have the expertise to share. There is an additional feature that helps knowledge seekers broadcast their needs to a wider audience across the organization in case there are no experts listed or they cannot find a satisfactory resolution.

Building a KM culture at Wipro consists of the following.

1. KM as part of process
   - KM orientation module in new joinee induction
   - KM in goals and objectives/progressions for specialist roles
   - KM embedded in different phases of the systems development life cycle (SDLC)
   - Re-use measured and reported in a project dashboard
   - KM and customer intellectual property.
2. Evangelization
   - newsletters
   - contests/quizzes
   - KM roadshows.
3. Reward and recognition programs.
4. Tacit knowledge exchange forums
   - expert talks/panel discussions
   - Web-based chats
   - best-practice sharing sessions
   - success stories.

Measurements

Wipro's KM framework has been evolved to ensure the continuous feedback of results into the system. This allows Wipro continuously to refocus the KM strategy, the key business processes and the infrastructure. The Six Sigma tools are being used to gauge the effectiveness and engagement of all KM initiatives. The objective here is to enhance continuously the quality of user experience. An important aspect of the knowledge management initiative is ongoing support for the KM initiatives and the solutions that have been deployed.

Wipro has created a KM Measurement Framework consisting of four key indices:

- KM Contribution Index – measures the overall rate of addition to Wipro's knowledge capital;
- KM Users' Index – measures the number of overall users of knowledge assets;

- Engagement Index – measures the number of unique users of knowledge assets;
- Usage Index – measures the level of usage of knowledge assets.

In addition, KM effectiveness is measured as a standard part of metrics at the individual project level, where productivity improvements and re-use percentage are measured. The information is published on a monthly KM Dashboard, providing top management with a clear view of activities, both at the organizational level and at each business unit level.

Wipro's KM initiative, in addition to building internal successes, has gathered international acclaim along the way, such as:

- the Global, Asian and Indian MAKE Awards 2007;
- induction into the Global MAKE Hall of Fame;
- the Asian and Indian MAKE Awards 2006;
- the Global, Asian and Indian MAKE Awards 2005;
- the Asian MAKE Award 2003;
- the KM Reality Award 2002.

Wipro has also gained good recognition for its KM initiatives in various external communities:

- the Indian Institute of Management (IIM), Bangalore uses a regular case study on knowledge management in Wipro for its MBA programs;
- Wipro's KM implemented on SharePoint has been highlighted as a case study on Microsoft's website;
- Wipro has presented its thoughts, ideas and KM best practices at a number of national and international conferences;
- Wipro is the industry representative on a national panel (under the Bureau of Indian Standards) for framing standards on KM.

Roadmap

Wipro has outlined a three-year roadmap (2007–2009) for taking KM to the next higher level of maturity. Various aspects of KM have been studied for other KM best-in-call consulting and IT service organizations and analyzed across multiple dimensions. Some of the recommendations that are being implemented in the roadmap include:

- embedding KM into critical business processes (the new KM vision's reference to creating a learning organization that seamlessly exchanges knowledge can be directly linked to this aspect of the KM roadmap);
- migrating to the next-generation KM platform, which also enables personal KM;
- consolidating KM across multiple businesses of Wipro, for both IT and non-IT sectors;
- linking KM with its customers and partners (the new KM vision brings this out explicitly).

KM Consulting Services

Since 2005, Wipro has been providing its customers with end-to-end knowledge management and collaboration services to reap the benefits of KM based on its own success and its deep expertise in the areas of technology and processes. These services include:

- knowledge audits and mapping;
- taxonomy and metadata development;

- KM measurements and metrics;
- knowledge integration across partners (customers, acquired organizations, vendors, regulatory agencies);
- best practices management;
- expertise location and management;
- enterprise re-use;
- KM portals and collaborative solutions;
- innovation and idea management.

Chapter 7

The Knowledge Economy Project: The Experience of IIT Roorkee

Prof. Harsha Sinvhal and
Prof. Vinay K. Nangia

IIT Roorkee

Background

The concept of a knowledge economy is not new to India. India's past achievements in science, philosophy, mathematics and astronomy reinforce the notion that the country has for millennia been a leading knowledge producer. Although knowledge has been recognized as the key resource for the empowerment of people and the promotion of sustainable development, there still exists a lack of awareness among all the stakeholders. This needs to be addressed. With the synergized efforts of the government, the private sector, the academic world and society, India can undoubtedly make tremendous economic gains by developing policies and strategies that focus on more effective use of knowledge to increase the overall productivity of the economy. In so doing, India will be able to improve its international competitiveness and join the ranks of countries that are making a successful transition into the knowledge economy. India has a tremendous potential to make dramatic improvements in its overall knowledge readiness. By developing a framework for collaborative linkages to meet the emerging challenges and by concerted synergetic efforts of all the stakeholders, national competitiveness in the global knowledge economy can be achieved.

The information revolution has facilitated and expedited the spread of knowledge. This is leading to a new era – one of knowledge and information that directly affects economic, social, cultural and political activities worldwide. Governments have recognized the vital role that information and communication technologies play in socio-economic development. Many countries in the developed world and some of the developing countries are designing policies and plans for transforming their economies into a knowledge economy.

Seeking to address the challenges of the emerging knowledge economy, India's Department of Information Technology, the Ministry of Communications and Information Technology and the Government of India have awarded a sponsored research project, "National Competitiveness in the Knowledge Economy – Developing a Framework for Collaborative Linkages to Meet the Emerging Challenges," to four institutions, with the Indian Institute of Technology (IIT), Roorkee, as the lead institute. The other participating institutions are the International Management Institute, New Delhi, the National Productivity Council, New Delhi, and the Indian Institute of Technology, Madras. The project commenced in April 2006, with an outlay of Rs 49.5 million to be executed over three years.

Indian Institute of Technology, Roorkee

The broad work plan of IIT Roorkee at first envisaged organizing seminars, workshops, brainstorming sessions, conferences and competitions in order to create awareness of the knowledge economy among all the stakeholders. Simultaneously, it planned to carry out groundwork to identify issues of concern among the key players and to evolve an industry–academia–government–society collaborative model. Commissioned research is also being organized by IIT Roorkee on related subjects.

Creation of Awareness about the Knowledge Economy

During the first year of the project, IIT Roorkee organized workshops, including brainstorming sessions and competitions, in the states of Rajasthan, Madhya Pradesh, Uttar Pradesh, Uttarakhand and Gujarat. In all these workshops, representatives from the academic world, industry, government, public organizations and student groups were invited to share their views on the role knowledge will play in the national and global economy. Emphasis was laid on making people from different sectors of society aware of the importance of knowledge and its generation, dissemination and management in the years to come. Poster competitions, paper presentations and quizzes were organized with the motive of creating and increasing awareness about the knowledge economy and knowledge management. In the technical sessions, knowledge management applications in various fields were presented.

Brainstorming sessions and panel discussions formed an integral part of the workshops. Eminent speakers from the academic world, industry, government and society deepened awareness of the knowledge economy among the audience. Questionnaires aimed at ascertaining the current level of awareness of the knowledge economy and knowledge management were administered to the students at these places and the data collected have been analyzed.

A sixth workshop, held over three days in March 2007 at IIT Roorkee, involved a series of events intended to facilitate exploration of the corpus of knowledge management applications in a comprehensive, innovative and motivating manner. The participants were students from various institutes, including the Indian Institutes of Technology and the Indian Institutes of Management, as well as experts from the academic world and industry. The best of the brains put their mettle to the test as they competed in a plethora of events held in various disciplines of engineering, sciences and management. All these events registered record participation and were keenly contested. The events gave participants the opportunity to exercise their academic intellect and also come up with innovations and solutions.

Non-Governmental Organizations

Realizing that non-governmental organizations (NGOs) have a vital role to play in the development process, owing to their presence at the grassroots level, IIT Roorkee has given special emphasis to NGOs and their activities under the project. Recognizing that NGOs can be vehicles of change because they are able to spread awareness at the lowest and furthest levels, it was planned to alert them to the advantages of modern technologies and the dissemination of information about the applications of modern techniques and marketing strategies. Special programs were designed for the NGOs called "Umang." As part of "Umang," IIT Roorkee organized three workshops for the benefit of NGOs. The stakeholders included students, teachers and some invited government functionaries. The events were aimed at providing an interactive platform for the exchange of views and opinions on current and emerging topics of contemporary interest, and were among the many steps taken to fulfill our social responsibility to bring about a positive change in the mindset of future managers towards society.

"Umang-1" was a two-day workshop organized on 18–19 April 2006 on the theme "Developing a Strategic Framework for NGOs." "Umang-2" was a workshop on rural technologies for the NGOs of Uttarakhand held on 18 March 2007. An exhibition was also organized to showcase a wide range of applications of rural technologies. Speakers included professors from various IITs who have developed and promoted technologies for use in rural areas. It was a multidisciplinary and multi-departmental initiative to showcase various rural technologies. A sustainable model of an IT initiative, developed by IIT Roorkee, to bring information and government services to the doorsteps of rural residents by means of information kiosks was also exhibited. The technical sessions dealt with rural technologies and their adoption and implementation by NGOs, with particular reference to Uttarakhand.

Micro-finance plays an important role in the fight against poverty by providing access to financial services for the underprivileged. Interest in institutional micro-finance has burgeoned over the last two decades as international lending institutions and NGOs have supported its development. Institutional micro-finance has evolved into an industry with the prospects of rapid growth on a commercial basis and the potential to reach millions of the poor. A brainstorming session on "Development of Micro-Finance Strategies in the State of Uttarakhand" was organized on 22 August 2007 at IIT Roorkee with the objective of discussing strategies for the development of micro-finance in Uttarakhand. Representatives from the National Bank for Agriculture and Rural Development (NABARD), the State Bank of India, ICICI Bank, micro-finance institutions and NGOs, as well as the IIT's faculty members, contributed to the success of this event.

Since micro-finance is a development tool with immense potential for the growth of the nation, as a sequel to the brainstorming session, "Umang-3," a seminar on micro-finance, was organized on 5 November 2007. The presence of representatives from banks, financial institutions, academic institutions and other like-minded organizations on the same platform helped the NGOs to gain a better insight into the subject matter. Various stakeholders had an opportunity to interact with each other and to share their experiences, views and suggestions.

Collaboration between Government, Industry and Academia

To prepare a framework within which various stakeholders can collaborate institutionally and synergistically to convert brilliant ideas emanating from the academic world into do-able projects that could be launched commercially by industry or business players, IIT Roorkee's work plan included undertaking surveys among all the stakeholders, to be followed by special meetings, workshops, seminars and conferences on related subject matter. In order to ensure that the benefits of this synergetic framework flow to industry, government, academia and society, data collection and analysis were undertaken by students, experts and investigators.

The first step in establishing a synergetic approach for efficient knowledge management among the stakeholders (academia, industry, government and society) was to study their current levels of awareness about KM and the knowledge economy and then to identify the verticals through which collaboration could be made possible across these stakeholders. It would then be possible to identify the specific core competencies of these stakeholders and evolve a conceptual synergetic model for the effective implementation of knowledge management.

Students from IIT Roorkee conducted surveys and interviewed members of the faculty and the administration and heads of Incubation Centers and IPR (intellectual property rights) Cells at various educational institutions and centers of excellence, apart from our own institute, IIT Roorkee:

- Indian Institute of Management, Ahmadabad;
- Indian Institute of Management, Bangalore – NSRCEL (Nadathur S. Raghavan Center for Entrepreneurial Learning);
- National Institute of Design, Ahmadabad – IPR Cell, NBDI (National Business Design Incubator), the Knowledge Management Center;
- Indian School of Business, Hyderabad – WCE (Wadhwani Centre for Entrepreneurship), K-Hub;
- Indian Institute of Technology, Kanpur – SIDBI Incubation Center;
- Birla Institute of Technology and Science, Pilani – Practice School;
- TBI (Technology Business Incubator);
- Indian Institute of Technology, Delhi – FITT (Foundation for Innovation Technology and Transfer);
- Indian Institute of Management, Lucknow – Incubation Center;
- Maulana Azad National Institute of Technology, Bhopal;
- Malaviya National Institute of Technology, Jaipur;
- Rajiv Gandhi Technical University, Bhopal;
- Jawaharlal Nehru Technical University, Hyderabad;
- National Research Development Corporation, New Delhi;
- National Institute of Agricultural Marketing, Jaipur;
- Delhi College of Engineering, New Delhi;
- Jamia Milia University, New Delhi;
- Indian Institute of Technology, Bombay;
- Indian Institute of Science, Bangalore.

The student teams also visited Bharat Heavy Electricals Ltd. Hardwar, and Dr. Reddy's Laboratories Ltd. Hyderabad, to study KM practices there. Two of our students underwent internship at Eureka Forbes, Mumbai, and had the opportunity to study the organization's KM programs, which blend the elements of fun and competition with the serious goals of sharing knowledge and capturing best practices.

Exploratory surveys were conducted in and around a cluster of villages in the Tehri district of Uttarakhand with a view to creating a functional model on the ground to showcase public–private partnership collaboration. However, the terrain and the environment were later found to be unsuitable for the experiment. The feasibility of creating a functional model of private–public partnerships in other areas of Uttarakhand is being explored. Alternatively, a possible mechanism for interaction between academia and industry, through the establishment of an incubation center, is being contemplated. Since small and medium enterprises need to adapt to innovations much more than do large corporations, the center would aim at:

- fostering experience sharing and after-action review among the participants, so that risks and uncertainties may be avoided;
- encouraging an open dialogue among the participants towards a holistic approach;
- promoting new ventures from start-up to full development;
- creating knowledge of specific skills, which will in turn help in generating conceptual as well as theoretically rigorous knowledge that has practical business utility.

Economic development is a collaborative process involving government at various levels, companies and teaching and research institutions. Collaboration between government, industry and academia has been widely discussed. In order to help design a collaboration model by drawing inputs from students, a national competition on this theme was scheduled for February 2008 ("Jigyasa '08"). The papers and deliberations were to deal extensively with the

model right from its conceptualization stage and delving into its components, collaborative linkages, implementation roadmap and evaluation parameters. The model needs to showcase a methodology of macro-level knowledge management on the ground and to be based on the needs of various stakeholders.

To retain a competitive advantage in the knowledge economy (KE), India needs to focus more on sustained innovation, although the knowledge–innovation linkage is only a journey and not the destination. Inventions and innovations by individuals in the formal and informal sectors have become important drivers of change in Indian society. Teams from IIT Roorkee actively participated in two international conferences in December 2007: "India Innovations: Issues, Opportunities and Solutions," in New Delhi, and "Encouraging Innovation: Perspectives from Industry and Academia," in Mumbai. Both were organized by the Department of Science and Technology, Government of India, in collaboration with the National Academy of Sciences of the United States of America.

Five students working on this project from IIT Roorkee were assigned KE-related projects at the Technology Information, Forecasting and Assessment Council, New Delhi. The projects sought to:

- design and implement a database for TePP (Telecommunications Equipment Purchase Program) projects, by developing formats, tables and attributes for user-friendly access;
- design and develop a portal of databases of publicly funded R&D institutions/mechanisms and build an inventory in the form of a meta directory;
- study the management of technology in a knowledge economy, with particular reference to science and technology mechanisms to nurture innovation, technology foresight and technology intermediation;
- analyze export competitiveness by studying the correlation between a capacity to generate intellectual property and total economic/trade turnover;
- assess how a few key sectors are technologically positioned;
- prepare a compilation of various grant schemes to nurture innovation in the private sector in a few select nations comprising both developed as well as developing countries.

General

IIT Roorkee investigators actively participated in a national symposium organized by the International Management Institute, New Delhi, as well as in the first International Conference on Knowledge Management organized by the National Productivity Council, New Delhi. Professor V. K. Nangia, Principal Investigator in the project at IIT Roorkee, attended the first and second meetings of the Asian Productivity Organization's Expert Group Meeting Series on "Knowledge Management" at Manila, the Philippines, and at Kuala Lumpur, Malaysia, in September 2007 and January 2008, respectively.

The investigators have visited several educational institutions to explore the feasibility of establishing a network of knowledge institutions. During the surveys conducted among the centers of excellence, certain institutes were identified that are interested in networking.

Studies on "Vocational Education and Training in the Services Sector" and "Vocational Education and Training in Transport, Health and IT in Haryana, Punjab, Capital Territory of Delhi and Three Foreign Countries" have been started, and a study on "Global Mega-trends Analysis: India's Transition from an Agro-Industrial to a Knowledge Economy" is under consideration.

Future Activities

Future activities of IIT Roorkee will include organizing symposia and seminars with a focus shift from academia to industry; conducting brainstorming sessions with representatives of government and society; interaction with members of various industry, trade and business associations, such as the Federation of Indian Chambers of Commerce and Industry, the Associated Chambers of Commerce and Industry of India and the Confederation of Indian Industry and representatives of other trade and business associations; holding national-level business plan competitions; and conducting commissioned researches.

In the knowledge society, it is crucial to provide support for information and knowledge exchanges on a wider scale. Some of the activities planned for execution in 2008 include:

- building a three-tier "knowledge team" consisting of IIT Roorkee (IITR) undergraduate, postgraduate and research scholars from different branches;
- initiating some of the knowledge management applications in IITR;
- building a knowledge network consisting of academic institutions, industry and government institutions across India by encouraging IITR students to become involved in projects with students from other academic institutions, alumni of IITR in industry and alumni of IITR in government institutions.

The three-tier knowledge team will be formed with the objective of motivating and grooming them to take leadership roles in the knowledge economy and knowledge management initiatives. The first rung of the three-tier system will comprise students who are acquainted with the project proposal, the Glossary of Knowledge Economy and Knowledge Management, and so on. Students will rise to the higher rungs of the system based on their aptitude, performance and skills through a selection process. In the final selection stage, students will be chosen to lead independent projects.

A weekly wall magazine will be brought out by the knowledge team to present its own views about the knowledge society, the knowledge economy and knowledge management. It will also be a medium for putting across the knowledge team's achievements and intentions to the rest of the students in IITR, and will act as a platform for bringing to the forefront readers of the wall magazine who show an appreciable understanding of these subjects.

With a view to forming a nationwide knowledge network with IITR as one of the knowledge nodes, students will be encouraged to undertake projects with friends in other institutions from academia, industry and government, to meet and interact with stakeholders from these institutions and to share their experiences with the others.

Conclusion

With the transition from an industrial to a knowledge economy, scientific research, innovation and networking have become the key drivers of economic progress. The development of any economy is therefore a collaborative process involving government, industry, the academic world, research institutions and society at multiple levels. The efforts of IIT Roorkee to create awareness about the knowledge economy, to design a model for synergetic collaboration and to carry out research are a few steps in this direction.

Panel Discussion 1

Panel Discussion 1

Moderated by

Raj Datta

Vice-President for Knowledge Management, MindTree Consulting

Raj Datta: There is much talk about knowledge management as people try to make sense of it. What is this beast, really? People are asking about what frameworks they can adopt. Certainly, the IT industry is known for the Capability Maturity Model Integration (CMMI) framework, which has been adopted widely in the industry. So, the question is very common: "Is there a framework?" Another related question is "Is there a standard?" Are we ready for a framework or a standard? And which are some of the leading contenders?

Ron Young: Let me deal with standards first. For three years, I chaired the British Standards Institute (BSI) Committee where we were exploring knowledge management standards. The BSI came to the conclusion that knowledge management was a rapidly evolving discipline and would be so for quite some time to come. I think we have just started the journey. It is a continuing journey but, in 10 or 20 years' time, I think we will be quite pleasantly surprised by the progress that we have made today. The BSI decided that what were needed were not standards but clarity, informed clarity. The role of standards institutions in the world should be to provide some informed clarity, because each organization needs to look at things in the context of its own organization, its own issues and its own problems.

As far as a framework is concerned, I must definitely say that a framework is extremely helpful. However, I do not like the idea of a single framework, preferring the idea of situational frameworks. A framework for specifically implementing something could be quite different from a framework that looks at the entire organization and its knowledge assets. I think of a framework that is situational across the industry sectors. Some of the frameworks I have seen are excellent, but I would not want to choose any single one. I have worked with the European Commission on this matter, and its critical review of the best frameworks around the world came to the conclusion that you should look at the best holistic frameworks, the best implementation frameworks and so on, but you should also look at them within the context of your own organization.

So, I would say that, as far as standards are concerned, no, we are not yet ready for them. Informed clarity, yes. Also, I am not sure if we will really ever need standards. I may be wrong, though. On frameworks, most definitely they are useful, but make them situational.

Rory Chase: I would agree with Ron on this. In the late 1980s, I was involved in quality management when the British Standards Institute was setting up the BS 5750 standards, which

eventually became the ISO 9000 standard. There was certainly great value to standardizing certain quality management procedures. The BSI still thought that it could then create something that was grander than total quality management (TQM). But the very fact that it put "management" into this term and then tried to create standards from it turned out to be a disaster. People ask, "Can you manage quality?" It has now become a seniority issue rather than a quality issue. I think that the analogy is very similar to knowledge management, where you find that there are guiding principles that are very sound – processes, procedures, mapping and things like that. But to assume that some things will work universally in all cultures, in all companies, in all industries is, I think, an almost impossible or fruitless exercise.

I have been looking at leading knowledge organizations for almost 20 years now. To my mind, the very best organizations are the ones that have developed their own way of doing things. Yes, they have borrowed; they have looked; they have adapted things. Whether it is the HP way or the Toyota production system, these companies have eventually created something that works for them that is superior to what their competitors have. I think that, rather than chasing after standards, you should look more at the principles at work within your company.

When we developed the MAKE framework in 1997, we looked at all of the very best frameworks at that time. The smallest number of identifiable elements in a framework was four and, if I remember it correctly, the largest was 34. But when we looked at all the elements and consolidated them, we found that only eight elements tended to be found almost everywhere. So, my belief is that, if you are just starting, forget about standards. Look at the organizations that you admire, examine how they are doing things and what elements they use. Then you can create something that is your own. The pioneers are the ones who learn from experience; they gained from their own mistakes. They usually are better at whatever it is they are doing at the end of the day.

Question: If knowledge management is a continuing journey, then how does an organization know how it is maturing and going up in the scale of implementing knowledge management for delivering value?

Rory Chase: We study MAKE winners to see how they started implementing knowledge management. We have found that, at the very best levels, they go through about four to five cycles.

Before they start the knowledge approach or strategy, there is an investigation step. They spend about one year with a small team of people talking about what the organization really needs, whether it might need knowledge sharing, or it might need knowledge creation, or it might need knowledge re-use. So you certainly have to understand what the strategy of the organization is, and knowledge management has to be aligned to that business strategy. If the two are disjointed, it will be a failure. KM has to support the organization's overall objectives. This takes about one year.

Then there is a first cycle that takes about two to three years. This is the introduction to the organization of the concept of understanding knowledge. There is training involved; there are some early knowledge initiatives; there are some ways of measuring things to see how well they are doing. Probably about 30–40% of organizations never get past this point. For a number of reasons, the initiative fails, the approach fails and they go on to something else, whatever is the new management buzzword at the time.

At the end of this cycle, there is a period of reflection ("How well have we done?"). You also

tend to find that some of the early knowledge team leaders are either moving on within the organization or leaving it. So, there is actually some knowledge loss as the knowledge leaders themselves leave. At this point, the organizations say, "we have done some of the easy things, now we have to start doing the more difficult things." This is almost a kind of re-energizing yourself, thinking about another set of challenges to introduce because, by that point, senior management want to have definable, measurable bases in place. They want to know if what they are doing is really paying off.

After Years 4–6, we see another cycle of more training and more, and increasingly difficult, knowledge initiatives, embedding KM into more places. In Year 6, there is again a period of reflection for most organizations. It becomes interesting because two things tend to happen. First, many members of the original knowledge team have left. So, it is almost a case of having to create a whole new knowledge team again. Second, in many organizations the senior management have left, and this is a very difficult time. You might have had a supportive president, CEO or managing director at the beginning, but the new executive who comes in might have a different set of objectives, and you might not have as much support. Also, a lot of organizations lose their way at the end of Year 6 because their senior management have different objectives. It is very difficult to go forward without this particular support.

If you are able to get executive support during Years 7–9, this is when you really are embedding knowledge management across the organization. You have broken down the silos; you are transferring knowledge capabilities across the divisions; you are embedding them in line with the business. You are also starting to take on areas such as building brand value and really doing intellectual capital management – very sophisticated KM activities. If you have done all of these things, you have already been through three three-year cycles. When you reach Year 10 and everything is working then, you have probably succeeded in establishing a knowledge organization.

You will now face another set of challenges. We tend to find that those are the three identifiable stages and that you have to prepare for setbacks at any point. It is not smooth sailing all the way. The flip side is that, although it can take you perhaps 10 years to build up a world-class knowledge organization, our research shows that you can undo everything in less than a year. You may have a poor senior executive and he may make a bad decision. If a new technology comes along that you are not prepared for, then it destroys your business plan. When we look at our MAKE studies, we find that only very few organizations can maintain KM leadership, year in and year out, decade in and decade out. This is a real achievement and a real tribute to all of these organizations that they can keep at the top of their business over the years.

Ron Young: I support that entirely. Now, what occurred to me as you were talking was that you do not have to reinvent the wheel. Although we are saying that it should be something unique to the organization, there are also some measurement tools and there are phases that are common. There are maturity model measures that you can take to see how you are capturing the different kinds of learning and insights, how effectively you are storing knowledge, how effectively you are sharing, etc. They are all available.

What also occurred to me was that, instead of standards, if we are looking at critical knowledge assets, we know very well that people are and always will be the key knowledge assets. We know that processes are knowledge assets. We know the technologies that support and enable our knowledge assets, as well as the policies and the strategies. But, increasingly, what has happened over the years is that we have identified the critical knowledge assets for each industry sector. For example, we know what the critical knowledge assets are for the

telecommunications industry. We know what they are for the banking and finance industry. We know what they are for the pharmaceutical industry and the agricultural sector. Therefore, as a starting point, I think that it is good to look at the critical knowledge assets in your organization within your industry sector. Then you can look at the phases that Rory has outlined and then at some of the measures. There are different measures for each of those phases that you can use to see how effectively you are starting this knowledge management journey.

Rory Chase: One thing that we have done for organizations, which I find quite interesting and which I think can be effective, is a self-knowledge assessment using the MAKE criteria. What we suggest is that they randomly select a group of employees, various job functions and various places and locations. They must have statistical numbers to make a good study. We present the eight criteria for the MAKE study. Sometimes we translate them into the local jargon so, rather than ask about "innovation," we ask "How well do we continually improve our processes?" The wording can be changed, but it will still mean the same thing. We ask this sample group of individuals to rate their organization on a scale of 1 to 10, which is what we use in the MAKE study. Sometimes people are a little bit self-critical and sometimes not. But what we tend to find is that, if this is done on a regular basis, then you can see if there are particular job functions or particular departments or regions that are resistant to knowledge management. In a way, this will give you some indication of where you can begin to identify critical barriers that you might have to address.

We are working with a large non-government organization in Asia at the moment and it has done three annual studies. One of its biggest problems is that it is a very bureaucratic organization where change does not happen easily. But the outside world is forcing this organization to make rapid changes. We have noticed after we have done our studies how many of its professional managerial staff rated their company very low in knowledge management. What this is telling us is that it is resistant to change. There are individuals who have spent 5, 10 or 15 years in the organization who have built up their expertise and reputation. Now they see it being taken away, because what knowledge management does is make many more people become experts themselves through social networks and other things. In 2008, what we saw was that the NGO's scores actually fell. When we were advising the senior knowledge leadership team, what we said was that this organization is facing a serious difficulty. Although senior management are very supportive and the knowledge workers want things to happen, this large group in the middle is resisting. They are resisting change dramatically, and if no implementation strategy for training and for learning is set in place, this organization will either lose most of its professional staff or simply give up on knowledge management.

So if you do periodic assessments – it does not have to be up to the fifth decimal point – these will give you an indication of where people, groups or divisions are just not receptive and then you can address those issues. If you do not know where the barriers are in any implementation process, how can you ever overcome them?

Raj Datta: Here is a written question: "We understand knowledge sharing; we understand knowledge dissemination; but what exactly is meant by 'knowledge economy'? Please elaborate."

Rory Chase: I think that the knowledge economy stems from the fact that ideas now have a value. In the old days, in the industrial age, you took an idea and you made something physical from it and then you could sell that as a good. We have moved into an era where ideas now have a value. It could be a book or a patent; it could be a new way of doing something, like eBay or Google or Facebook. I think that what we are talking about is how we can combine different experiences, lessons learned and best practices in a way that adds value. By adding

value you can create wealth, whether it is individual wealth, organizational wealth or societal wealth. Vis-à-vis ideas, land is now less important, machinery is less important.

Ron Young: I can give you a couple of examples. At a knowledge management conference, a Shell executive was saying that, if you asked Shell's employees 15 or 20 years ago what business they were in, they would say "We are in the business of oil exploration, oil refining and oil distribution." But if you ask them today what business are they in, they will say "We are in the business of having the best knowledge of oil exploration, the best knowledge of oil refining and the best knowledge of oil distribution." We may or may not do all those things, but what is of increasing value to us is having the best knowledge of whatever it is we are doing. This is what happened to General Motors, too. They would say something like "We used to be in the business of making motor cars. We have not made motor cars for years now. We are now in the business of acquiring the best knowledge in the best designing of cars, the best knowledge in marketing cars and the best knowledge in manufacturing. We do not do all these ourselves but we have to have the best knowledge, the best knowledge in servicing and supporting." What these organizations are saying is that they are increasingly putting far more value on knowledge. Knowledge underpins everything they do and knowledge is their value.

We are not belittling manufacturing or the other things. We are simply saying that knowledge is coming to the forefront as a very high-value product. We used to be in an economy that was about creating things and selling them. Now, the knowledge economy is about creating best knowledge and applying best knowledge profitably or providing value for the common good if we are in a public organization. I think that the characteristic of a knowledge economy is how many people are employed and earning their living or creating companies and making profits around creating and selling knowledge. More and more are involved in this business. This is what I think we mean by a predominantly knowledge economy; it is a situation where most of the wealth is being created through our ability to create and effectively or profitably exploit knowledge.

Raj Datta: An analogy I want to draw is that the raw material here is knowledge or ideas. The work process itself is knowledge-based because we are inputting knowledge; we are transforming it; we are applying it; we are collaborating towards creating new knowledge. In many cases, even the finished goods happen to use knowledge. As I see it, if we look at the constituents of what creates economic value, we find many intangibles – knowledge-centric intangibles – creating value. The difference from industry is that here we are talking not about physical resources that are depleted when they are used or transformed, but about knowledge resources that actually multiply. Knowledge equity has a multiplier effect, as opposed to the depletion effect in industry. And so, this whole area of knowledge economics is actually an interesting area that has been emerging in recent years.

Question: There is another phenomenon that is happening outside the organization. Ron mentioned Wikipedia in his presentation, where people are sharing knowledge without any economic benefit. Knowledge is becoming universal. Knowledge that is now at a premium in an organization may become universally available in the years to come. In that case, what will be the scope or what will be the fate of knowledge management?

Ron Young: That is a very good question. If you look at the Wikipedia example, it is telling us a lot of things about why people share. Most of our discussions about why people do not share are within corporations or within organizations. But now, with the new participative technologies on the Web, we are seeing lots of examples where people are passionate about sharing. Facebook, YouTube, MySpace and Wikipedia are all examples of sites where people

do want to share. Why do they want to share? Much of it has nothing to do with money; it is about learning and the recognition of your peer group and community and things like that. I was also wondering whether the open source movement would apply more generally. One of my great interests is in open source knowledge and knowledge come-ons that are starting to appear, or knowledge for the public good.

Once upon a time you could go to any place in America and get as much coffee as you wanted to drink. Now, we go to Starbucks and we pay a lot of money and we do not even pay for the commodity, the coffee beans. The beans are almost free because what we actually pay more for is the ambience, the experience. Many people say that we are not really in a knowledge economy, that we are actually in an "experience economy," which is about creating value in experiences. So, I wonder if we are going to see more and more knowledge openly contributed and volunteered by groups all over the world, but adding another form of value to it that is experiential nature, as well. This is a very challenging issue. I think nobody knows the answer, ultimately. I am very interested in why all these people want to go to Wikipedia and work into the early hours of the morning to do this. And yet, in some organizations, people are very protective of their knowledge because they think that their knowledge is their value and their power. If they share their knowledge with others, they will have no more value as individuals. These are issues that are facing us all.

Rory Chase: I think, as a general observation, that certainly there is going to be more transparency. With greater democracy in the Internet, organizations will become more transparent, whether they wish to or not. With the globalization of the open source of knowledge, you are going to find more pressure groups. This could be a negative thing or a positive thing. Certainly, for organizations, the boundaries will become less defined; we will have more partnerships and alliances and fewer of the very strict organizations that we have seen in the past.

This raises the question of commercialization. Some individuals would argue that there should not be a commercialization of the Internet. They say, "Look, knowledge is free, therefore we should create structures that provide education and all sorts of services also free of charge." It does seem though that, by nature, people do like to make money. There will be ways that, even with free systems, you can still commercialize. One of the big arguments against Wikipedia and the newly introduced Wikia, a search engine, is that there is inaccurate and sometimes false information on it. You have to build up monitoring mechanisms so that people cannot put false information on it. On Facebook, MySpace and other sites like these, advertising is now creeping in, although it is subtle. There is a movement among open source people who say, "No, keep that out; we do not want any commercialization."

I still think that, in terms of general business practices, there will always be people willing to buy things that are customized, exclusive and validated. So, even if something is freely available (like Wikipedia information), one might be prepared to pay an organization to verify whether this information is correct and up to date. I think there are going to be some subtle changes in the near future and probably greater changes to come. But the model is creaking a little bit in terms of capitalism. However, I think this situation is still going to be around for a few years.

Raj Datta: In the open collaborative process, what matters is that people want to get noticed and they want to get noticed for their ideas. Partly, it is individually driven. Why do people blog? Why would they want to get noticed? Basically, they want to link up with others who might want to engage in a discussion, either positively or negatively. But they are also building a reputation with their peers at the same time that they want to be admired for, essentially, what they are sharing. So that is one of the motivations behind what we are seeing and why I

think that we are completely missing things if we say that people only need to be motivated. They are already intrinsically motivated. There are too many examples out there which point to that.

We actually have to look at the whole community spirit as building some kind of a social movement. Any open source project, essentially, is someone's idea that is meant for something or they are trying to create a movement around it. And Wikipedia is no different from that. So the building of a community spirit itself is of a high value. These days, economic value no longer means just buying goods and services. What is happening is that it essentially is translating a lot of these intangibles, which include things like reputation, a feeling of community and a sense of identity. Because of this, the very soft aspects are coming to be interesting significant transformational changes in the way people are doing business.

Rory Chase: Some of the work that I do includes being editor of a journal, *The Capitalist*. GDP today does not necessarily equate to intellectual capital. The OECD and other organizations are starting to create indexes of countries' intellectual capital and I think that, in the not too distant future, what we will see is countries being ranked by how smart they are. Then money will start to flow to countries that have very good educational systems and very good innovation systems.

Question: Who are the role models for world-class knowledge organizations in the business sector?

Rory Chase: As I said, it is very difficult to stay on top year after year. I think only three organizations have remained in the top 10 globally, and they are Accenture, Ernst & Young and Microsoft. What is more important is whether an organization is increasing, or is not decreasing, its knowledge capabilities. Certainly, companies such as Samsung, Tata, Infosys, Wipro and Satyam are increasing their knowledge capabilities. What you are looking for in an organization is its rate of change rather than its individual ranking. We are looking for organizations that are able not only to absorb but also to accelerate their transformation processes on knowledge.

Question: How can we draw a distinction between information that we can share and information that we wish to keep highly confidential?

Ron Young: That is a very good question but I am not sure I can answer it. We tend to think that we have to share everything. But good knowledge management is knowing what knowledge is best to share for good reasons and what knowledge should be better protected, also for good reasons. This comes back to the issue of "Is knowledge a competitive asset?" There are problems as well, because knowledge sharing is all about collaboration but we are also talking about competitiveness. So I think this is a strategic issue. I think an organization needs to address this matter carefully.

One tool in a consultant's diagnostic toolkit that I rather liked is called a knowledge-sharing risk assessment. It simply looks at an organization's key areas of knowledge and does a quick risk assessment of the benefits of sharing them. What are the problems and issues? What are the benefits of protecting them? I do not think organizations are protecting well enough yet.

Knowledge sharing actually is a paradox, in that knowledge sharing seems selfless but it can also be quite selfish. In sharing, knowledge expands, as we have heard Raj say. It is not necessarily about who has the finer idea or who has the best insight or who has the best learning. There is something even more powerful than these, and that is when people beget ideas from your

ideas or they are learning new things about your learning. In this way, you can gain very much from the amplification of knowledge. It is selfish as it is selfless. I think we have to be quite strategic in identifying how we are going to manage our best knowledge.

Raj Datta: One of the best-known MAKE winners is Google; and you will not find what its algorithm really is. Nobody can find out what Coca-Cola's formula is. Although Google is into sharing quite openly in many other ways, at the same time it is building a competitive advantage as well.

Question: The knowledge management trend has been quite strong in recent years, but do you think that it will last, and what will come next? In other words, is it just a fad or is it going to be sustained?

Rory Chase: It is interesting that knowledge management did not start in the consulting world; it did not start from academia. It started from an observation of a requirement for competitive advantage in business. "Knowledge" and "management" probably are not the best two words to put together. Many people have a lot of problems with the term "knowledge management," especially in the United States and Europe. In fact, many organizations in North America and Europe no longer use the term. They would prefer innovation and organizational learning, collaboration and knowledge sharing. In Asia, on the other hand, the two words do not seem to cause any problems and "knowledge management" is commonly used for what we call knowledge activities. It is also interesting that in academia this is the term used. So, if you are looking for degree programs, this is the accepted term. Because of academia, if not for anything else, the term "knowledge management" will be around for a long time to come. I suspect though that, in the real world, "knowledge management" will not be used as often. I think that better words will come along. It is not that the principles are bad, it is not that organizations will not use the tools and techniques and the methodologies. We might still be talking about knowledge management over the next 10 years, but by 2050 people will be using a different jargon – although it will still refer to the same things. It will still be about how we make decisions, how we come up with more creative processes, how we get customers to buy our products and how we increase the standard of living for our citizens. Those things will remain.

Ron Young: I think it was the Danish philosopher Søren Kierkegaard who said, "Once you label me, you negate me." This is one of the problems we will suffer from because, as soon as we put a label on to something very important like "knowledge management," suddenly somebody asks, "What is knowledge?" People will start arguing about what knowledge is and what it is not, and what the difference is between information and knowledge, and all these sorts of discussions.

In the 1980s, I was very much involved in time management. Now people say, "Ah yes, time management, that is a fad that is now over. We have done that, we have attended the time management course." But, I say respectfully, we are worse at managing our time today than we were in the 1980s. The reason is that we have more things to cope with – like we have to cope with the global day. "Oh, information management; we have done that. It happened in the 1990s. Now, we have information overload, chronic information overload and more stress than ever before." "Ah, process innovation; that was another fad." In fact, very good work was done on identifying and being able to work more innovative processes. But, suddenly, we have moved on and now we are in knowledge management. This is the buzzword for the day.

I will come back to what I said in my presentation, that there are some basic timeless evergreens.

Knowledge will always be around. If there is one thing that I can be certain of, it is that, in a hundred years' time, people will still be interested in how we can better create and apply our knowledge. How can we better make use of our time? How can we better distribute our information and manage it? So, yes, knowledge management may be perceived by some people around the world to be a fad. But I have faith that we will realize that knowledge is something that is an evergreen, a perennial for all the people. I do not think that it is a fad at all.

Where is KM going? That is a big question. What actually happens next, in my opinion, is that we will realize that these evergreens, these timeless principles about information and knowledge, process and people, all need to come together.

We brought time out and put it in the spotlight. We took processes out and put them under the spotlight. We took information out and put it under the spotlight. But as soon as you pull knowledge out into the spotlight, it becomes vulnerable. "You label me, you destroy me." We need to look at the evergreens and understand them, but then put them back as part of a holistic approach. I do not know what we are going to call that, but personally I believe that management will be interested in all these things, integrated into a more holistic approach. I certainly do not think it will disappear.

Rory Chase: Just a small addition. I have worked in business for 35 years now and it is my observation that, just as individuals may have memory losses, organizations have memory losses too. There are organizations that used to be experts in various aspects of business that may find that, after a few years, they have forgotten how they do things. I was involved with benchmarking back in the late 1980s and early 1990s and there were then some organizations that were very good at benchmarking. And yet, 10 years later, they would have no corporate memory of how they did a benchmarking exercise. Sadly, this is going to be true of knowledge management, too. There will be organizations that are very good today at all these things that we are talking about, but 10 years from now they themselves will be going to consultants and academics saying, "We do not know knowledge sharing very well; can you help us?" So, there is an ongoing cycle of learning and forgetting. As you say, the labels change, the ideas, the words, but it is just a human process that we need to deal with. Thus, in this sense, the cycle is eternal.

Raj Datta: One way of looking at that process of forgetting is that human capital was not converted into structural capital. When human capital walks out, you are left with consultants. But this is okay with some of us who are consultants.

Question: How is customer knowledge managed in KM implementation in an organization?

Rory Chase: This particular area is one of the weakest when we measure organizations. Many organizations focus on customer delivery and customer satisfaction, but they do not actually engage the customer to the degree that allows them to forecast needs, wants and desires. In working with customers, you have to have customer-focused groups that really involve customers. Managing customer knowledge is usually a hands-off matter for many organizations, often limited to trying to extract some bits and pieces of ideas to use for their own commercial gain. Really excellent organizations, in contrast, work in partnership with their customers to a degree where they understand what is going to happen. It is a kind of sharp technology jump or a new thing that they actually worked through.

I will give you an example. A company called Hallmark in the United States makes greeting cards

that you would send on birthdays or anniversaries. It is a US$1 billion family-run organization; it is probably secretive too. A few years ago Hallmark decided that it would create a little focus group on the Internet and it would ask these people questions about how they liked the designs of cards and whether they would pay this amount of money for a greeting card. It did this thinking that it could control this group and use it as a focus group. What it found was that, very quickly, this group took on a life all its own. The members started to interchange comments with one another; they sent pictures of their children; and they started creating a social network. But one of the things that Hallmark did not expect was that people started designing their own greeting cards and sending them to Hallmark. They were saying, "We do not like your greeting cards for birthdays, here is a much better idea," and Hallmark started to agree. It found there is a whole pool of talented artists and graphic designers who, for no cost at all to Hallmark, were sending it designs for greeting cards. And I think that Hallmark said it was saving something like US$50 million a year because its customers were designing their own greeting cards.

What was even better was that the customers starting sending ideas for a whole new range of greeting cards, things that Hallmark had never even thought about. For example, in the United States there is a high level of divorce so it is not uncommon for a child to have four, five or six sets of grandparents. And, many times, the grandparents get separated from the children; they do not see them at all anymore. So some people said, "Why don't you have greeting cards for grandparents saying: 'Happy Grandparents Day' or 'I Miss You, I Haven't Seen You for a While'?" Hallmark took that on board and that is now a US$150 million business. Not only were the customers improving on the current product lines of Hallmark, they were actually creating new product lines at no charge. Even if they had signed away their intellectual copyright, the customers still seemed to be happy with the outcome because they were getting the recognition for designing a card. What Hallmark did was to make sure the person who contributed the idea got his or her name on the back of the card – "Designed by . . . of the Hallmark consortium."

This was customer interaction that was actually creating new businesses for Hallmark. This small story shows how you can actually get to a point where the customer is working with you and for you, and you are not merely seeing a customer as just an object for a sale.

Ron Young: I will just add a short story to that. I worked with General Motors in the early 1990s when it was very concerned that it was being perceived as a fear-based, coercive organization that did not think customers existed. In fact, it was so coercive that it would say to the dealership, "If you do not sell enough motors this quarter, you will lose your franchise." And GM asked, "How can we become more customer-focused in what we do?" And it decided to launch an initiative in Europe, starting in Scotland. What it decided to do was to get blow-up dolls, a man and a woman, to represent customers. In every meeting that it had, there would be two extra chairs around the table for them. The blow-up doll man was called "Bruce" because that is a really popular Scottish name, and the doll woman was called "Brenda." And, throughout General Motors, Scotland, for a period of six months, people had to have a Bruce and a Brenda at the meeting table. In every discussion and in every decision, they had to look at the dolls and say, "Now what do Bruce and Brenda think they need?" And it seems to me that we just need to ask the customer more than what we want, and it worked very well.

Question: According to our understanding so far, knowledge management basically means identifying the knowledge available in an organization at different levels, collaborating and applying this knowledge. In different terms, total productivity management, total quality management and other similar concepts and initiatives also mean involving the whole workforce

and using their knowledge and potential to create improvements. Learning and improvements are documented and shared as assets. How is knowledge management different? How is it different from TPM or TQM?

Ron Young: This is the point that I was trying to make earlier. They are not separate. They are all integrated. We may pull knowledge out and have a look at knowledge, and we may pull quality out. Through quality management, excellent work is done in identifying errors that occur in a process. In knowledge management, we look at knowledge gaps – the equivalent of errors. I think that it is not good to look at these as separate or different. They should be integrated. There is a lot of good work in quality management process innovation and knowledge management working together. We should not pull them apart so much – only to the point that we can understand them and then put them back together again.

Rory Chase: I would suspect that the person who asked the question is a science teacher or an engineer. There is also a difference between men and women. I have to be careful about this because I may get into trouble. But I think more men are left-brained, analytical and process-driven and, as a result, they tend to be critical of knowledge management. When I am talking to groups, I get more questions from men about process, how it relates to quality and how it relates to various tools and techniques and metric issues.

What the very best organizations do is to move one step higher than the process level. They are looking at what are called value chains or knowledge chains. What they are saying is, "We can do some processes very effectively, efficiently and in a timely manner, but these processes may be costly to the organization if you are looking at value chains or knowledge chains in the entire organization." You can then start to say, "Why do we need to do this thing when it is not adding value to the organization?" So I think that, when you are looking at the quality management tools and techniques that you describe, that is only one part of the portfolio. Knowledge management brings you to almost a higher level of the holistic thinking that Ron was talking about – the organizational value chains and mappings.

Many times when an individual is asked to document, report or photograph a process, I think a key to future success is going to be what we call "dynamic knowledge." Knowledge is changing and moving; it is like Wikipedia. It is not the quality report that you update every month or six times a year, but it is knowledge being changed instantaneously across the entire organization; it is the dynamic nature of the processes and the chains. The value chains, I think, are an unexplored area for many organizations; they can be very useful when supported by all the tools and techniques that were mentioned.

Question: What should be the basic preparedness, the take-off point or the maturity level for initiating KM in a multidisciplinary managerial consulting organization? In other words, how do we know we are ready to initiate KM?

Rory Chase: By definition, a consulting organization is almost pure knowledge work. So, you are already ready; that is not even a problem. I think the question is, "How do you take tacit knowledge from the consultants and put it into the organizational memory?"

McKinsey and Company may be the very best business management and consulting firm in the world. It was the number-one-ranked global MAKE winner in 2007. We spent a lot of time looking at the organization and how it works. It seems that the way McKinsey works is that it hires the very best knowledge workers in those fields. These are very competitive people; they are very intelligent people; they are very ambitious people. Although they talk about

team playing, they still want to be individual stars. So what McKinsey does very well is that it actually forces the consultants every step of the process to take tacit knowledge and convert it into organizational knowledge. For example, new hires are assigned as researchers or junior assistants to the partners of teams, and so they spend a lot of time understanding how the McKinsey knowledge databases work, how the various best practice things work. They are grounded on that. If they are lucky enough to survive the first couple of years, then they are promoted to be a part of McKinsey and Company. As part of their job performance review every year, they have to demonstrate that they have shared knowledge with their colleagues. They actually put knowledge into their asset banks. Every year, 12% of McKinsey consultants leave the company. Therefore, either you move up or you get out. It is very much part of the McKinsey model that you have to do this knowledge sharing and collaboration or you will not be a McKinsey. Even when you get to be a partner or a managing partner, you are still expected to write papers or articles for the *Harvard Business Review*, the *Wall Street Journal* or various knowledge publications to demonstrate thought leadership to all the rest of them. They are increasing the asset bank of McKinsey.

Really, the thing about McKinsey is its global reputation, so that, when it goes to a company, the company does not even have to ask who or what you are. The reputation of McKinsey is already out there. This is where a lot of the smaller consulting companies have a difficult time, because they still have to demonstrate that they have the knowledge resources, capabilities and abilities that are needed. If you spend half of the interview session trying to demonstrate that you are as good as McKinsey, you have probably lost already.

So McKinsey is using this very disciplined way to extract knowledge from its consultants and, even if the consultants leave, they are most likely to be hired as chief executive officer by one of the Fortune 500 companies and they have a previous relationship with McKinsey. They are referred to as the McKinsey alumni group. That is how the McKinsey model works: they have very bright, very well-educated, very clever, very ambitious consultants. They really force them to be team players to transfer tacit knowledge into organizational knowledge. That is what works with McKinsey, and I think also for most of the major consulting companies. It is not really a touchy-feely "we hope to share knowledge with the world." It is too competitive for that, at least at a high, multidisciplinary consulting level.

Ron Young: Absolutely, knowledge is their business. It is no surprise that the management consulting firms were the first to look at effective ways to manage their knowledge better. With McKinsey, I particularly liked it when it says "You no longer buy a consultant when you buy McKinsey; you buy the entire knowledge of McKinsey through our consultant."

Managing consultants, we are told, is like managing a herd of wild cats. It is very difficult to extract the knowledge that they have. But things change once there is a realization that there is a better way, that we can move from managing our knowledge as individuals to more collectively and systematically managing knowledge as an organization. But that involves having the right strategy for the consulting firm. It has to decide what is most important. Is it better for us to concentrate on creating new knowledge? Would it be better for our organization to be more innovative? Or is it better to be more focused, like HP? They have so much knowledge from around the world and they simply want to focus on the knowledge that they know best. To me, the key to when an organization is ready is when it sees the benefit and wants to move into collective and systematic ways to create, share and apply knowledge.

Rory Chase: I think it is not a surprise that in the health sector and in the education sector, especially at the university level, we do not see this sharing. You have very bright people or very

capable people, whether consulting surgeons or key academics in departments, but you do not have the "consulting capitalistic discipline" in these two areas. That is why there are very few good examples of knowledge management working well in academia or in the health services. I think there are great opportunities here, if only you can have the universities working on a more collaborative basis. When you talk about collaboration in universities, for most of the university professors I know, "collaboration" is a difficult world. There are many things going on in universities that are not collegiate and not knowledge sharing. I think if one were able to harness the corporate knowledge capabilities of academia, hospitals and the health services, it would have tremendous benefits across all of society.

Question: Mr. Krishnan of NPC was saying that the GDP from agriculture is only 2.7%. What can we do to increase knowledge management in agriculture and in the rural sector to increase the GDP of agriculture?

Rory Chase: What we have found in the studies that we have done is that, if you agree that we live in a knowledge economy, improving the standards of living of societies is based upon generating wealth from the application of knowledge. Our observation is that in Asia only a few sectors are applying knowledge principles. For India, for example, only eight sectors lead in knowledge management. You do not find agriculture there. So if I were going to prescribe something, first I would suggest that national governments have to understand the importance of creating a national knowledge economy. There needs to be direction and guidance, not necessarily just in information, communications and telecommunications, but across a whole range of people and technological issues. What any country needs is to have role models and leadership across various industries, because, with agriculture especially, people will say, "Who shall I go to?" And you cannot give them an example. And so, if you have the role models and the leadership, that allows people to start benchmarking and to share best practices and start pulling everybody up. It takes a while to develop effective programs. I truly believe – and this is a personal belief – that it is education that is most important. When you look at the leading knowledge economies – and this is very interesting – they tend to be the smaller countries. They tend to be island countries for that matter. If you look at their national statistics, they tend to have very good educational systems, high literacy rates, all sorts of things that deal with the educational capability of the society to change, to be able to adapt, to be entrepreneurial. So, I think, two critical issues for Asia are to adopt national policies that encourage the country to understand what the knowledge economy is, and, secondly, to put money into education so that you have the brightest and best kids possible.

Raj Datta: Well, that brings us to the conclusion here. I would like to thank everyone in the audience for the diversity of their questions and comments and, of course, special thanks to both Rory and Ron. We have all been enriched as well through the interactions and the power of conversations.

Technical Session III:
KM Networking

Chapter 8

Knowledge Management Framework: An APO Perspective

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In his address to the International Productivity Conference in 2007, the Secretary-General of the Asian Productivity Organization (APO) said that the most relevant tool these days is no longer quality control or quality management. Today, it is knowledge management (KM); and value creation is the most relevant issue in this context. This is one of the strategic thrusts of the APO and the reason we want to develop this is to provide a generic framework for the APO member countries in the implementation of KM.

We started the development of the framework in September 2007 in Manila. We had representatives from various countries besides the APO, including China, India, Japan, Malaysia, the Philippines, Singapore, Thailand and Vietnam. We had Mr. Prakash from the APO, Dr. Chen from the National Taiwan University, Prof. Nangia from IIT Roorkee , India, Dr. Takanashi from Japan, Mrs. Rokiah Aziz from Malaysia, Dr. Manugue from the Philippines, myself from Singapore, Dr. Praporn from Thailand and Mrs. Vu from Vietnam. The participants were practitioners as well as academics, giving us a good perspective from several fields. We developed a framework that is applicable and understood by all APO member countries and can be applied by any country, regardless of the industry and the level of KM maturity. It is a generic framework and it went through several revisions after the first draft in September. The final version was produced in March 2007 in Kuala Lumpur.

The framework is intended to help explain the KM domains and how to implement them in an organization. The framework is a concise description of the major elements, the concepts and the principles that need to be considered when implementing KM. It is not really a prescriptive approach; it is generic and flexible enough to be context independent. As such, it can be tailor-made for any organization.

We also had a fact-finding mission in 2007 to the USA and the UK, and one of the things that we found out was that there are many case studies and best practices when implementing KM in relation to large organizations. However, we did not find enough examples for small and medium enterprises (SMEs), so we thought that it was appropriate to focus on the framework and implementation approach more specifically for SMEs – how they can implement KM.

One of the first things we wanted to do is to define KM. In the process, we realized there are very many different definitions of KM and no one agreed definition. We wanted to come

up with an APO definition that would be more aligned to the APO's mission and its strategic thrust. This is what we came up with:

> *"KM is an integrated approach of creating, sharing and acquiring knowledge to enhance organizational productivity, profitability and growth."*

The key term here is "integrated approach." This means that it is multidisciplinary. We need to consider the people aspect, the process aspect and the technology aspect. We have to arrive at a holistic definition focusing on productivity, profitability and growth. Initially, we used the term "socio-economic development." This gave rise to a lot of debate over the fact that, for SMEs, socio-economic development might not matter much. What are important to them are profitability and growth, so we changed the definition to include these two aspects as well.

The feedback we received included the need to come up with a simple tagline definition so that SMEs can easily understand what KM means. Thus, very simply, KM is defined as "using knowledge to increase productivity, profitability and growth."

Then we worked on developing an APO KM framework. In thinking about the APO framework, we looked at various other frameworks – from the American Productivity & Quality Center (APQC), from Europe, from Australia. We tried to incorporate some of their elements in the framework that we have developed. The framework we have come up with essentially conveys the basic elements in KM. Its starting point is the vision and mission of the organization. What are the specific objectives and goals for the organization? KM will not succeed if KM is implemented for the sole purpose of doing KM. KM needs to be aligned with the organizational vision and mission, which set the strategic direction for the organization. It is important to determine the critical knowledge that the organization needs to make it different.

The framework model has three levels (see Figure 8.1): the accelerators, the knowledge process and the outcomes. We use the term "knowledge accelerators" because an accelerator is really a combination of both drivers and enablers. The common term in most literature is "enablers," but we thought that "accelerators" would convey the message more clearly, because accelerators speed up the KM initiative in the organization.

Figure 8.1 The APO KM Framework.

We have identified four accelerators: leadership, people, processes and technology. Initially we had something like eight levels. Then we simplified things to focus on just these four accelerators. Leadership is the driver for the KM initiative in an organization because it is from top management's commitment that you can actually set the direction for the KM initiative. You also have to provide support by making sure that the resources are available. Process refers to both the social process and the technological process, which can enhance the contribution of knowledge within the organization.

The second layer in the model is the knowledge process. This is most important because of the continuous process of identifying, creating, storing, sharing and applying knowledge. This was discussed quite extensively by Dr. Ron Young in his paper.

The next layer is learning and innovation. This is an intermediate outcome of the knowledge process. Continuous learning and innovation at all levels in the organization can enhance not only individual capability but also organizational capability and societal capacity. Individual capability here refers to the increase in knowledge and skills that will enhance the performance of the individual workers. Organizational capability really focuses on the core competencies of the organization – the processes and the systems. We decided to include societal capacity because that is really aligned to what the APO is doing. At the end of the day it is the collective knowledge of individuals, organizations and institutions that can be harnessed for inclusive growth.

The outer layer is the outcomes. Increasing individual capability and enhancing societal capacity and organizational capability will lead to higher productivity, quality, profitability and growth. Quality here refers to the quality of products and services and, of course, profitability and growth are really all about having a better quality of life for everybody. The APO KM framework is not a methodology, but it highlights what are the essential elements to be considered when implementing KM.

In a nutshell, what I have tried to provide is a brief overview of what are the domains and the elements that need to be considered when implementing KM in an organization. The next thing that we looked at was a generic implementation approach for SMEs, especially for those companies that might want to start KM but do not know how to do it. Again, the APO KM implementation approach is flexible in the sense that it will provide a general approach on how to implement KM but it will be up to the organizations to implement KM within the context of their organization, considering their specific needs as well as the culture of the organization.

The APO KM implementation approach is called the **Four D Approach**: Discover, Design, Develop and Deploy (see Figure 8.2). This is a very simple approach. The Discovery stage is where the knowledge needs and gaps of the organization are identified, based on the organizational mission, objectives and goals. The KM approach should be built around the organization's critical knowledge needs. At the Design stage, we identify specific KM projects that the organization can undertake and design programs for pilot runs. The Develop stage is where we implement the pilot projects. At the Deploy stage, once the pilot projects are successful, we can look at how we can deploy KM throughout the organization.

Figure 8.2 The APO Implementation Approach.

Why do we focus on pilot projects first? One of the philosophies behind this is to think big but to start small. In my own experience, organizations that implement KM on a very large scale from the start tend to encounter problems. They find that, when the KM initiatives do not take off, people become cynical. Starting with pilot projects provides the opportunity to create some initial KM success stories, which can then be used to demonstrate how KM benefits the organization. Thereafter, we can look at implementing the KM program organization-wide.

The APO has developed the details for each of the stages, including the change management activities for each stage as well as the key focus areas for each of these stages. One of our next major undertakings is to develop a training program anchored around this KM framework.

Then we will use organizations, national productivity organizations (NPOs) in particular, to pilot the APO KM framework.

One approach that we will be taking is to train-the-trainer: identifying trainers at the NPO level who will be familiarized with the APO framework and instructed on how to go about implementing KM in SMEs in their respective countries. The next stage is the development of this training curriculum. Once all the details have been finalized, we will disseminate them to all NPOs.

Chapter 9

The Status of Knowledge Management in Asia: Results of an APO Survey of Nine Member Countries

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This chapter will summarize the results of a survey of the status of knowledge management (KM) in nine member countries of the Asian Productivity Organization that the APO started in the last quarter of 2006. A team of nine national experts met in Bangkok. They undertook the case studies, and the national reports were finished in the third quarter of 2007. I will also include some insights that I gained from the APO-sponsored International Productivity Conference in 2007 (IPC 2007) on the topic "Knowledge Management: From Brain to Business."

KM Development across Asia: Uneven

What are the findings of this KM survey? The first observation is that, among APO member countries, the GDP of six is predominantly in services, namely Japan, India, Republic of Korea, Hong Kong, Republic of China and Singapore. The services sector is knowledge-intensive, and these are the more advanced countries among the APO member countries. We can see that services – to be more specific, knowledge-intensive services – will become more and more important for the APO member countries. In fact, the winners of the MAKE Asia Award come mostly from three of these countries (Japan, India and Republic of Korea). As Rory Chase points out in his chapter, the global MAKE winners in Asia have caught up with their counterparts in Europe, although both Europe and Asia are still behind North America.

Another observation is that professional KM associations have been started in a number of APO member countries. This is an indicator of the extent of interest of a group of people who are concerned about and dedicated to KM; to my knowledge, these associations exist in Japan, Hong Kong, Singapore, the Philippines, Malaysia and Indonesia. Thailand has a government-supported KM institute and Republic of China has a KM research center.

A few Asian governments have adopted a national strategy or a national policy towards a knowledge-based economy (KBE) or knowledge-based development (KBD). Government KBE or KBD policy can push forward the development of KM in that country. So far, however, only Japan, India, Republic of Korea, Malaysia, Thailand and Singapore have adopted a national KM roadmap or strategy. My own country, the Philippines, has not, and one of the things that we are doing is pushing our government to do what countries such as India have done. Of course, the other side of the coin is that a number of APO member countries are not so far forward as the others in KM.

Specific KM Strengths of Some Asian Countries

The APO originally wanted to include 10 member countries in the survey, but for some reason could not find a national expert for Japan. We therefore had to proceed without Japan, unfortunately. It is noteworthy that each of the 9 countries has specific strengths.

India is definitely the leader in information and communication technology (ICT) support systems for KM. KM practice is especially prevalent in ICT companies, such as UNISYS and Wipro. India has a National Knowledge Commission, and it has a governance model on how to move towards becoming a knowledge-based economy or nation.

KM is extensively practiced in the **Republic of Korea**. In Korean firms it is no longer a question of whether or not to do KM. The question for them now is *how* to do KM. KM has been embedded in business processes in many companies, and of course the Republic of Korea is a leader in e-governance.

Singapore is also a leader in e-governance and, in fact, KM practice in the Singapore government is ahead of KM practice in the corporate sector. Singapore is one of the early adopters of a national knowledge economy strategy and KM is applied both for productivity and for innovation. The national productivity organization (NPO) of Singapore includes the word "innovation" in its name (the Standards, Productivity and Innovation Board), telling everybody that it is no longer just into productivity. It is also concerned with increasing innovation nationwide.

In the **Republic of China**, KM is widely accepted and, just as in India, there are very good ICT support systems for KM. It is also very noticeable in the Republic of China that there is very active KM support from the government, particularly for small and medium enterprises.

Malaysia exemplifies support from a national leader. KM development and KBD are leadership driven: KM from the very top. The Multi-media Super Corridor would not have been there were it not for the push given by former Prime Minister Mahathir. E-commerce and e-governance for the social sector are quite advanced in Malaysia.

It is very interesting that **Thailand** issued a royal decree a few years ago that requires all government agencies to do KM and become learning organizations. Thailand has set up an Office of KM and Development and it supports the KM Institute.

In the **Philippines**, KM in government and in non-governmental organizations is driven by support from development funding institutions. KM development is thus largely donor driven. There are advantages and disadvantages in that situation. One of the leading promoters of KM in the Philippines is the NPO of the Philippines, the Development Academy of the Philippines.

Vietnam has government-led initiatives to transform itself into a knowledge-based economy with knowledge-based development. It has exhibited very rapid adoption of productivity and quality management tools. I would expect that, from that base, it will also move on very rapidly to knowledge management. If there is an order from the top, it will be disseminated very quickly.

In **Indonesia**, KM has been disseminated by academia and the private sector. One very interesting thing about Indonesia is that it has MAKE Indonesia. The franchisee, Dunamis, says that the introduction of MAKE Indonesia helped promote an appreciation and awareness of KM nationwide in that country.

Some Issues in the Development of KM in Asia

One issue in the development of KM in Asia is that there are several very different interpretations and understandings of "knowledge management" or just the word "knowledge." This is going to lead to a lot of confusion. One of the things that the APO may have to do is to develop a basic course in KM among NPOs. Thus, I support Mr. Praba's suggestion that there must be a basic training program for NPOs, specifically for practitioners. There must also be a common language. The APO has a P-Glossary (which can be seen on its website). I think the APO should also develop a K-Glossary for KM so that we have a common understanding of words and terms.

Another issue is that alignment of knowledge management initiatives to organizational goals is often only implicit. There is a need for a tool or a methodology that will explicitly link KM and organizational goals and value creation. In fact, this is one way to convince a CEO to adopt KM, because if the head of the corporation or organization does not see the direct connection of KM to organizational goals, he or she is unlikely to support KM. There are some APO member countries where KM is not yet as popular and widely practiced as in the others. Here is where we need special assistance. The APO has what it calls bilateral cooperation between NPOs, or BCBN. Maybe it is time to have MBCN, or multilateral cooperation between NPOs. Such a program could address the need for a KM glossary and a training course on KM.

There are many approaches in the area of KM measurement. I think this is partly because there is no common, agreed-upon framework. Thus the framework project that has been started by the APO will be useful for this purpose. There are many gaps in measurement as well as different kinds of measurement. If we can have a very good framework then the measurements can follow. If there are no measures of the impact of KM, people will not be convinced about it.

An interesting issue is the relationship between the management of productivity or quality and knowledge management. This is something that is not very clear to many people. We need to be able to understand the linkage between productivity and quality management on the one hand and KM on the other hand. Since the APO as a matter of policy has moved to KM and innovation, how do you link the framework of productivity and quality management to a larger framework that will include KM?

Setting up a network of KM practitioners in and outside NPOs could further stimulate the development of KM. In my experience, study meetings in the APO tend to be attended by different people. Most of them want to learn about KM, but their interests are so diverse that it becomes very difficult to establish a network that can be sustained after the event. If, however, we network the KM practitioners from NPOs – who will be staying within these organizations and who have the interest to learn KM and to apply it – there is a greater chance that the network will continue to exist. It should be a self-sustaining network but it has to be supported, especially at the beginning. Through an NPO network of KM practitioners, those NPOs that are not yet fully into KM will have the opportunity to learn from those NPOs that have gone ahead. This will be good for all, because there are many countries in Asia that are good at certain things, and they will be the ones that can transfer the knowledge to those that are willing to learn.

Motivating Knowledge Workers

An interesting pattern can be discerned from the case studies: many of the good or best KM practice organizations employ various motivational approaches.

For example, setting up an intranet does not ensure that people will use it. In a voluntary

network or e-group, participation varies according to interest. People may know *how* to do their job well, but they may not want or be willing to do it. In addition to managing knowledge assets, the motivation of knowledge workers must also be given attention in KM.

The word "buy-in" is a common and important word in KM. This aspect is essential for the success of KM initiatives: there has to be buy-in, from the top to the bottom of the organization. How do we motivate people to have buy-in? Some examples are given in Table 9.1.

Table 9.1 Motivating Knowledge Workers: Examples from Asian Case Studies

Rewards and recognition	Knowledge Dollar (K$) and Joint President's and CEO's KM Award at Airtel (India); Learning Award for Knowledge Transfer and Enterprise Award for Intrapreneurship at Unilever Indonesia; 10 different awards at Wika (Indonesia).
Measurable returns	Measurable returns from KM initiatives at Infosys (India); positive feedback on outputs/benefits of KM at Goldsun (Vietnam).
Mix of communication modes	Mix of informal and formal communication modes to get employee and customer buy-in at Qian Hu (Singapore).
Design of physical spaces	Physical spaces for interactions at SCG Paper (Thailand); redesigning library furniture and interior at Bank Negara Malaysia.
Caring leadership	A caring leadership is important in promoting a motivational organizational culture at JTC Corporation (Singapore). A survey of KM success factors revealed that senior management commitment ranked highest in Thailand and second in Malaysia.
Training and professional growth	Employees are motivated when they learn, receive training or get support for their professional growth. CAPCO (Republic of China) set up a Multimedia Cyber College and included on-line training and certification as part of its employee evaluation and promotion processes.
Peer-to-peer public compliments	"Praise Ground" is a notable site on the company intranet of SAIT (Republic of Korea) for public compliments about exemplary KM behavior.
Honor and recognition as an expert or mentor	The honor of being a coach/mentor or an acknowledged expert or knowledge champion is good for motivation and getting "buy-in" at SCG Paper (Thailand) and Airtel (India). Wika and Bank Indonesia have created the title of "begawan" (sage) for mentors.
Overlap between personal and organizational goals	A workshop process for optimizing overlap between personal and organizational goals was tried among the KM team of the Department of Health in the Philippines.
Face-to-face interaction, socialization and learning	Face-to-face interaction, socialization and learning in communities of practice (CoPs) were found effective in Unilever Indonesia, SCG Paper and Siriraj Hospital (Thailand) and SAIT (Republic of Korea). To sustain employee interest in KM, Bank Negara Malaysia uses study visits or attachments, benchmarking projects and cross-functional teams.

Rewards and recognition are important. So too are measurement tools, because when everyone sees the numbers go up, of course the good performers become more motivated. A mix of informal and formal means of communication may be used to arrive at customer and employee buy-in. There is also the solution of providing physical spaces to encourage interactions and knowledge exchange. A leader who understands KM, models KM and lives and breathes KM can be a strong motivating factor. If the lower-level people can see that their leader is an exemplar in KM, it becomes very easy for them to follow. But if there is just a formal directive from the CEO without a corresponding visible personal action, it may be counterproductive. So support or sponsorship from senior management is essential. This support can include budgetary allocations to support the KM initiative. Training and continuing opportunities for professional growth can motivate a knowledge worker to stay longer in a company. The Samsung Advanced Institute of Technology (SAIT) has a very interesting mechanism. "Praise Ground" is where someone will write on the intranet about someone who has shown exemplary KM behavior. The praised person will then praise another person, and the praising process goes around. I feel this process of peer-to-peer public compliments is applicable to many Asian cultures. Acknowledging, recognizing and bestowing the honor of being a mentor or expert work well,

too. Workshop processes to maximize the overlap between personal goals and organizational goals are another way to generate personal energy for or interest in organizational KM. Many case studies describe the efficacy of face-to-face interaction, socialization and learning.

The case studies and the national reports reveal a shift going on among the case study organizations: a shift from concern with just productivity and quality management to one of continuing interest in productivity and quality management plus a new and additional concern for KM and innovation. This brings us back to the question: what is a coherent framework that can embrace both productivity and quality management and knowledge management? How do organizations move towards KM or towards productivity-plus-innovation in a smooth and coherent fashion because they see the interrelationship of the two? This is very important because there are already many experts in productivity and quality management. If they can see that what they are doing is very much related to KM in some fashion, it will become easy for them to move into becoming KM experts. This is demonstrated by organizations that are undergoing this shift.

I conclude with a very important quotation from APO Secretary-General Takenaka, which shows that the APO is also going through a paradigm shift, from productivity alone to productivity-plus-innovation:

> *"The days when incremental or continuous improvement preoccupied corporate managers are over. It is to innovation and breakthroughs that those managers have turned their attention. For achieving innovation, the most relevant tool is no longer quality control or quality management. It is KM in its broadest sense, which includes value creation or knowledge creation, that is the most relevant."*[1]

I anticipate that "innovation" is going to be a very important byword in the APO for the next few years.

1 Shigeo Takenaka, "Opening Remarks," International Productivity Conference 2007: Knowledge Management–From Brain to Business, 18–19 January 2007, Bangkok, Thailand.

Chapter 10

Critical Factors Constraining the Growth and Development of the Indian Economy: A Sectoral Study

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Introduction

This is a very opportune time for India to make its transition into the knowledge economy – an economy that creates, disseminates and uses knowledge to enhance its growth and development. The knowledge economy is often taken to mean only high-technology industries or information and communication technologies (ICTs). It would be more appropriate, however, to use the concept more broadly to cover how all economies harness and use new and existing knowledge to improve the productivity of agriculture, industry and services and increase overall welfare. In India, great potential exists to increase productivity by shifting labor from low-productivity and subsistence activities in agriculture, informal industry activities[1] and informal service activities[2] to the more productive modern sectors, as well as to new knowledge-based activities, and, in so doing, to reduce poverty and affect every member of society. India should continue to leverage its strengths to become a leader in knowledge creation and use. To get the greatest benefits from the knowledge revolution, the country needs to press on with its economic reform agenda, which was put into motion more than a decade ago, and to continue to implement the various policy and institutional changes required to accelerate growth.

This chapter attempts to explain the critical factors responsible for the growth and development of India in its various economic sectors – primary, secondary and tertiary. From among these three sectors of the economy, the chapter will focus on the secondary and service sectors, with special reference to Tamil Nadu. Tamil Nadu is one of the leading industrial states in South India, with an area of 130,000 km^2. In 2004/5 in Tamil Nadu, the contribution of the secondary sector to gross domestic product (GDP) at factor cost was Rs 17,866.7 crores and from the service sector was Rs 59,621.0 crores. In the secondary sector, the highest contribution to GDP at factor cost was from the manufacturing industries, especially from the automobile industry. Tamil Nadu is the hub of the Indian automobile industry, and several automobile and automobile ancillary units are located in the state. The chapter will examine the growth

1 These industries typically operate at low levels of organization, with little or no division between labor and capital as factors of production and on a small scale.

2 This sector includes home-based workers, vendors, manual laborers and service providers.

and development of the automobile industry in the whole country and then in Tamil Nadu. We explore the numerous factors that constrain the development of Tamil Nadu's automobile industry capabilities, such as human resources and infrastructure developments, intellectual property rights legislation and compliance conditions and overall corporate and public policy and government issues.

The chapter also discusses the growth of the service sector in Tamil Nadu and the key factors driving the rapid growth of software industries in the area, which include human resources, IT policy, costing, productivity quality and rate (PQR), a focus on margins and cost pressures, growing demand for high-quality products, an increasing focus on core competencies, global quality accreditations and a secure environment. This state is also one of the favored destinations for the information technology and information-technology-enabled services (IT/ITES) industry. Therefore this chapter focuses on Tamil Nadu's emerging role as an attractive location for the knowledge process service industries.

The factors constraining the development of Tamil Nadu in the automobile and IT/ITES industries will be discussed in the context of the following four aspects, which are widely considered to be the four pillars of the new knowledge economy:

- strengthening the economic and institutional regime;
- developing educated and skilled workers;
- creating an efficient innovation system;
- building a dynamic information infrastructure.

The key issues that India needs to address in each of the four pillars are to increase growth and innovation, and, in so doing, to increase economic and social welfare. By implementing the above four points in the industry and service sectors, tremendous potential can be achieved. The four pillars of the knowledge economy are explained below. However, this chapter addresses only some dimensions.

Strengthening the Economic and Institutional Regime

The knowledge economy provides the overall framework for directing the economy, strengthening macroeconomic stability, competition, good regulatory policies and legal rules that need to be addressed. The strengths of India's economic and institutional regime lie in its flourishing entrepreneurship and free enterprise, a strong infrastructure for supporting private enterprise, a low-cost and skilled workforce, a large domestic market, a capital market that operates with great efficiency and transparency, and a good investment climate. Such a climate provides opportunities and incentives for firms – from micro enterprises to multinationals – to invest productively, create jobs and expand their operations.

Developing Educated and Skilled Workers

Education is the fundamental enabler of the knowledge economy. An appropriately educated workforce is essential for creating, sharing, disseminating and using knowledge effectively. This can be achieved by the following:

- improving efficiency in the use of public resources in the education system;
- enhancing the quality of primary and secondary education;
- ensuring consistency between the skills taught in primary and secondary education and the needs of the knowledge economy;

- developing a framework for lifelong learning, making effective use of distance learning technologies to expand access to and improving the quality of formal education and lifelong training.

Creating an Efficient Innovation System

- The innovation system consists of institutions, rules and procedures that affect how the system acquires, creates, disseminates and uses knowledge.
- Tapping global knowledge is another powerful way to facilitate technological change through channels such as foreign direct investment (FDI), technology transfer and trade and technology licensing.
- Industries must take bold steps to strengthen their R&D infrastructure, develop technological innovations and alter the mindset of their people towards the better creation, acquisition and use of technology.

Building a Dynamic Information Infrastructure

- The information infrastructure in a country consists of telecommunications networks, strategic information systems and policy and legal frameworks.
- Rapid advances in ICTs are dramatically affecting economic and social activities, as well as the acquisition, creation, dissemination and use of knowledge.
- The use of ICTs is reducing transaction costs and lowering the barriers of time and space, allowing the mass production of customized goods and services. With ICT use becoming all-pervasive, and owing to its transformational impact on the economy, it has become an essential backbone of the knowledge economy.

The Secondary Sector

The secondary sector of the economy manufactures finished goods. Activities associated with the secondary sector include metal working and smelting, automobile production, textile production, chemical and engineering industries, aerospace manufacturing, energy utilities, breweries and bottlers, construction and ship building, and other engineering industries.

Among the four southern states of India, the manufacturing industries of Tamil Nadu make the highest contribution to GDP. Tamil Nadu leads in the production of automobiles. The automobile industry in Tamil Nadu has posted attractive growth but faces many problems, including inadequate power supplies, inadequate R&D facilities and a shortage of skilled labor.

To contextualize, we shall briefly discuss the growth of the automobile industry in India.

The Growth of the Automobile Industry in India

After a decade of reforms, the manufacturing sector is now gearing up to meet the challenges of the twenty-first century. Investments in Indian companies have been on the increase and many multinationals have decided to set up shop in India to take advantage of the improved financial climate. In an effort to provide a further boost to the industrial manufacturing sector, FDI has been permitted through the automatic route for almost all industries, with only certain restrictions. Indian subsidiaries of multinationals have been permitted to pay royalties to the parent company for the licensing of international brands, for example.

According to economic surveys conducted by the Confederation of Indian Industry (CII),

companies in the manufacturing sector have consolidated around their area of core competence by tying up with foreign companies to acquire new technologies, management expertise and access to foreign markets. The cost benefits associated with manufacturing in India have positioned the country as a preferred destination for manufacturing and sourcing for global markets.

The CII's survey in the southern region in 2006/7 revealed that the automobile industry grew by 15% in the first six months compared with its performance in 2005/6. The rise in sales and production of the automotive and auto components industry (15–20%) was in line with its rapid growth in the previous couple of years. It was expected to jump significantly in the next six months, with production and sales going up by 20–25% in 2006/7.

The Growth of the Automobile Industry in Tamil Nadu

Tamil Nadu is the home of major automobile manufacturing companies. The state's auto components sector is thriving: 35% of India's auto component production comes from units in Chennai. Tamil Nadu's current annual output in the automotive sector is estimated to be US$3.0–3.5 billion, with an estimated share of 25% in the Indian automotive industry, and its contribution to the state's gross state domestic product (GSDP) is 7–8%.

The state government intends to transform the state into one of the top three manufacturing hubs for the automotive and auto-ancillary industry in Asia by 2015. The state's target is to achieve output of US$18 billion in the automotive industry, employing a total of 600,000 people by 2015. To achieve this growth, Tamil Nadu needs investments of US$5 billion in the automotive sector in the coming 10 years to expand existing capacities; 60–70% of this will have to be from global multinational companies and the balance from Indian companies.

According to the CII's study "Mapping of Human Resource Skills in Tamil Nadu," by 2015 the size of the auto industry in Tamil Nadu will be US$15–20 billion (Rs 67,500–90,000 crores). The report said that, because the auto industry is manpower-intensive, this expansion would generate as many as 500,000 fresh jobs in the next 10 years, increasing the total number of employees in the state's auto sector to 580,000. The report also stated that the current productivity in the auto industry in terms of annual output per employee stands at over Rs 1,200,000. With the industry registering around 8% improvement in productivity, annual output per employee is likely to increase to over Rs 1,600,000 by 2010 and Rs 2,400,000 by 2015.

The CII report attributes this growth to several factors, such as the adoption of lean manufacturing practices, the shifting roles of companies, from being assemblers to contract manufacturers, and the shifting roles of product development, from product testing to design and development, with purchase becoming a techno-commercial function instead of a purely commercial function. Further, there is devolution of responsibility for problem solving to lower levels. Identifying some of the skill gaps in the industry, the study said that the industry needs project management and problem-solving skills to identify the root causes of design issues, and that process and system knowledge and techno-commercial orientation at the level of purchase executives are inadequate. In addition, the industry needs operators and technicians with a basic understanding of environmental and safety practices and quality concepts such as total quality management (TQM) and Six Sigma.

Critical Factors Influencing the Growth and Development of the Secondary Sector in the Southern Region (Tamil Nadu)

The following points are the critical factors for growth and development in the southern region of India (Tamil Nadu). The findings are based on interviews conducted among the manufacturing automobile industries TVS Motors, Ford, Ashok Leyland and Hyundai Motor India Ltd. However, the factors mentioned below also have certain drawbacks, which are demonstrated by a few of these automobile companies (discussed below).

- **Human resources and competency.** Rapid growth and technological change in the automobile industry are leading to changes in human resource policies and practices. More and more labor power is being employed, and proper training is provided to new entrants. There are also development programs for employees to integrate the technological changes.
- **Costing.** There are competitive wage levels and other cost advantages.
- **Infrastructure.** A gradual improvement in infrastructure is illustrated by better telecoms connectivity and the development of industrial parks and, more recently, of special economic zones offering infrastructure, fiscal and labor laws and other incentives.
- **Institutions and legal and regulatory frameworks.** There are well-established democratic institutions and financial and legal systems, including a favorable track record in intellectual property rights compliance in industrial R&D. There is a diverse set of educational and R&D institutions and options for collaboration with Indian companies.
- **Government policy, incentives and governance.** Trade and R&D are increasingly favorable. There are gradual and reasonably predictable processes for economic reforms and improvements in corporate governance.
- **Proximity to markets and production.** Proximity to markets and production, including the potentially large Indian market and a wide range of goods and services production capabilities, is coupled with proximity to other fast-growing Asian markets. Time zone advantages enable a 24-hour working cycle.
- **High-tech industry clusters, networks, industry-specific corporate and individual champions and experiences.** Corporate success stories provide demonstration effects and inspiring industry champions provide arguments for companies to invest. Individuals find that India generally provides an attractive living environment, including professional challenges and a rich social and cultural life. Global and local network-related dynamics, including virtual networks, the development of industrial parks or clusters and the Indian diaspora, all play a role.

Although each of the above areas is a central driving force in the growth in the automobile industry's related operations in Tamil Nadu, there are also major constraining factors in all of the above-mentioned areas. These include the following.

- **Human resources and competency.** Capacity and quality limitations in higher education and training institutions result in uneven standards and a shortage of competent engineers, research engineers and project managers. Inadequate process knowledge and systems knowledge and a lack of techno-commercial orientation are some of the skill gaps identified at the level of purchase executives.
- **Costing.** Wage inflation and high attrition in overheated market conditions are a big drawback.
- **Infrastructure.** There are weaknesses in physical infrastructure such as transportation and communication systems and the general provision of energy and other utilities,

including insufficient new capital investments and major deficiencies in the maintenance of existing systems.

- **Institutions and legal and regulatory frameworks.** There are deficiencies in institutions, the enforcement of legal and regulatory frameworks and the length of time spent getting various types of permit from government authorities and in settling legal disputes. Weaknesses relating to intellectual property rights regimes give rise to concerns regarding security, data protection and limitations of the Patent Act and its enforcement. Weaknesses relating to industrial and labor laws and regulations hinder the flexible use and reallocation of labor, small-scale industry, education and other reservation/affirmative action policies.
- **Government policy, incentives and governance.** There is concern over performance records in terms of the speed, scale and scope of public and private sector reforms; accountability and transparency (and associated issues of trust and corruption); the communities gap; and impediments to innovation and institutional change (e.g. a reluctance to share information; timelines and other issues related to bureaucratic inertia; and political economy impediments to making rapid decisions and the implementation of public sector, central and state-level economic and other reforms).
- **Proximity to markets and production.** The size of the Indian market is still relatively small in many product sectors when compared with the world's largest economies. There is also the problem of remoteness from the more advanced industrial markets, production facilities, R&D centers, corporate headquarters and other decision-making and knowledge centers.
- **High-tech industry clusters, networks, industry-specific corporate and individual champions and experiences.** Newcomers to the Indian environment often find it hard to handle the red tape and governance and other obstacles in expanding their Indian-based operations. Foreigners and some Indian nationals who have lived abroad in particular can find it difficult to adjust to local business and living environments. There are bottlenecks in social and economic infrastructure development in rapidly growing major cities with high-tech industry.

In summary, the survey report shows that specific factors have resulted in a need for the rapid expansion of the automobile industry. Access to person power and cost factors are central, but a wide range of other aspects such as competency development, quality performance, intellectual property rights management and links to production are also important considerations. If the various constraints on the automobile industry were to be removed, India's GDP growth could be raised and the standard of living improved. Many factors continue to constrain the expansion of the automobile industry's efforts, but significant progress has been made in education, infrastructure, legal and regulatory frameworks and, more generally, market conditions, providing greater incentives to expand this industry.

The Tertiary Sector

The tertiary sector of the economy is the service industry. This sector provides services to the general population and to businesses. Activities associated with this sector include retail and wholesale, transportation and distribution, entertainment (movies, television, radio, music, theater), restaurants, clerical services, the media, tourism, insurance, banking, health care and the law. India's services sector has matured considerably during the past few years and has been globally recognized for its high growth and development. This sector grew at an annual rate of about 28% between 2002 and 2007. Services exports amounted to a meager US$8.9 billion in 1997 but, over the years, services exports have grown substantially, especially since 2002. Exports grew to US$73 billion in 2006. The services sector currently accounts for about 55% of India's GDP.

India is fast becoming a major force in the information technology sector. According to the National Association of Software and Service Companies (NASSCOM), over 185 Fortune 500 companies use Indian software services. The world's software giants such as Microsoft, Hughes and Computer Associates that have made substantial investments in India are increasingly tapping this potential. A number of multinationals have leveraged the relative cost advantage and the highly skilled labor base available in India. They have established shared services and call centers in India to cater for their worldwide needs.

The software industry was one of the fastest-growing sectors in the past decade, with a compound annual growth rate exceeding 50%. Software service exports increased from US$6.32 billion in 2004/5 to US$8.3 billion in 2005/6. India's success in the software sector can be attributed largely to the industry's ability to nurture superior knowledge through intensive R&D efforts and the expertise available in applying the knowledge in commercially viable technologies.

The Growth of IT/ITES Industries in Tamil Nadu

Tamil Nadu is a favored destination for the IT/ITES industry. During 2005/6, IT/ITES exports from Tamil Nadu were worth Rs 13,960 crores, growing by 29% over 2006/7.

India has witnessed tremendous growth in the IT sector in recent years. The government of Tamil Nadu has been instrumental in bringing the information technology revolution to the state. It is a matter of pride that, in 1997, Tamil Nadu was the first state in India to announce an IT policy. TIDEL, a world-class IT facility, was also established during that period (in 2000). Likewise, many far-sighted schemes were implemented during the period 1996–2001. These measures laid the foundation for the spectacular development of IT in Tamil Nadu.

Tamil Nadu has witnessed substantial growth in the IT, IT-enabled services (ITES), business process outsourcing (BPO) and IT hardware manufacturing sectors. Software exports from Tamil Nadu have reached Rs 14,115 crores. The depth and range of the IT sector can be gauged from the broad-based portfolio of its export basket: application software and system software (70%); ITES and BPO (13%); communication software, VLSI (very-large-scale integration) design and web solutions (8%); IT consultancy (6%); and product development (3%).

The number of software units in the state is also growing rapidly. So far, 1,437 software units have established facilities. The rapid rise in the number of national and international players that have chosen to establish their businesses and manufacturing facilities in Tamil Nadu, as well as the expansion in the activities of established firms in this state, is a firm indication that Tamil Nadu has emerged as a preferred destination for domestic as well as foreign direct investments. Leaders in the Indian IT sector such as Tata Consultancy Services (TCS), Infosys, Wipro, Satyam, HCL, Patni Computers, I-Flex, Polaris and Hexaware, as well as a galaxy of international majors – Accenture, Verizon, Xansa, Office Tiger, Standard Chartered Bank, ABN Amro, Alcatel and Cognizant Technology – have established operations in Tamil Nadu. To add to the state's leadership role in the software sector, large international hardware manufacturers such as Nokia, Foxcon, Flextronics and Motorola have already located facilities in Tamil Nadu. The Department of Information Technology of the central government has played a crucial role in bringing these units to Tamil Nadu. The central and state governments are jointly taking action to establish Tamil Nadu as the leading state in the IT sector. Many more national and international establishments have shown an interest in investing in Tamil Nadu.

A survey was conducted among the lead IT companies in Tamil Nadu. The main aim of the

survey was to discover the factors that are influencing the growth of the economy. These industries are providing services such as IT consulting, IT outsourcing and IT services. They are acquiring a technically skilled workforce from highly regarded institutions. These industries have university–industry partnerships called academic interface programs, in which they give projects to students by conducting technical seminars. This is helping the industries to improve their performance. To adapt quickly to the new skills demands generated by the changing market and technologies, computer-based training programs are given to their associates. Sometimes these industries provide technical, behavioral and domain-specific courses. To support these industries, the government is providing tax holidays.

Knowledge management portals are the sources of sharing and innovation in the service sector, even from other countries. To meet the growing demands of the market, these industries are spreading across various geographical locations to cater for the needs of their various customers.

Critical Factors Influencing the Growth and Development of the Tertiary Sector in the Southern Region (Tamil Nadu)

The following findings are based on interviews conducted for this report among the following IT companies in Tamil Nadu: TCS, Wipro, Cognizant, Satyam, HCL and Infosys.

- **Human resources and competency.** The availability of a large, diverse and geographically mobile skilled workforce enables rapid expansion in a wide range of fields. There is a strong human resource competency potential for executing quality software and engineering work, including IT applications and quantitative work, as well as a proven ability to work in international teams. India has a wealth of competency of entrepreneurship and within private, public and non-governmental institutions.
- **Cost advantages.** By establishing industries in rural areas, the cost of land has gone down.
- **IT policy.** A number of measures have been undertaken by the government to attract investments. The destination of choice highlights the advantages of investing in IT industries. The floor-space index regulation for IT parks has been relaxed. And the government has given a 50% exemption on stamp duty and registration fees for the purchase of land.
- **Productivity, quality and rate (PQR).** These factors form the core of India's attraction as an offshore destination for software and services.
- **Focus on margins and cost pressures.** Outsourcing to Tamil Nadu has helped companies achieve 40–50% cost savings. Companies are also able to generate higher free cash flows owing to reduced investments in physical infrastructure, telecoms and equipment. Wage arbitrage has also led to increased cost savings.
- **Increasing focus on core competencies.** The need to focus on core competencies to remain competitive is driving more companies to offshore outsourcing. Offshoring helps free up resources and bring about a higher management focus on core business requirements. Offshoring also allows for access to new technologies and talent to help strengthen business offerings.
- **Global quality accreditations.** In an increasingly competitive economy, customers demand and expect the highest levels of quality. Tamil Nadu vendors are quality-centric and have adopted several industry standards, such as SEI-CMM, ISO, TQM, Six Sigma Quality and COPC.
- **Secure environment.** Both companies and the government have been proactive in taking appropriate steps to tackle security concerns. Most Indian companies are aware of, and are opting for, international security standards such as ISO 17799, BS7799, COBIT and ITSM. NASSCOM, along with the Indian government, has laid the foundations for

the required legal framework. The IT Act 2000 includes laws and policies concerning data security and cyber crimes. Other than the IT Act, the Indian Copyright Act of 1972 deals with copyright issues in computer programs.

These factors are contributing to the growth and development of the Indian economy, but the growing software and BPO industries are also confronted with a number of challenges, for example a shortage of skilled person power. India needs to increase the number of knowledge workers fluent in languages such as French, German, Japanese and Spanish. Since salaries and other costs are rising every year, IT and BPO providers must find ways to reduce total costs in order to continue to offer customer cost savings. Another major challenge for these industries is how to strengthen the nation's physical infrastructure, one of the principal bottlenecks in India's development. The state requires appropriate urban planning and major investments in infrastructure in order to sustain economic growth. This includes investments in the high-technology industry. Major efforts are required to accelerate industrial development.

Conclusion

This chapter has examined the critical factors influencing the growth and development of the Indian economy. In the automobile industry of Tamil Nadu these include human resources and competency, costing, infrastructure, institutions, legal and regulatory frameworks, government policy, proximity to markets and production, high-tech industry clusters, networks, industry-specific corporate and individual champions and experiences. The same factors helped improve the growth of the IT companies of Tamil Nadu. Additional aspects include productivity, quality and rate (PQR), a focus on margins and cost pressures, growing demand for a high-quality, skilled workforce, an increasing focus on core competencies, global quality accreditations and a secure environment.

Chapter 11

Knowledge Management in the Food and Nutrition Community in India: The UN's New KM Initiative

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India is one of the world's fastest-growing economies and it is making impressive progress in science, information technology, space and biotechnology. India also has a vast knowledge base in several other sectors. It has made significant gains in recent decades in food and agriculture, improving literacy levels and life expectancy as well as reducing poverty. But still much remains to be accomplished.

Although some of this knowledge has been codified, shared and replicated, there is a large pool of knowledge that remains tacit – gained through experience and in danger of being lost. To harness this knowledge, the United Nations Country Team in India launched a knowledge-sharing platform called Solution Exchange. The UN serves as a catalyst and provides an impartial platform for the exchange of knowledge and ideas among development practitioners in key thematic areas under the framework of the Millennium Development Goals (MDGs).

The Solution Exchange (see Figure 11.1) connects development professionals working in similar fields but coming from diverse organizations, ranging from government, bilateral and multilateral development partners and non-governmental organizations to academics, corporations and the media. It is building communities of practice through electronic mail groups and also face-to-face interactions. The Solution Exchange seeks to empower practitioners by offering them "knowledge on demand" based on solutions from their peers.

Figure 11.1 The Solution Exchange

The Exchange is a free, impartial, demand-driven and solution-oriented service. It functions as a mail group with a moderating team. All messages flow through and are filtered and edited by the team (see Figure 11.2). Problems and challenges are submitted as a query in an e-mail and posted to all community members. Members then offer advice, experience, contacts or suggestions. A consolidated reply is prepared with a synopsis of the original responses, additional resources and links. These are available on the website http://www.solutionexchange-un.net.in. E-discussion papers, newsletters, updates and so on are also made available, as well as face-to-face meetings.

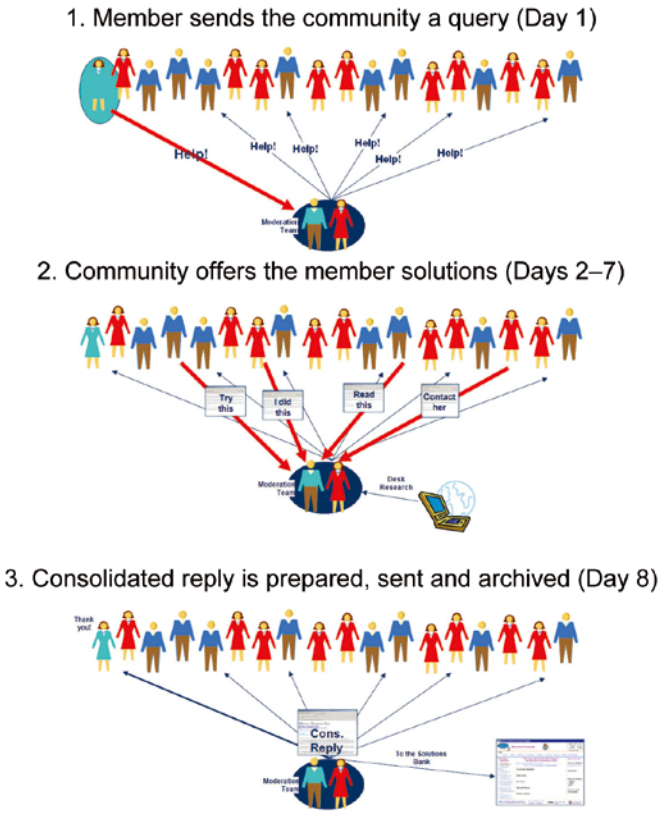

Figure 11.2 How It Works.

So far, the communities of practice are built around the following broad themes corresponding to the MDG goals and India's development priorities:

- Poverty
- Work and employment
- Microfinance
- Environment – water
- Health – maternal and child health
- HIV/AIDS
- Gender
- Food and nutrition security
- Decentralization
- Education
- ICT for development
- Disaster management

More communities and many other sub-groups within a community are also in the pipeline, for example:

- Health – communicable diseases
- Environment – sustainable environment

The Solution Exchange for the Food and Nutrition Security Community is a group of professionals from a wide range of organizations who are actively engaged in meeting the country's food and nutrition security goals. The Community promotes, among others:

- sustainable improvements in food security;
- reducing malnutrition and poverty;
- improved implementation and impact of food-related social safety net programs;
- food safety and the prevention of food-borne diseases;
- dietary diversification to prevent micronutrient deficiencies.

This community has so far discussed over 94 diverse topics (accompanied knowledge products) over a period of just over two and a half years, covering issues such as multiple dimensions of food security, sustainable agricultural practices, crop diversification, agricultural extension, rural financing, irrigation systems, organic farming, tribal development, food safety, anemia, food fortification, micronutrient deficiencies, and infant feeding practices. It has about 1,775 members.

The community has deliberated on some key food and nutrition programs run by the government and has come up with valuable suggestions. Although it does not directly prescribe policy advocacy, some of the deliberations have positively influenced a host of government programs. The more notable discussions have been on a draft National Farmers Policy, modalities on the newly introduced National Rural Employment Guarantee Act, the World Bank-funded National Agricultural Innovation Project, the sustainable extension system for the Asian Development Bank project, the Food and Agriculture Organization project concepts on sustainable agriculture and rural development (SARD), the Pro-Poor Livestock Policy and value chain marketing.

Some of the key challenges are deepening the reach of the network, scaling up, barriers such as literacy and e-literacy, information in the vernacular languages and access to power, telephony and the Internet, bringing in cultural transformation in knowledge sharing. Overall, it is a wonderful learning experience that tends to facilitate the sharing of practical needs-based ideas and know-how, the creation of focused and tangible knowledge and information critical for development, the development of a unique awareness in collective knowledge sharing, and the building up of an open, facilitating environment that will contribute towards the effectiveness of development in a positive and transparent manner.

Technical Session IV:

Human Resources, Education and Financial Perspectives in KM

Chapter 12

Participation of the International Management Institute in the Knowledge Economy Project

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In this chapter we will outline the role and activities of the International Management Institute (IMI) in the "National Competitiveness in the Knowledge Economy" project, a major initiative by the Indian Ministry of Communications and Information Technology. The very title of the project suggests that we are going beyond the borders of corporations and companies and want to look at the entire economy. All sectors will be looked at in this project, including agriculture and education. We want to see how to transform our economy, which is part agricultural, part industrial and part service, into a knowledge economy.

It is a three-year project, and four institutes are working on this project together. They are the Indian Institute of Technology (IIT), Madras, the Indian Institute of Technology, Roorkee, the International Management Institute and the National Productivity Council (NPC).

The objectives of the "National Competitiveness in the Knowledge Economy" project are:

- mapping out the directions of the transition from an industrial economy to a knowledge economy;
- developing strategies of change management for the transformation from an industrial age to an information age;
- identifying new knowledge streams/disciplines likely to emerge in the evolving knowledge economy and suggesting specialized courses to help meet the person power requirements of the knowledge economy;
- generating a deeper understanding among key stakeholders of the scope and significance of knowledge, technology, R&D and innovation management for the emerging knowledge economy, and developing model course curricula for adoption by other knowledge institutions;
- anticipating trends and identifying issues for formulating policy initiatives;
- preparing policy recommendations for an efficient, smooth and speedy transformation;
- creating a network of knowledge institutions;
- promoting the use of knowledge management as a tool for securing the larger good of society.

The four institutes will be undertaking various activities under the project. The IMI will also be undertaking academic activities such as research studies and seminars. In addition, the IMI

has the role of coordinating all the academic activities of the project, and is where all the four institutes meet. We discuss what work has to be done and which institute will take up which work, and look at their progress.

We will be undertaking certain specified activities under the project. The project document stipulated that we would have one national symposium at the beginning, to bring out issues to be discussed during the course of the project. We have had two international conferences, both organized by the NPC. We will have other seminars and workshops at the decentralized level, which will be conducted by some of our partner institutes. There will be awareness development seminars, advocacy seminars and sensitizing seminars. We will have a number of commissioned studies, around 10–20, on topics to be identified jointly by the four institutions working as a Steering Committee. The project will also develop a working framework or model for active collaboration and synergy among people from academia, industry, government and society. The outline of the framework is presented in Chapter 7. Another task is the identification and development of courses that need to be introduced in the education sector in order to increase the content of knowledge management in educational programs and to develop human resources for future purposes. Ultimately, we will have a workshop to come up with policy recommendations so that the government can adopt those policies for speedier and smoother transformation of the economy into a knowledge economy.

The tasks of the IMI under this program are to:

- provide project coordination by organizing meetings of the Steering Committee, communicating decisions of the Department of Information Technology (DIT), compiling progress reports and liaising with the DIT;
- conduct the initial symposium, seminars, final workshop and other events as decided by the Steering Committee;
- organize workshops, management development programmes and/or short courses in knowledge, technology, R&D and innovation management;
- conduct and implement such studies and carry out such other tasks as may be decided by the Steering Committee;
- submit periodic progress reports and the final report to the DIT.

So far we have conducted the national symposium. We are also undertaking research studies and preparing a book on the knowledge economy.

The National Symposium

The national symposium, entitled "Competitiveness in the Knowledge Economy: Imperative of Change," was conducted in November 2006. We had set up an advisory committee to guide us, under the chairmanship of Mr. Brijesh Kumar, former Secretary of the Department of Information Technology. In fact, it was under his guidance that the idea of the project was developed. The project proposal was prepared and ultimately approved by the Department of Information Technology.

The symposium had certain objectives:

- to present a perspective of the changes that are occurring in the economy;
- to identify the directions that the economy should take for its transformation into a knowledge economy;
- to elicit the concerns of stakeholders regarding the process and consequences of change;

- to bring out issues that need to be looked into through further research;
- to provide inputs for the identification of education, training and dissemination activities;
- to facilitate the development of a research program that would lead to recommendations on policies and strategies for change.

We were surprised by the magnitude of the response to the symposium. We had planned for 60 delegates; we got 110. It was a national symposium but there were also some international participants. A number of implementing agencies were represented, namely government departments, academia and corporate sector, business and industry associations, including those dealing with specific industries. We had with us workers' organizations and non-governmental organizations representing civil society. We also had people from international agencies participating in the symposium. Quite a few very senior people had come to the symposium. They included Mr. Rajeeva Ratna Shah, Member Secretary of the Planning Commission, Mr. T. S. Krishnamoorthy, former Chief Election Commissioner, and people at the level of secretaries, e.g. Dr. P. P. Gupta, a former Secretary of the Department of Electronics, Mr. Brijesh Kumar, till recently Secretary of the DIT, and Professor Ashoka Chandra from the IMI, who had been Special Secretary in the Ministry of Human Resource Development. And we had people of such eminence as Mr. Abid Hussain, who had been Secretary of Commerce and later Ambassador to the USA. Papers from all four partner institutes were presented at this seminar.

The major outcomes from the symposium are, in summary, as follows.

- The present pressing problems demand a significant change in the style of governance so as to have public administration with a human face and efficacy, challenging and overriding traditional and historical concepts of public administration of a bygone era.
- Demands on public administration are indeed going to be on the increase, with knowledge power acquiring more importance and fueling increased expectations, especially because of the significant strides in print and electronic media.
- Thirteen areas were identified for research: demography; the socio-economic situation; technology; environment; natural resources; energy; water management; inequalities; health; the military; geo-political realities; agriculture; and global systems.
- At the level of a company, in order to implement KM a company needs to consider leadership, culture and measurement issues in addition to process and technology.
- KM initiatives cannot be successful without the active participation of employees.
- Networking among business organizations is largely successful even if it involves complicated and problematic "negotiations" of interdependencies and the self-interest of participant organizations.
- Although design and other technical aspects are necessary conditions, subtle factors that create success may include those termed "self-organization based." Self-organization-based systems will be more learning oriented, have greater tolerance for trial and error, be less obsessed about avoiding mistakes, be willing to sacrifice efficiency for flexibility and be less in awe of hierarchical and power considerations.
- Knowledge indicators can be computed. The knowledge economy framework consists of four pillars: education and training; innovation and technological advancement; information infrastructure; and a proper economic and institutional regime. Each can have a number of measurable parameters.
- Linkage between knowledge management and learning organizations helps in moving towards business excellence. Business excellence with respect to improved performance of people and processes, customer satisfaction and the creation of a better society is achieved through appropriate use of the knowledge assets of individuals and teams.
- Certain streams of knowledge will need concentrated attention in the decades to come.

Eight branches/specializations were identified as frontier areas for research:
    - power and communications;
    - computer science;
    - bio-technology;
    - infrastructure;
    - nanotechnology;
    - energy;
    - manufacturing;
    - mechatronics.
- A number of industries and R&D organizations in the private sector are doing commendable work in frontier areas that are important for the knowledge, economy. They highlighted genuine problems in terms of regulations, restrictions on research funding, etc. These need to be discussed and conveyed to policymakers.
- There is a need to identify shortcomings in the present curriculum and devise mechanisms to overcome them.
- An effective platform for face-to-face interaction between academia, industry and the state (a triple helix) needs to be created.
- Tata Steel follows three strategies for managing organizational knowledge, catering to the needs of diverse groups of employees, from the top management to the lowest level of employees on the shop-floor.
- Formal and technology-intensive networks as well as informal approaches centered on people and institutions are essential requirements for globalization.
- For an effective knowledge management system to be in place, the issue of ownership of the intellectual property of knowledge can be of paramount importance.
- Understanding how people and societies acquire and use knowledge – and why they sometimes fail to do so – is essential for adopting measures to improve people's lives, especially the lives of the poorest.
- In the absence of a clear-cut definition of the "larger good of the society," and in view of the familiar debate about GDP and economic growth vis-à-vis human development as indicators of well-being in society, one can take the view that "development" may be taken as a good proxy for the "larger good of the society."
- There is hardly any alternative but to focus on the collective benefit of society at large instead of driving the policy through pockets of growth that have already created social and economic imbalances. Ultimately, only technology and innovation can blend and balance the two. Business leaders, once seemingly opposed to social concerns, have begun looking at them, and development leaders of a traditionally socialist mindset have begun paying attention to the global business call.

It should be noted that the eight areas that were identified as needing attention – power and communications, computer science, bio-technology, infrastructure, nanotechnology, energy, manufacturing and mechatronics – are the areas that can contribute more significantly, relatively speaking, to the change process that we are initiating towards a transformation to a knowledge economy.

Research Studies

At the start of the project, it was intended that we would conduct 10–20 research studies. At my institute, we formed a group of about 10 faculty members who were interested in the subject. Initially, we were hazy about what to do, and not much was known about this subject. Gradually, through discussions and various inputs, we clarified our own ideas about what this whole work was about, what had to be done about it, the dimensions of this work, and the

kind of issues to be looked into. We then realized that 10–20 studies would not be enough. We would need to conduct about 100 studies, and those studies would have to be conducted every two, three or five years, or whatever period was considered appropriate. We did not have the intellectual or the financial resources to conduct such a large number of studies, so we did our best in the circumstances. We are confining ourselves to this project and we hope that this work will continue later. This project may end but there will be other projects. The people may change, the institutions may change, but the work will go on once it acquires a certain momentum.

We have in hand a limited number of studies, of which the IMI is conducting a large number. Our partner institutes, too, are conducting studies. We hope that, even while this project is under execution, other researchers and other institutions will join this movement. Already, interest has been shown by IIT Bombay and IIT Kanpur in joining the project. Although it is too late for them to get on board on this project, they will certainly be able to take up work on the knowledge economy on their own or maybe through some other forum.

The studies that the IMI has agreed to undertake are as follows.

1. Developing knowledge economy indicators for the individual states of India.
2. Knowledge management initiatives and practices for moving towards learning organizations in selected Indian companies.
3. A survey of knowledge management practices in select Indian companies using the knowledge management assessment tool (KMAT).
4. Trends and issues in firms delivering knowledge-intensive services.
5. Development of a conceptual design for a knowledge economy information system.
6. The impact of the knowledge economy on small and medium enterprises.
7. The spatial distribution of local innovation capacity and skills in different states and regions of India.
8. Transition to a knowledge economy: implications for India.
9. From adoption to innovation: the dynamics of Indian knowledge firms' technology learning.
10. Pilot study on the approach to knowledge and skill development in the new knowledge economy.

We will elaborate only on the first one – developing knowledge economy indicators for individual states. We wish to develop a common system for measuring how far the states have progressed and how prepared they are for the knowledge economy. We will select a number of variables that are quantifiable and measurable, which will then be measured through data collected by the data collection agencies. This seminal task will need to be repeated every year so that the states can be informed about where they stand and whether they are making progress or not. Do they need to make any changes in their policies and programs so that they too can move forward along with others? We will also know from the data collected what the states are doing, what works, what does not work, and so on.

The challenge of the project is encouraging faculty members to take up research studies. The subject area is relatively new and not many faculty members have previous background in this area. Yet, in all the institutes, there has been much interest and enthusiasm, despite some problems connected with compensation and payments. In the IMI, faculty members have received support from the management in order to accommodate this work in the whole gamut of activities that they are engaged in.

Book on the Knowledge Economy

The symposium provided us with a very rich literature through the papers submitted and presentations that were made. We wanted them to be developed as reference material for use by other researchers in other organizations. If we had limited ourselves to the proceedings of the workshops or seminars, they would have remained confined to the participants. We therefore decided to bring out the compilation as a book, with the aim of aligning the objectives of the book with the objectives of the project and thus contributing to the fulfillment of the objectives of the project.

The larger purposes of the book are to:

- provide a reference volume of the excellent papers written on this new subject;
- extend the outreach of the reference material to government bodies for formulating policies/plans and academic institutions for teaching and further research;
- facilitate access to this material by international agencies and other countries.

As further work, we are planning to hold some workshops for people in research institutes in science and technology and in the universities for more intensive discussions on various aspects of knowledge management in order to spread awareness and knowledge about this subject area to those working in R&D and similar activities.

Chapter 13

Innovation and Knowledge Management: An Indic Play Ethic and a Global HR Model

Dr. Prem Saran
Indian Administrative Service

Introduction

The Indic civilization is one of the five or six major civilizations of the world. In this chapter, I propose to revisit three of its main cultural traits or values, and argue that these provide the building blocks for a new approach to innovation and knowledge management. For it is high time that we complemented our necessary openness to ideas from Western (and other) sources with a nuanced appreciation of our own traditional knowledge systems.

For one thing, it is too facile (if not slavish and deracinating) to assume that the Western and the modern are synonymous, since there are today a number of other versions of modernity, such as the Indian and the Chinese. This is why I myself skeptically coined the term "Westernity" to refer to the Western kind of modernity, so as to deconstruct such an automatic equation.

On the other hand, it is also healthy to treat Indian civilization as "non-modern."[1] This opens up the possibility that the Indic cultural ethos may actually subsume both modernity and post-modernism, and that it may also thus provide inputs for a pedagogical paradigm shift. In other words, by using certain liberal and humanistic themes of Indian culture, one may well be able to promote learning that is contemporary as well as cross-culturally replicable.

Peter Drucker, writing about the knowledge society, has said that a reigning paradigm today is that of living systems – that is, biological systems – and so the emphasis has shifted from mere analysis to the dynamics of perception. Now we are more interested in wholes and meaning, and meaning has become more important than just analysis. Dr. Chase is interested in the differences between the Indian and Western civilizations. He thinks that the basic difference between the two is that the Indian cultural systems are non-linear and more amenable to chaos theory, but in a positive sense; on the other hand, the Chinese and Japanese, as well as the American and European, cultural traditions are more into order and harmony.

I propose that chaos is something potentially useful and creative, hence this contemporary

1 Ashis Nandy, *The Intimate Enemy: Loss and Recovery of Self under Colonialism*, New Delhi: Oxford University Press, 1983.

interest in chaos theory. Further, for historical reasons, the Southeast Asian cultures have been more influenced by Indic knowledge systems than by East Asian civilization inputs. Or, to put Dr. Chase's insights in a different way and based on my own PhD research on Indian culture, I feel that the vitality of the Indian civilization lies in its "non-modernity." This becomes evident when it is seen beside Western civilization, where modernity and now post-modernism have been/are reigning paradigms. And I deliberately use the term "non-modernity of Indian culture," being something I borrowed from Ashis Nandy, a well-known Indian cultural psychologist. Nandy says Indian non-modernity has long subsumed both modernity and post-modernism, and is predicated on a deep-structural mindset that has been influenced by the yogic–that is, the Indic meditative traditions.

As for my philosophical standpoint, my arguments here are based on my varied expertise as a technocrat (i.e. engineer-cum-MBA from the Indian Institute of Management-Calcutta, with human resources specialization) and an Indologist-cum-cultural anthropologist (with graduate degrees from the Universities of Pennsylvania and California). Also, my approach is informed by about 30 years of experience as a public administrator in the Indian Administrative Service.

More specifically, I have been researching, as well as experimenting with, Indic systems of visualization/meditation (both Hindu and Buddhist) for over three decades. Utilizing that theoretical and empirical platform, I have now developed my own visualization system, which is a radical simplification of the ancient yogic technique of kundalini meditation. My model has already been found useful in a number of fields, including human resource development (HRD), land resource management and culture studies.[2]

There are about two dozen schools of meditation in the Hindu and Buddhist traditions in India. These traditions have interested me over the past 25 years of my scholarly research. According to French Indologist Louis Renou, yoga, or meditation broadly speaking, enables you to access the unconscious systematically. Jung, Maslow and other Western psychologists have also pointed to the potential benefits of accessing the unconscious.

Further, my technique functions as a simple and easy way to help tap one's creative right brain, which is usually neglected in Western systems of education. The Occidental civilization overemphasizes the Aristotelian logical mode associated with the human left brain, even though that is only the iceberg's tip of one's total mental capacity. In other words, in line with the contemporary split-brain research inaugurated by the Nobel Prize winning work of Roger Sperry, because my model enables one systematically to foreground one's right-brain endowment, it can thereby enable one to function in an increasingly whole-brain manner.

Thus, it also functions as a state-of-the-art tool for super-learning, which is the term used for the pioneering work on accelerated learning by researchers such as Sergei Lozanov, who found that certain kinds of music stimulate the right brain in such a way as to generate optimal learning. Again, because my technique is based on certain core themes in Indian culture that

2 Prem Saran, "The Government as Learning Organization: A Globalized HRD Model for Leadership, Creativity and Eustress," in Noorjahan Bava, ed., *Public Administration in the 21st Century*, Golden Jubilee Volume of Indian Institute of Public Administration, New Delhi: Kanishka Publishers, 2004; Prem Saran, "Indic Knowledge Systems and Land Resource Management: A Cross-Cultural HRD Model for Rural Upliftment," in *Advances in Land Resource Management for 21st Century*, New Delhi: Soil Conservation Society of India, 2004; Prem Saran, Entry on "Hedonism and Leadership", in *Notework*, the Newsletter of the Standing Conference on Organizational Symbolism, May 2005, p.33, at http://www.scos.org.

promote a balanced mindset of openness to the world, it also serves as a meta-learning tool, namely one that can promote "generative learning," or "learning how to learn."[3]

After all, according to the contemporary school of applied psychology called Neuro-Linguistic Programming (NLP), "Learning is about life."[4] Or, to extend that aphoristic insight, the ultimate learning skill is that of *learning how to learn*, whereby one learns to respond optimally to life's challenges. Moreover, such continuous and lifelong learning is very much the need of the hour today, in order that one can function optimally in a world that is globalizing apace.

Coming to contemporary developments in the knowledge economy, the whole open source movement has meant that knowledge is now universally available. Technology per se is nowadays not a source of competitive benefit; for within six months everybody has the latest technology. So what you have to do now is to look for *value*, and for that you have to dredge, strategically and intelligently, the sources of knowledge available. Again, the problem of information overload is something that affects all of us as denizens of the global knowledge society. So I feel my chapter has a simple and therefore effective technique of systematically accessing the right brain – using this term in a somewhat simplistic sense, without going into the refinements of contemporary research in this area.

In short, one needs techniques for accelerated learning; and learning *how* to learn is more important than any codification of knowledge or any legacy systems. Thus, the question of selecting and prioritizing knowledge becomes extremely important. So, ultimately, to go back to Drucker, perception is more important than all the codified knowledge available; because only then, by taking up different perspectives, can you extract value. Only then can you design innovative products, processes and new experiences, as Dr. Ron Young indicated about Starbucks in Panel Discussion 1.

Linus Torvalds, in the book *The Hacker Ethic* (which refers to the term "hacker" in the original sense of "computer geek"), has said that it is time for a post-Protestant ethic.[5] And Pat Kane wrote an important book called *The Play Ethic,* in which he talks about pleasure and play, and the question of passion for your work as opposed to mere productivity and profitability.[6] This again brings up the question of living systems and human needs, needs postulated by people such as Maslow, for example the need for self-actualization and beyond that of transcendence (Maslow's term for peak experiences of various kinds).

Given the above, I now refer you to my empirically tested Indic technique of self-learning (i.e. self-directed learning), which appears in the Annex. It is the crux of the *Report of the Human Resource Sub-Committee of the Assam Administrative Reforms Commission,*[7] and is also available (as a "unique e-HRD model") on the main server of the Government of India

3 Joseph O'Connor and John Seymour, *Training with NLP: Skills for Managers, Trainers and Communicators*, London: HarperCollins, 1994.

4 Sue Knight, *NLP at Work: The Difference That Makes a Difference in Business*, 2nd edn, London: Nicholas Brealey Publishing, 2002.

5 Pekka Himanen with Linus Torvalds and Manuel Castells, *The Hacker Ethic: The Spirit of the Information Age*, London: Secker & Warburg, 2001, Prologue.

6 Pat Kane, *The Play Ethic: A Manifesto for a Different Way of Living*, London: Macmillan, 2004.

7 Prem Saran, "The Government as Learning Organization," in *Report of the HR Sub-Committee of the Assam Administrative Reforms Commission*, 2003.

(http://www.assam.nic.in/). We can now examine how the main Indic cultural traits that are utilized in my model – as elaborated upon in my book *Yoga, Bhoga and Ardhanariswara*[8] – can also be used cross-culturally for purposes of innovation and knowledge management.

Culture and Learning Competencies

My Indic learning technique (see Annex) is based on three core Indic themes or values: porosity, the play ethic and gender mutuality/complementarity. These are pan-Indian traits which I have elicited from my own original research at the University of California, and which are also in effect "core cultural competencies" – to extend the concept of "core competencies" theorized by the management gurus Gary Hamel and C. K. Prahalad.[9] For, as psycho-cultural themes, they are essentially right-brain traits, and can thus be instrumental in facilitating access to the huge untapped mental reservoir of the right brain.

Porosity

First, South Asian/Indic personhood is "porous," unlike the atomistic personality structure that is modal in the modern West. For it is "holonic," to use Arthur Koestler's term. Like everything in nature, a "holon" is a whole that is in turn a part of other wholes. Moreover, this holistic psycho-cultural understanding of selfhood is seen to be cross-culturally much more valid than the Western, as anthropologists such as Melford Spiro[10] and Malcolm Crick[11] have shown. That in fact is also why well-known transpersonally oriented psychologists such as Robert Assagioli and Abraham Maslow have significantly enriched their work by the use of perspectives from Indic and related meditative traditions, which enable one to access one's own deep-structure learning resources.

This porosity is evident in interpersonal relations, too. For example, when you travel by train in India, you know that within a few minutes you will be telling your neighbors all sorts of intimate details about yourself. This kind of intimacy would cause raised eyebrows in America, where I lived for six years as a graduate student. Intra-psychically, too, there is more porosity between the three layers of the psyche of Indians. And that is the reason why Indian mythology is such a rich source of the kinds of stories that Dr. Chase is interested in.

Play Ethic

In contrast to the Judeo-Christian worldview of the Western civilization, with its distinctive and almost pathological Protestant work ethic, the Indic cultural ethos is more playful. This is indicated by the salience of the Indic cosmogony of "*lila*," which views the creation of the cosmos as resulting from the sport of the "divine." This cultural syndrome clearly has very positive and humanistic practical effects, because it makes for a more relaxed and healthier attitude towards life, thus functioning as a veritable *play ethic*[12] that facilitates optimal learning.

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8 Prem Saran, *Yoga, Bhoga and Ardhanariswara: Individuality, Wellbeing and Gender in Tantra*, New Delhi: Routledge India, 2008.

9 Gary Hamel and C. K. Prahalad, *Competing for the Future*, Cambridge, MA: Harvard Business School Press, 1995.

10 Melford E. Spiro, "Is the Western Conception of the Self 'Peculiar' within the Context of the World Cultures?." *Ethos*, 21(2), 1993, 107–53.

11 Malcolm R. Crick, "Anthropology of Knowledge," *Annual Review of Anthropology*, 11, 1982, 287–313

12 Kane, *The Play Ethic.*

In connection with this second theme, there is also the Indic cultural salience of the *pleasure principle*. This is quite patently evinced by the pan-South Asian persistence of Shakta/Tantric cults. These traditions foreground a balanced hedonism in order to attain the altered mental state of "*samadhi*," the pan-Indic term for the mystical experience of union with the ground of being. This sophisticated appreciation of the role of Eros in human life also happens to resonate with Freud's final realization that the libido is naught but the life-force, which can thus be channeled positively for learning purposes.[13]

This positive valorization of pleasure and play has been a very important theme in Indian culture. In contrast, even though when you go to an American university – say, the University of California – or travel in a bus in Santa Barbara, you might witness people locked in intimate embrace, it still seems to me that, at bottom, a certain degree of guilt about pleasure infects many people in the Western neck of our global woods! And I would argue that this is different from what we have in India, where there is a positive valorization of the connected values of pleasure and play. I am of course talking not only of sensual pleasure but also about intellectual pleasure, which is obviously very important because we are here to discuss the play of ideas and so on.

Gender Mutuality/Complementarity

Finally, as against the androcentric, Judeo-Christian metaphysical biases of Western culture, Indic philosophy and culture are pervasively imbued with the ancient bipolar ideology of Samkhya, with its basic attitude of gender mutuality/complementarity. This can perhaps be related to Carl Jung's theories about the archetypal anima and animus, which allude to the psycho-spiritual complementarity between the sexes. At any rate, this equi-gendered view of reality is visually encapsulated in the striking icon of Shiva as Ardhanariswara ("the God who is half-Woman"). This image also neatly epitomizes the synergized possibilities of balanced or *whole-brain* learning, through the co-option of the usually sub-dominant and latent right brain.

Indic Visualization as an Optimal Learning Technique

The above three cultural competencies are therefore extremely useful cultural valences, which can be said to characterize the Indic civilization as a "right-brain culture." Moreover, they also underpin the radically simplified version of the centuries-old Indic technique of bipolar yogic visualization, described here as the basis of my self-learning model.

The effectiveness of any tool or technique depends on how simple it is, as Edward de Bono has pointed out, and as is brought home to me particularly when I use it for training hard-boiled professionals such as senior civil servants in India. For, within minutes, worldly-wise subjects such as these are enabled to enter a profound meditative state, within which they can very easily be taught to "learn how to learn." This is made possible through the synergized achievement of peak performance, enhanced creativity and a systematic right-brain learning style, as I next indicate.

13 Martin Seligman, *Authentic Happiness: Using the New Positive Psychology to Realize Your Potential for Lasting Fulfillment*, New York: Simon & Schuster, 2002.

Peak Performance

As I mentioned above, according to French Indologist Louis Renou, the Indic techniques of meditation/visualization are a veritable "discipline of the unconscious." Or, to use contemporary terminology, such techniques are effective ways to get out of one's normal left-brain mode of consciousness, which constitutes merely the iceberg's tip of one's actual mental capacities. Thus, one can easily learn systematically to access the vast submerged and untapped potentials of the right brain. In other words, by regular practice of meditative absorption and thus of deep relaxation, states that manifest the right brain, one can effectively release the bulk of one's accumulated stresses, so that one begins to function at optimal levels of stress. One can thereby acquire a mindset of "learned optimism"[14] and therefore of openness to learning, which in turn enables one to operate at levels of peak performance that progressively help bring about Maslowian self-actualization.

Creativity and Innovation

According to many experts, individual creativity depends essentially on the ability to make novel conceptual associations, whereby one is then able to generate innovative ideas. This process is eminently facilitated by techniques of right-brain-tapping, which enable one to bypass the routine style of functioning of the left brain in order to enter the visual mode of the right brain. This latter holistic mode permits one to make the imaginative leaps that constitute what de Bono calls "lateral thinking."[15] The creative ideas that are thus generated can be critically evaluated later for their practicality and feasibility, by subsequent resort to the logical activity of the left brain. The net result is that one begins to learn in a synergized, whole-brain manner.

Right-Brain Learning

In the view of cognitive experts such as Edward de Bono, even the best-known universities worldwide are unable to produce the kinds of citizens/learners that modern societies need. Moreover, in Harry Alder's diagnosis,[16] the main reason for this is that most thinking techniques are largely left-brain-oriented; they focus mainly on the overvalued skills of critical analysis, sadly neglecting the much more powerful right-brain modes that are characteristic of the Indic civilization. In fact, he found that most successful business leaders he studied had somehow learned to access their full mental capacities systematically by using the holistic, visual mode of the right brain. In other words, there is a definite global and cross-cultural trend towards the "right-brain learner."

Indic Visualization as a Self-Learning Modality

The above three core values of Indian culture can be easily and systematically inculcated by the time-tested techniques of Indic visualization. By regular practice of this visual mode of thinking, one is enabled systematically to tap the vast but latent resources of one's own right brain. The subliminal dynamics so entrained therefore make it a fabulous tool for "super-learning." This

14 Ibid.

15 Edward de Bono, *Lateral Thinking for Managers*, London: Penguin, 1990.

16 Harry Alder, *Think Like a Leader*, Bombay: Magna Publishing, 1998; also Harry Alder, *The Right Brain Manager*, London: Judy Piatkus, 1998.

results in a tremendous learning synergy, whereby one learns *how* to learn in a positive and self-motivated fashion.[17]

Thus, the core values of Indian culture are themselves utilized as the bases of my state-of-the-art model for self-learning; this is in fact consonant with contemporary neuro-scientific findings that deep (self-induced) meditative states are powerfully conducive to learning.[18] Further, the model is also a generic one, for contemporary research has shown that a common neurology is shared by all learners, whether female or male, child or adult.[19] That in turn means that the model can be fruitfully used for both pedagogical and andragogical purposes.

Conclusion

To summarize, the Indic model of self-directed learning is both simple and effective, as well as cross-culturally valid. A cognate version of it has already been proved to be effective as an HRD-cum-learning intervention among senior civil servants working in various state governments in India, and also with senior executives and managers in major business organizations. It has been appreciated by global business leaders such as Bob Lutz (of General Motors) and Azim Premji (of Wipro). And, at an international conference in Bangkok on the "learning organization," it was even considered to be a possible alternative to the well-known model of MIT Professor Peter Senge.[20]

In short, this Indic HR model can be a powerful engine for innovation and knowledge management, besides constituting a *play ethic* that can replace the stodgy and outdated Protestant work ethic. It can effectively address the universal human need for the lifelong, holistic development of the individual, namely the optimization of one's physical, mental, emotional and spiritual potentials, as postulated in UNESCO's landmark Delors Report.[21] Furthermore, as a simple and effective application of Pareto's Law for the optimization of one's resources such as time, energy and money,[22] it also has worldwide outreach as a whole-brain approach to the problem of information overload in a globalizing world,[23] as indicated too by Dr. Ron Young's detailed entry on it in his widely read blog.[24]

17 Seligman, *Authentic Happiness*; Diane Dreher, personal communication, e-mail, January 2005.

18 Tony Buzan, *Use Both Sides of Your Brain*, New York: E. P. Dutton, 1980.

19 Edward de Bono, *Teach Your Child How to Think*, London: Penguin, 1994.

20 Prem Saran, "The Sixth and Ultimate Discipline: An Indic Model for a Learning Culture," in *Proceedings of the International Conference on the "The Learning Organization in a Learning World"*, Bangkok: King Mongkut's University of Technology, Thonburi, 2005.

21 Jacques Delors et al., *Learning: The Treasure Within*, Report to UNESCO of the International Commission on Education for the Twenty-first Century, Paris: UNESCO Publishing, 1996.

22 Richard Koch, *The 80/20 Principle: The Secret of Achieving More with Less*, New York: Random House, 1998.

23 Peter M. Senge, "Through the Eye of the Needle," in Rowan Gibson, ed., *Rethinking the Future*, London: Nicholas Brealey Publishing, 2003.

24 http://km-consulting.blogspot.com, 23 February 2008.

Annex
Saran's Model: An Indic Meta-learning-cum-Super-learning Technique

My Indic right-brain-tapping technique is described in the following five sections. In the first four, I outline its progressive stages: (A) the progressive relaxation of one's body, which is followed by (B) the progressive achievement of a deeply relaxed but alert mental state, in which (C) one then systematically programs oneself in order to accomplish one's goals, after which (D) one reinforces that programming. Then, in the final section (E), I make some useful points for its effective practice.

(A) Relaxing the Body

1. Lie comfortably on your back. Close your eyes. Take three deep breaths, imagining that you are exhaling all your worries and tensions with each out-breath, and inhaling deep feelings of relaxation and peacefulness with each in-breath.

2. Direct your attention to your feet. Imagine that they are becoming warm, as though steeped in warm water, with currents of warmth flowing through them. They gradually become very pleasantly relaxed and heavy.

3. Repeat this with your legs, thighs, hips, lower and upper back, shoulders, hands, wrists, lower arms, upper arms, chest, stomach, abdomen. Progressively your feeling of relaxation deepens, heavy and warm....

4. Now imagine the same with your neck, back of head, scalp, forehead, eyes and eyeballs. Let your mouth open slightly, with your tongue lying limp inside; then your jaws, chin and throat get relaxed. Now you are in a state of very deep relaxation. Heaviness and warmth….

5. Next, imagine you are going down in an elevator, 20 floors downwards. As you count each passing floor, from 20 to 1, you become more and more totally relaxed. Then, when you reach the bottom and the elevator doors open, you find yourself in a beautiful scene: perhaps a garden, a mountain vale or a solitary beach…. It is some place where you have been before, and so you easily recall those earlier feelings of being at peace with yourself, with nature and with the entire Universe….

6. Suddenly, you realize that you are no longer alone... there is someone with you. He or she is someone you trust and like very much. It is a person you are or were very intimate with, someone with whom you are totally relaxed. It feels so good to be with that special companion that your whole being is filled with joy....

(B) Relaxing the Mind

1. Then you realize that you are alone again. You find yourself lying there alone in that relaxing place, fully grounded to the earth beneath you. You now begin to imagine a fine tube inside you, extending from the bottom of your body to the crown of your head. You imagine that there is a fluid inside the tube, rising slowly within it like the mercury in a thermometer.

2. The fluid in the tube begins to rise, and to change color kaleidoscopically as it rises, taking up all the colors of the rainbow.... At the bottom of the tube the fluid is violet;

midway to your navel, indigo; navel, blue; heart region, green; throat, yellow; forehead orange; and at the crown, red.

3. Finally, when the fluid reaches the crown of your head, it magically fountains out through a very fine hole there. It covers and bathes your entire body, and your very being, with a feeling of peace, total calm and contentment.... You feel as though you have become an inert doll made of salt which has been dipped into the sea, so that you melt totally. You become one with the surrounding ocean….

(C) Auto-Programming

1. Next, imagine that you are in a "special place" of your very own. It is your sanctuary, where you can be highly creative and productive. It is a secret place, where you can also meet your personal adviser or guru. Perhaps it is a room with a panoramic view–a room that you have furnished with great care.... There is a large whiteboard with highlighter pens, two full-length mirrors and other things that you need.

2. So you are now in that "special place" of yours.... You are facing the whiteboard, and you slowly walk up to it. You pick up a yellow highlighter pen, uncap it and begin to write the syllable "One." You also say this to yourself mentally, say six times.... If your mind wanders, as it possibly may, let it do so. When you remember the sound again, just repeat it some more, for as long as you wish, until your mind is calm and relaxed....

3. Then, on that whiteboard of your mind, you begin to write in yellow again.... You write a brief, positively worded affirmation about your goals. It is in the present tense, as if you have already achieved what you want. You also repeat the affirmation to yourself mentally, or even out aloud if you wish: "I easily achieve [whatever your goal is]." And, finally, you visualize it too. You visualize a past success in detail, and then visualize in full detail that your present goal too is already achieved…. Your friends and well-wishers are shaking your hand and congratulating you… and it feels truly wonderful to be such an outstanding achiever.

(D) Reinforcing and Anchoring

1. You are now in a deeply relaxed and self-confident state. You are therefore ready to reinforce your own self-programming, by looking into the mirror of your mind and visualizing the positive outcomes you want in your life. You do so by using all three of your thinking modalities (see "E" below) – namely, the visual (i.e. images), the auditory (i.e. sounds) and the kinesthetic (i.e. feelings).

2. So you turn next to the two mirrors that you have in your "special room." The first mirror has a blue frame, and in it you visualize in detail your problem situation, whatever it is that you want to change. Immediately thereafter you look into the second mirror, which has a white frame and is to the left of the first one. In it you see the solution, the desired new situation, clearly and in vivid detail. And you feel the joy of achievement….

3. Repeat this process of seeing the problem and the solution a number of times. Each time you see the problem in the blue-framed mirror, you immediately see the solution in the white-framed mirror to the left of it.... And each time you see that solution image, you form a circle with your thumb and forefinger, and say "Yes, I can." This anchors

your feelings of confidence and enthusiasm, and triggers them off each time you repeat this special gesture or anchor.

4. It is now time to invite your personal adviser or guru into your "special place." He or she may be someone you actually know, or someone you simply imagine. It is a being who is very wise and resourceful.... Visualize the person clearly, and ask for advice. Imagine getting exactly the advice you need....

5. Finally you end your meditation by gradually counting from 20 to 1. As you pass 15 and 10, you tell yourself: "I come up feeling relaxed and alert." You then go about your daily activities enthusiastically, feeling progressively better each time you practice the technique.

(E) Points to Be Noted for Daily Practice

1. Regular practice makes the process more and more enjoyable, and also improves the effect. So do it twice a day for 15–20 minutes, just after waking up in the morning and just before sleeping at night–and, if possible, a third time at midday. And do it regularly for 21 days, which is the time needed to create a new habit.

2. The visual, the auditory and the kinesthetic modalities refer to the three main ways in which the human mind thinks, according to Neuro-Linguistic Programming – namely, images, sounds and feelings, respectively.

3. The colors in the tube are the rainbow colors, "VIBGYOR."

4. While visualizing, it is not important to have your images picture-perfect; it is the feeling of vividness that causes the effects of relaxation, not the perfection of the imagery.

5. You will be able to use the syllable "One" as a keyword or mnemonic – along with your thumb-circle anchor – any time in your daily round, and it will trigger off your feelings of relaxed confidence, optimism and enthusiasm.

Chapter 14

Dimensions of Knowledge Management Projects and Leveraging Technology in Higher Educational Institutions

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Introduction

Higher educational institutions have been regarded as the sites of knowledge production, storage, dissemination and authorization. Over the centuries a knowledge culture has been formed, but it is presently facing challenges on various fronts, such as finance, infrastructural facilities and from new providers of education and training. The time is opportune for India to make its transition to the knowledge economy – an economy that creates, disseminates and uses knowledge to enhance its growth and development. According to the World Bank, the critical demographic advantage favoring a shift of India's economy to a knowledge-based one is the availability of the largest pool of young people in the world. But the major stumbling block impacting this shift is India's higher education system. Higher education in India faces great challenges and difficulties related to creating an inclusive design, funding, enhancement of quality in teaching, research and development, leveraging technology for learning, employability of graduates and equitable access to the benefits of international cooperation. Building a roadmap for addressing these issues needs an understanding of the role of higher education in the management of a knowledge economy.[1]

Universities are now experiencing competitive pressures resulting from a reduction in government financial support and the consequent need for more enterprising approaches to revenue generation, bringing a commercial orientation to the provision of teaching and student services. This causes universities to measure their teaching programs, at least to some extent, as a market commodity that is aimed to meet the needs of the customer. Thus the "branding" of courses with an institutional reputation can make the "product" for "sale" much more attractive in the marketplace. Students become highly selective, using their enhanced information base, resulting in their becoming dependent subcontractors to retailers, rather than consumers in the traditional sense. Therefore, the universities' markets are also changing owing to new student demographics.[2]

1 Executive Summary, The Higher Education Summit, "Innovation for Quality and Relevance," Federation of Indian Chambers of Commerce and Industry, New Delhi, 2–3 November 2007, p. v.

2 W. Dolfsma, "Consumers as Sub-contractors in Electronic Markets," *First Monday*, 4(3), 1999.

Today, the government is no longer able to meet the growing demands and challenges faced by the higher educational institutions. The changing needs of industries for highly skilled and well-equipped human resources to be made available by higher educational institutions are creating gaps. Education today is subject to the same pressures of the marketplace.

> *Profound changes in competition have made universities and higher education institutions think like business enterprises. The educational markets are becoming global as universities attempt to internationalize their curricula and other higher quality programs to students regardless of location. Universities have to adjust themselves and develop strategies to respond rapidly to the changes in technologies and increasing demands of their stakeholders.*[3]

Driving Forces of Change in Higher Education

> *The competitive environment is becoming complex and keen between the existing higher educational institutions and the new providers who have fielded themselves with the prime motive of profit. The influence of the globalization process on higher education demonstrates the trends that this tug and pull are not only within national boundaries but have become a global phenomenon. The global networks and the market places for academic research have grown significantly. Efforts are being made internationally to converge and standardize undergraduate and graduate degree programs. International collaborations with other academic institutions and businesses are now commonplace. Universities seek new avenues to fund and promote the commoditization of their knowledge production capabilities. Many higher educational institutions are recruiting relatively new pools of students outside national borders. In this quest, most are seeking to apply new instructional technologies to expand enrolments and to enhance the viability and profitability of international ventures.*[4]

The world of higher education has been facing immense changes, and is now approaching a paradigm change. A new competitive environment has already emerged, and is being dictated by various forces. "These forces include not only institutional resistance to change, but also external politics and government initiatives, cultural dynamics, economic wealth, labor needs and the maturity of existing higher educational institutions."[5] Some of the forces are:

- intense global competition in the educational sector;
- increasing rate of innovation and quality education;
- transnational sourcing operations;
- education as a saleable service commodity under the World Trade Organization's General Agreement on Trade in Services;
- new providers of education fielding themselves with a view to complement and compete;

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3 J. S. Brown and P. Duguid, "Universities in the Digital Age: Change," *Magazine of Higher Education Learning*, 28(4), 1996, p. 10.

4 U. Zander and B. Kought, "Knowledge and the Speed of the Transfer and Limitation of Organizational Capabilities: An Empirical Test," *Organization Science*, 6, 1965, p. 76.

5 John A. Douglass, "All Globalisation Is Local: Countervailing Forces and Influence on Higher Education Markets," Research and Occasional Paper series, CSH, 1.05, Centre de Sciences Humaines, New Delhi, January 2005, p. 2.

- increase in global networks and marketplaces for educational research;
- increasing rate of intellectual diversification and migration;
- increasing focus on a knowledge society;
- need for life long learning becoming an inescapable reality;
- open and distance learning (ODL) enrolments increasing and becoming more competitive;
- international collaboration with other academic institutions becoming more common in order to compete.

Transforming Higher Education, the Key Factors: Knowledge and Technology

In the twenty-first century, knowledge and technology are the key factors in transforming any society or organization. Today, knowledge can be transported around the world to gain advantages over competitors through the constant process of innovation and the communication and dissemination of information/knowledge. The creative talent of knowledge workers using modern technology has become the key factor in success. We are living in an information society in which the knowledge economy and knowledge management (KM) are essential for competitive advantage. Existing knowledge and skills are becoming redundant, and innovations in the knowledge process are required.

Knowledge as a Source and Power

Knowledge is the cumulative stock of information and skills derived from the use of information by the recipient. "Where the recipient is a human being, knowledge reflects the processing (thinking or cognition) by the brain of the 'raw material' supplied in the form of information, so that data (signals which can be sent by an originator to a recipient), on its evolution to become information and then further to its next level of transformation to knowledge – gathers both meaning and value."[6]

It has been a seemingly endless journey from the information age to the knowledge age.

> *It is only nowadays (starting perhaps to move from the information age to the knowledge age) that ubiquitous computing allows us again have the interactive relationship between the knowledge creator and receptor, yet in a global and not a dual fashion. The opportunities resulting are so enormous and intuitively clear to all that the researchers and practitioners in the field of KM are merely making them explicit.*[7]

Knowledge is a body of information consisting of facts, opinions, ideas, theories, principles and models or any other frameworks. In practice, however, the terms "information" and "knowledge" are often used interchangeably. Knowledge basically starts as data emerging from raw facts and numbers. If these facts and numbers are used and put into some context, then they become known as "information," which may be embodied in documents or databases with the use of technology. When combined with experience and value judgment, such information can be used as "knowledge."

6 A. Burton-Jones, *Knowledge Capitalism,* New York: Oxford University Press, 1999, p. 248.

7 Gil Ariley, "KM as a Methodology Towards Intellectual Capital," 3rd European Knowledge Management Summer School, San Sebastian, Spain, 7–12 September 2003, p. 2.

> *Knowledge can be highly subjective and hard to codify. It includes the insight and wisdom of employees. It may be shared through e-mailed "best practices" memos or even sticky notes on a cubicle wall. And once we have knowledge, we can put it to work and apply it to decision making.*[8]

Knowledge limited only as a body of information will be of no use until it is applied in practice. It is aptly remarked,

> *[K]nowledge is a fluid mix of framed experiences, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of those in the know. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices and norms.*[9]

Knowledge has been studied in various contexts and has differed in its definition and scope from time to time. Some have defined knowledge as: "what do you know and how you know it, individual competencies and information."[10]

> *The properties of knowledge include:*
>
> - *Context specificity – the extent to which knowledge is contextualized and dependent on the environment;*
> - *Dispersion – how widely held is knowledge;*
> - *Tacitness – the extent to which it is codifiable or not;*
> - *Transferability – transfer between and within firms;*
> - *Reception or absorption – ability to absorb knowledge; and,*
> - *Complexity – difficulty in comprehending.*
>
> *If knowledge is power and a source of competitive advantage, then there needs to be special attention given to securing knowledge and knowledge repositories within the firm to protect the core asset of the organization.*[11]

In higher education, knowledge is generated and has different inflows and outflows at various organizational levels (see Figure 14.1). Knowledge accumulation, its generation and increase arise basically from individual and group members of the organization. The faculty and administrative wings are continuously busy with the development of the knowledge process as the key asset that fosters the attainment of competitive advantage. The elements used in their development process at all levels are:

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8 Jillinda J. Kidwell, Karen M. Vander Linde and Sandra L. Johnson, "Applying Corporate Knowledge Management Practices in Higher Education," *Educause Quarterly*, 4, 2000, pp. 28–9.

9 T. H. Davenport and L. Prusak, *Working Knowledge: How Organizations Manage What They Know*, Boston: Harvard Business School Press, 2000, p. 2.

10 Zander and Kought, "Knowledge and the Speed of the Transfer and Limitation of Organizational Capabilities," p. 76.

11 Ebrahim Randerce, "Knowledge Management Securing Future," *Journal of Knowledge Management*, 10, 2006, p.146.

- creation of knowledge;
- use and sharing of knowledge;
- transferring knowledge;
- continuous researches further adding to knowledge innovation;
- integration and formation of a database system (use of technology);
- diffusion and dissemination of knowledge to all systems within and outside institutions;
- valuing intellectual capital.

Thus, in higher education, the knowledge of an individual or a group is filtered to provide a final shape to become a part of curriculum culture, and in this process various information technologies are used.

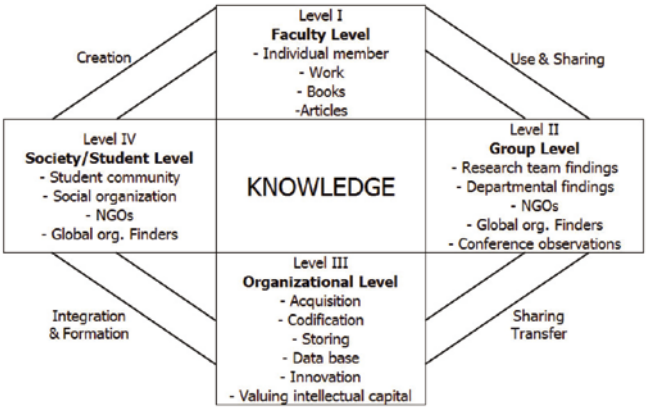

Figure 14.1 Knowledge Development in Higher Education.

Dimensions of Knowledge Management as Applied to Higher Education

Knowledge management, being a new and complex process that is understood differently in different contexts, is concerned with the exploitation and development of knowledge assets in the institution of higher learning with a view to enhancing its objectives. However, on the basis of project objectives, KM as applied to higher educational institutions may be identified and categorized under the following headings.

Creating Knowledge Repositories

In its starting stage, any educational institution will store both information and knowledge. The sources may be:

- external knowledge/information;
- internal structure derived from research projects and reports;
- internal knowledge such as discussions and databases, which is stored as "know-how."

It is beyond doubt that all institutions inherently store, access, filter, arrange and deliver knowledge in some manner or another, and add to the delivery of effective and improved services to the faculty, students and community at large. "Higher education institutions have significant opportunities to apply KM practices to support every part of their mission."[12]

> *As public, private or for profit, educational institutions alike respond to the phenomenal growth of entire courses, cyber colleges and virtual universities,*

12 Depung D. W. Davenport and M. C. Beers, "Successful Knowledge Management Projects," *Sloan Management Review*, 39(2), 1998, pp. 43–57.

> *these are the same reasons why they should adopt KM. It is with KM that colleges will be better able to increase student retention and graduation rates, retain a technology workforce in the face of severe employee shortages, expand new web-based offerings, work to analyze the cost effective use of technology to meet more enrolments, transform existing transactions based systems to provide information, not just data, for management and to compete in an environment where institutions cross state and national borders to meet student needs anytime/anywhere.*[13]

Improving Knowledge Access and Connectivity

The purpose is to facilitate transfer or provide access to knowledge. Some examples are the use of technologies such as video-conferencing systems, document scanning and establishing telecommunication networks to give and take knowledge to and from established repositories.

Creation of a Strong Knowledge Environment

A strong knowledge environment is created so that effective knowledge creation, transfer and use become possible. The success of knowledge management to a large extent depends upon improved structures and a culture that encourages individual and group creativity.

Managing Knowledge as an Asset (Intellectual Capital)

Knowledge is power, and is an intangible asset of an organization to which value can be assigned.

> *Assessment of knowledge can be made on the basis of knowledge that increases revenues and reduces costs by using a balanced scorecard as devised by Kaplan and Norton. Using the balanced scorecard, an organization is valued on four dimensions and not simply in terms of its financial performance. These four dimensions are customer, internal process, innovation and learning, and financial.*[14]

Demarest proposes a similar model "identifying four phases of knowledge management in any institution": knowledge construction; knowledge dissemination; knowledge use; and knowledge embodiment.[15]

> *[Knowledge management] is the formalization of and access to experience, knowledge and expertise that creates new capabilities, enables superior performance, encourages innovation and enhances customer value. It is an umbrella term for a variety of interlocking terms, such as knowledge creation, knowledge valuation and metrics, knowledge mapping and indexing, knowledge transport storage and distribution and knowledge sharing.*[16]

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13 Jillinda J. Kidwell, Karen M. Vander Linde and Sandra L. Johnson, "Applying Corporate Knowledge Management Practices in Higher Education," in Gerald Bernbom, ed., *Information Alchemy: The Art and Science of Knowledge Management*, Educause Leadership Strategies No. 3, San Francisco: Jossey Bass, 2001, pp. 1–24.

14 John H. Milan, "Knowledge Management for Higher Education," *ERIC Digest*, April 2001, p. 317.

15 M. Demarest, "Understanding Knowledge Management," *Journal of Long Range Planning*, 30(3), 1997, pp. 374–84.

This process further allows collaboration for continued learning and improvement. "It is a holistic solution incorporating a variety of perspectives, namely people, process, culture and technology, all of which carry equal weights in managing knowledge and in creating an environment conducive for innovation to take place."[17]

Treating knowledge management as a conceptual framework has been aptly defined: "knowledge management is the configuration and control of operational knowledge processes in such a way as to promote the yield and pleasure of knowledge as a factor of production."[18]

Yet KM aims at seeking organizational strategic advantage, and is treated as involving "strategies and processes to create, identify, capture and leverage vital skills, information and knowledge to enable people to best accomplish the organization's missions."[19]

Knowledge Management as an Integral Function of Higher Education

Knowledge management is increasingly becoming an integral function of any organization, and higher educational institutions are no exception to this recently developed practice and process. However, experiments in the educational sector are just beginning, with the help of knowledge management. Higher education is moving from the old culture, which considers "What is in it for me?", to a new culture that says, "What is in it for our customer?" And it is developing a culture that is ready to embrace knowledge management. "Using knowledge management techniques and technologies in higher education is as vital as it is in the corporate sector. If done effectively, it can lead to better decision-making capabilities, reduced 'product' development cycle time (for example, curriculum development and research), improved academic and administrative services, and reduced costs."[20]

Knowledge management offers something in a better and more effective manner to all sectors. "Universities and other higher education institutions are recognized to be in the knowledge business and increasingly they are exposed to marketplace pressures in a similar way as other businesses. It might, then, be reasonable to suppose that knowledge management might have something to offer higher education institutions."[21]

Higher educational institutions engage in a series of knowledge management activities, which could be used for further development rather than for developing a brand-new paradigm. It is important to bear in mind that "universities and their staff must recognize and respond

16 M. Gloet and M. Terziovski, "Exploring the Relationship between Knowledge Management Practice and Innovation Performance," *Journal of Manufacturing Technology Management*, 15(5), 2004, pp. 402–9.

17 M. Du Plessis and J. A. Boon, "Role of Knowledge Management in e-Business and Customer Relationship Management: South African Case Study Findings," *International Management*, 24(1), 2004, p. 86.

18 M. Noordegraaf, "Vigorous Knowledge Management – Conceptual Framework for Knowledge Management in Central Government Ministry of Interior and Kingdom Relations," Utrecht: Public Sector Information Policy Directorate, 2001, p. 28.

19 C. C. Brook, "Knowledge Management and the Intelligence Community," *Defence Intelligence Journal*, 9(1), 2000, pp.15–24.

20 Kidwell, Vander Linde and Johnson, "Applying Corporate Knowledge Management Practices in Higher Education," Educause Quarterly, 4, 2000, p. 31.

21 Jennifer Rowley, "Is Higher Education Ready for Knowledge Management?," *International Journal of Education Management*, 14(7), 2000, p. 325.

to their changing role in a knowledge-based society. Universities need to be consciously and explicitly managing the processes associated with the creation of their knowledge assets and to recognize the value of their intellectual capital to their continuing role in society and a wider global marketplace for higher education."[22]

Higher educational institutions' organizational design differs from that of business organizations in many respects and requires specific applications of KM. The differing features in particular are:

- the organizational set-up of universities, such as central/state universities deemed to be universities, institutions of national importance and private universities with or without aid or funding systems;
- governance through enactments passed by center/state or authorized autonomous bodies such as the University Grants Commission and governing bodies;
- accreditation system and nominated bodies;
- funding and grants in aid/resources, and levels;
- accountabilities/leadership and level of autonomy;
- vision and strategy under educational plans and policies;
- social value creation/cultural additions;
- bindings of multiple rules and regulations;
- public and private educational institutions;
- service rules and regulations.

Projected Objectives of Using Knowledge Management in Higher Education

Almost all institutions – whether public or private – engaged in imparting higher education will store, access, capture, share or deliver knowledge from faculty members to students and the community. In the current situation, where globalization and competition are having diverse effects in all sectors of the economy, higher education is no exception. KM involves much more and goes beyond the inherent knowledge industry of colleges and universities. Various reasons for adopting KM techniques in higher education are to:

- provide competitive teaching/training methods and systems;
- capture and share the best practices and courses to offer;
- increase customer satisfaction;
- generate revenues for improved infrastructure and facilities;
- deliver competitive study materials, through the use of improved technology;
- generate and make available the best faculty programs:
- provide training and refresher courses to faculty members:
- enhance Web publishing and e-learning set-ups;
- manage and protect intellectual capital (asset management);
- provide project and research/innovation facilities and a conducive environment;
- enhance the ability to manage and create a needs-based community for the development of its skills and knowledge;
- plan and redesign library facilities to users' satisfaction.

22 Ibid., p. 329.

Leveraging Technology to Facilitate KM in Higher Education

Knowledge management basically consists of people, process, content and technology to support and initiate the achievement of given objectives. Technology plays an important role in delivering and supporting knowledge management aims and objectives, including services. Therefore, there will be a need for some technology to be used to support knowledge management initiatives. In practice, there are different techniques/technologies that could be made use of for the purpose of achieving knowledge management objectives, including:

- electronic document and record management systems;
- collaboration tools;
- Web content management systems;
- portals;
- classified tools;
- search engines.

KM assists in providing a platform and processes that are shared and leveraged in higher education. It focuses on creating a conducive environment by the use of techniques to convert tacit knowledge into explicit knowledge. KM use in higher education facilitates collaboration across organizational boundaries through on-line forums. The use of technology and techniques in KM for higher education is not limited to a few situations, but would depend upon the requirements of the institution with its particular purposes. Technologies and techniques, instruments and aids enhance the speed and efficiency with which KM objectives are processed. But the total advancement of KM in any organization would depend upon the management philosophy strategy, the availability of funds and the procedures adopted. The most common instruments and techniques used are as follows.

1. Decision support techniques.

   They are tools and services such as data mining, simulators, artificial intelligence or the integration of all of them in an OLAP (on-line analytical processing). By making the right information available at the right time to the right decision makers, in the right manner, data warehousing and decision support technologies empower the employees to become knowledge workers with the ability to make the right decisions and solve problems, thus creating strategic leverage for the organization. The knowledge workers can use these tools to uncover strategic business opportunities, monitor product performance, investigate potential problem areas in current business operations, understand changing customer requirements and manage customer relationships in real time.[23]

2. Groupware solutions – applying a variety of computer-based systems designed to allow people to communicate with each other to complete projects.

   The most common features of group solutions are electronic mail and messaging, on-line calendars or diaries of employees, project management, TQM [Total Quality Management] and environmental manuals, documents and best practices (document repositories), mapping of employee knowledge areas and

23 Ibid., p. 329.

> *expertise (expert diaries or yellow pages), desktop video conferencing, on-line catalogues of library materials, books, journals articles and workflow tools.*[24]
>
> *Information technology supported by a space-based communication system has attempted to convert the world into a global village. Information super highways have generated e-commerce, e-business and e-education. However, there still exists a chasm between the developed and the developing countries in the arc of literacy.*[25]

Some of the techniques whose use will enhance competitive capacity and attain objectives are discussed below.

Data Mining

Data mining has been comprehensively defined by the Gartner Group as "the process of discovering meaningful new correlations, patterns and trends by sifting through large amounts of data stored in repositories, using pattern recognition technologies as well as statistical and mathematical techniques."[26] The use of data mining in higher education attempts to answer some complex questions, such as:

- the courses and combinations of subjects taken together;
- students' most sought after and most liked courses;
- an interdisciplinary approach to a course of study;
- the number of students opting for higher education degree courses and the percentages that stay on to continue further studies;
- new courses that could be added to the curriculum;
- present academic performance and its reflection in increased enrolments in universities/colleges;
- the impact of faculty development programs on improved academic results;
- students' cultural interaction in groups;
- faculty, student and administrative staff behavioral patterns.

Data mining is a tool that can assist in identifying patterns of needs and opportunities. It is correctly observed that

> *marketing is in a state of revival in higher education. As modalities of delivering learning have changed from the "only game in town" to "anywhere, anytime", institutions began to find themselves locked in a semi-fierce to fierce competition. Who else has the college not reached? Who may be interested in receiving more information in a particular program area? Marketing, powered by data mining, may provide just the right amount of "lift" to bring in more enrollments.*[27]

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24 Angel L. Merno, Calonia Lopez-Nicolas and Raman Sabater Scandez, "Knowledge Management Strategy Diagnosis from KM Instrument Users," *Journal of Knowledge Management*, 11(2), 2007, pp. 62–4.

25 Bhusan Patwardhan, "University Education, Quality Competitiveness and Grants: Global, Challenges – Indian Responses," Souvenir, The Higher Education Summit, "Innovation for Quality and Relevance," Federation of Indian Chambers of Commerce and Industry, New Delhi, 2–3 November 2007, p. 24.

26 See http://www.gartner.com.

27 Jing Luan, "Data Mining and Knowledge Management in Higher Education – Potential Applications," Presentation at AIR Forum, Toronto, Canada, 2002, p. 5.

Today, every institution is interested in increasing its student intake, and enrolment management is becoming a key factor.

> *As colleges and universities re-examine themselves, a painful experience by all means, enrollment management will be re-engineered and re-invented. Enrollment management was met with a variety of realistic challenges in the late 80s because it could not find the speed and tools to quickly identify the prospective student, to pin-point the time when a student may drop out and to meet the needs for services as quickly as students would desire. With data mining, web technology, and future Learner Relationship Management (LRM), enrollment management is once again poised to becoming a key player in higher education.*[28]

E-Learning

E-learning is the use of electronic multimedia technology to deliver education, information, skill, knowledge and individual learning programs to large audiences, potentially around the globe, using the Internet and other technology-based systems. SAP, IBM, Oracle, Microsoft, Sun, Siebel and PeopleSoft have all added new e-learning methods and redefined e-learning "as a core business process that must be automated like any other business process. They contend that, like other automated business processes, learning must be integrated into enterprise application suites."[29] E-learning is one of the most important KM practices, something that one would expect higher education institutions to have as an advantage. Yet these e-learning opportunities are geared most often to students as on-line customers, not to employees as part of capitalizing on their knowledge as an intellectual asset. The e-learning focus in KM is on "just-in-time" knowledge delivered anytime and anywhere, within a traditional "course" disaggregated into knowledge chunks. E-learning materials are at the core, and vocational subjects have to be prepared and developed properly.

> *The University of Wisconsin offers portal-centric graduate learning, customised forms of learning and assessment ("e-pedagogy"), personal intelligent agents, lifelong access to a body of knowledge, greater involvement in professional societies, and fusion of internship experiences with formal learning. The Monterey Tech System (ITESM) offers connected learning services to ten different countries in Latin America. Blending learning centres leverage the clicks-and-bricks model for bringing educational services to developing countries in Asia, with local ICT-enabled centres acting as local learning gateways.*[30]

Conventional practices in higher education need to be replaced. There is no time or place for the conventional events of an institution in the automated workflow. The traditional modes of delivery basically lack three characteristics: first, an instructor is available only to some people at a certain time; secondly, an instructor is not available anytime and anywhere to the learner; and, thirdly, an instructor may not be up to date with the most recent information and ideas. Hence

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28 Ibid.

29 Sam Adkins, "The Brave New World of Learning," *T+D Magazine*, June 2003, p. 29.

30 Review by Madanmohan Rao of Donald Norris, Jon Mason and Paul Lefrere, *Transforming E-Knowledge: A Revolution in the Sharing of Knowledge*, Ann Arbor: Society for College and University Planning, 2003, at http://www.techsparks.com/Transforming-e-Knowledge-A-Revolution-in-the-Sharing-of-Knowledge.html.

e-learning needs to be blended with classroom-based learning and other types of learning to ensure that technological, social and interpersonal skills are all learned properly.

In the Indian context, it has been observed that:

> *[T]he eleventh five year plan targets the ODL system to account for an enrolment of around 7 million students. If the Open and Distance Learning System is to meet the enrolment target of forty per cent of the total enrolment in the higher education, the delivery infrastructure will have to be augmented and expanded. To be more specific, the Indian Government should leverage the technology that matches the requirements of open distance learning. The facility needs to be extended for education, in general. Examples such as distance delivery, e-education and virtual universities need to be leveraged expeditiously to cope with the manpower requirements in the country.*[31]

Total Quality Management in Higher Education

Total quality management (TQM) is an alternative to many of the business management practices previously adopted in higher education. "TQM is a style of management that has worked for several decades overseas and is receiving growing attention in the United States. Now some colleges and universities are beginning to recognize that TQM values are more compatible with higher education than many existing management systems."[32] TQM concepts control quality, process and student management. Various quality principles such as vision, mission, system, decisions based on facts, planning for change and supporting a quality culture are essentially compatible with the values of higher education. Developing management skill is not the norm in higher education. Professional development is more often a discipline and a person-specific undertaking instead of focusing on members who can collectively improve institutional processes. Although data are collected for a variety of purposes in directing higher educational institutions, quality principles emphasize systematically collecting data before making academic and administrative decisions.

> *For culture to change, members need to shift their thinking about how the work is done. When the paradigm shifts, members begin to ask different questions in search of new answers to the same old problems. . . . People are trained to feel comfortable with change and not fear becoming involved in improvement efforts. Planning for change is an attitude to be cultivated by the leaders in the institution. Leaders are essential in creating a quality culture and they play a significant role in assuring that the necessary resources are available to support quality initiatives. When the quality principles are implemented holistically, a culture for academic excellence is created.*[33]

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31 "Higher Education: The Change Agenda," The Higher Education Summit, "Innovation for Quality and Relevance," Federation of Indian Chambers of Commerce and Industry, New Delhi, 2–3 November 2007, p. 7.

32 Lawrence A. Sherr and G. Gregory Lozier, "Total Quality Management in Higher Education," http://campus.mst.edu/assess/tqm/tqmhed.html.

33 Jann E. Freed and others, "A Culture for Academic Excellence: Implementing the Quality Principles in Higher Education," *ERIC Digest*, 1997, p. 3.

TQM as applied in any organization is a dynamic and progressive approach. Its overall success to a large extent will depend on the educational leaders/administrators accepting responsibility for providing better-quality services. It calls for a redesign of work systems, redefining objectives, roles and responsibilities. In such a process, "quality" is the permeating ethic in a community and organization delivering maximum welfare.

Human Resource Information System in the Context of Higher Education

The staff in higher educational institutions include administrative as well as teaching faculty members. Accurate information about staff is needed before effective human resource decisions can be taken; "getting the right person in the right place at the right time" is the motto of human resource management. The establishment of human resource information systems (HRIS) looks towards the integration of and support for the three essential corporate processes: strategic planning; operational planning; and human resource planning (including career planning).

"To survive, higher education institutions will need to be capable of adapting to changing workforces and responding to the dynamic demands of business and government, clients, policies and practices. In order to build effective institutions, create change strategies and achieve quality management, teams will need timely human resource information."[34] The essential components of an HRIS are accuracy combined with timeliness, to increase reporting capacity and controlling the whole system to achieve accuracy and confidentiality.

> *…an HRIS will enable an institution to format a profile of its staff – their strengths and weaknesses. In this way, the institution will know what it has, in the personnel sense. By knowing where it is going, through clear mission and goals, then the organization will be able to structure appropriate development, promotion, training and recruitment programs. In this way, the right people will be in the right place at the right time – resulting in quality human resource and personnel management.*[35]

HRIS moves from isolation to integration and facilitates a holistic approach to education (see Figure 14.2).

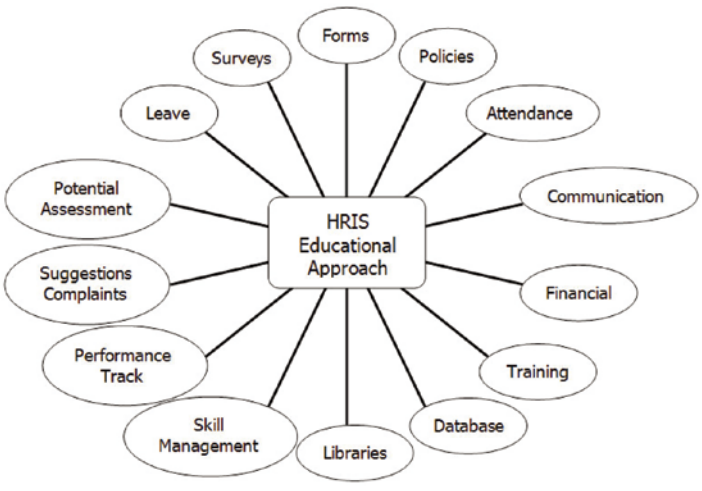

Figure 14.2 HRIS Service Delivery.

34 J. Dobson, "Changing Workforce," *Business Officer*, 26(12), 1993, p. 32.

35 Peter Hosie, "Promoting Quality in Higher Education Using Human Resource Information Systems," *Quality Assurance in Education*, 3(1), 1995, pp. 30–5.

The basic objectives of HRIS are many, including:

- standardization of activities and processes;
- reduced paperwork;
- information at fingertips;
- improved service delivery;
- enhanced efficiency at work;
- effective analysis;
- student self-service (SSS) or open system;
- Web system/analysis;
- user ID/password for users' security.

The University of California's HRIS supports a wide range of computing needs, such as administrative, academic, research and information portals.

> *The University of California system is undoubtedly the largest and most complex university system in the world. The university is also one of the fastest growing institutions in the world and operates in a highly complex and politically charged environment while facing tightening budget constraints. The university is also facing increasingly complex regulatory requirements and accountability expectations.*
>
> *It is in this situation that the university had the foresight to develop in July 2000 its vision for the future* UC 2010 – A New Business Architecture for the University of California. *The New Business Architecture put forward six general strategies that will allow the University to achieve these objectives:*
>
> - *Develop campus business portals that will integrate components of the New Business Architecture*
> - *Apply new approaches to how the University recruits, retains, and develops the very best people*
> - *Streamline UC's cumbersome policies and processes*
> - *Leverage new technology to contain costs and improve services to UC's constituents*
> - *Integrate campus financial systems and provide enhanced financial reporting through implementation of emerging technology standards, and*
> - *Embed performance management systems in UC business processes and focus on the most important financial controls.*[36]

Digital Dashboards

The University of California's HRIS supports a wide range of computing needs, such as administrative, academic, research and information portals. A notable feature is its digital dashboard.

> ***A digital dashboard dynamically integrates personal, team, corporate and external information.***

36 Oracle USA, "University of California – Human Resource Information System: Architecture Concept Paper," 18 September 2006, p. 1, http://www.ucop.edu/irc/docs/hrarchconcept.pdf.

A successful digital dashboard deployment is designed with the following goals in mind:

- ***Focus on critical information.*** *With so much information coming from so many sources, knowledge workers often spend hours sorting through various materials to find one key point. A digital dashboard helps solve information overload by delivering focused, vital business data through the use of filters, user-specified categories and summaries. Users can access high-level information in relevant business reports directly from digital dashboards.*
- ***Integrate information from a variety of sources.*** *Unlike some browser-only portal solutions that deliver information solely from the Web or an intranet, a digital dashboard integrates information from a variety of sources. Key business data from corporate applications, Internet and intranet sites, team folders, and personal files can all be organized and viewed easily on a digital dashboard.*
- ***Use knowledge fully.*** *Digital dashboards enable knowledge workers to make use of each other's knowledge. As corporations become more global, it becomes more difficult for workers to collaborate. Whether they are in the office next door or on another continent, workers can use a digital dashboard to locate and communicate with experts, collaborate on projects, and research corporate presentations and documents. Because digital dashboards are based on Active Server Pages and XML technology, companies can incorporate real-time tools into their digital dashboard solutions, such as Microsoft NetMeeting® conferencing software and Microsoft Windows MediaTM Player, which enables people to access dynamic streaming media content such as company communications, online training materials, and business broadcasts from the Internet or intranet.*

Digital dashboard allows users to integrate unstructured and structured data alongside rich collaboration and communication tools.

- ***Work with the same information, in the office or on the move.*** *Digital dashboards enable workers to make efficient and effective business decisions, no matter where they are. . . . Knowledge workers are often away from their desks but still able to access their company's networks and the World Wide Web and communicate with their teams and their customers. Using a digital dashboard, knowledge workers can view information from any source – including messaging and company applications, public folders, and favorite Web sites.*

A Powerful Tool for Change

As workers increasingly use digital dashboards to view their daily activities, share information with coworkers, and get feedback on company performance, these systems have a profound effect on workers' priorities.[37]

37 "MS Digital Dashboard Business Process Assessment Guide," prepared in conjunction with SPECTRIA, 1 May 2000, pp. 1–12, http://www.microsoft.com/technet/archive/itsolutions/intranet/plan/bpag.mspx.

Statistical Analysis System

The large amount of data held in college and university databases can be transformed into meaningful intelligence. Organizations are now better equipped and prepared to respond to complex educational issues, such as measuring effectiveness and strategically allocating resources.

The Statistical Analysis System (SAS) provides a powerful and comprehensive suite of solutions and services, from decisions to support administrative solutions to curriculum resources. Educational professionals can turn to SAS to get the accurate, critical and timely information that they need. SAS helps correlate learning outcomes and measurement and academic records with other critical factors. This enables trigger events to be identified that might cause a student's success or failure.

SAS offers capabilities in the following categories:

- *enrolment management* – attract and retain academic talent, identify students at risk and position resources to support student leaving and success;
- *institutional advancement* – cost-effectively target potential donors that are most likely to contribute;
- *institutional effectiveness* – monitor and track performance;
- *operational efficiency* – increase efficiency, maximize the use of available funds and better position resources to support student learning;
- *on-line curriculum* – offers innovative on-line instructional activities and tools in core subjects such as English, math, sciences, history and Spanish.

Launching Knowledge Management Projects in Higher Education: Some Key Points

The choice of the technique/technology that will be used for a project is a multifaceted decision to be taken after considering strategic issues such as:

- budget and time suitability;
- the value of knowledge management in terms of tangible and visible advantages:
- the changing requirements of institutions:
- the integration of various academic and non-academic activities;
- communication among staff members;
- a strong leadership initiative with a clear vision;
- complex situations requiring special attention.

Higher educational institutions must take a global and consistent vision when managing their knowledge assets and selecting the KM tools to be implemented. Many organizations still do not know what to do in order to manage their knowledge. Some important key points to remember are:

- approach knowledge management with a clear and definite attitude to what you want to achieve (strategy);
- the whole institution must share the KM strategies to be implemented;
- effective review and analysis should be done to update KM practice;
- strike a balance between exploration and exploitation, i.e. between the creation, discovery or acquisition of knowledge and its refinement and re-use;

- create a culture conducive to the application of KM practices ;
- effectively propagate an awareness of the benefits of KM practices and its ongoing uses;
- match the funding of resources for KM practices and tools/techniques to the financial and administrative benefits for the faculty, students, society and stakeholders;
- use appropriate technology and its latest tools/techniques as enablers and measure their impact on financial benefits;
- procure the possibility of achieving economies of scale, re-using knowledge for future growth and development;
- establish a balance between the accountability and autonomy of the educational institution as applied to faculty and administrative members;
- exercise care when codifying knowledge, using a "people-to-document" approach to ensure that strategies are innovative and build and sustain competitive advantage;
- develop organizational infrastructure accordingly to support KM.

Kidwell et al. gave the following advice to ensure success of a KM initiative:

- *Seek a high-level champion for the initiative – someone who believes in its benefits and who can advocate as needed.*
- *Select a pilot project for knowledge management – ideally one with high impact on the organization but of low risk to build credibility for KM. If possible, make the pilot one that participants will enjoy and find rewarding.*
- *Develop a detailed action plan for the pilot that defines the process, the IT infrastructure, and the roles and incentives of the pilot project team.*
- *After the pilot, assess the results and refine the action plan.*[38]

Observations and Remarks

The potential of the KM concept lies in how well a project exemplifies and applies progress from hoarding to sharing knowledge and gaining a competitive advantage. Higher education culture has to change to grab the emerging opportunities. The big challenge right now is to get people to change their leadership approach from formal authority to moral authority, and to create systems, structures and processes that will provide answers to the changing educational requirements for society. Education is the third-largest industry in the world after health and defense.

> *At present India has only a minuscule share in the $3 trillion global education market. But the possibilities are immense. Education could be India's best export. We can take the lead in providing professional education/training in I.T., healthcare, humanities and pure sciences in addition to engineering. An integrated policy for managing and exporting knowledge is the need of the hour and the Government should set up special economic zones focused on education. Unless we improve the quality of our institutions, we will be short of knowledge manpower and the demand will outstrip supply.*[39]

All educational institutions must heed the stipulation that they are under an obligation to provide academic standards in the delivery of quality education. Competition will decide the fate of higher educational institutions on a worldwide basis.

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38 Kidwell, Vander Linde and Johnson, "Applying Corporate Knowledge Management Practices in Higher Education," Educause Quarterly, 4, 2000, pp. 31–3.

39 *Sunday Times of India*, New Delhi, 22 January 2006.

Chapter 15

Service Quality in the Supply Chain: A Knowledge Gap Perspective

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Introduction

Supply chain management (SCM) involves integrated and synchronized operational efforts to improve the flow of materials and products,[1] i.e. all the stages involved to fill a customer order.[2] SCM is a management process[3] or a value chain, and involves the flow of physical, financial and information/knowledge resources.[4] SCM helps in achieving multi-criteria objectives such as serving the right customers, finding the right suppliers and fostering trust with partners.[5] The agility, adaptability, alignment[6] and service quality of the supply chain govern the competitive advantage of organizations. Service quality is an important issue in achieving competitive advantage and needs to be monitored and achieved for business success,[7] thus making service quality a concern of all organizations. Service quality is an outcome of the evaluation process (comparison of expectations and perception of performance),[8] involves customers' judgment of the overall excellence of a service and is a sum total of the customer's perception of the

1 R. A. Novack, C. J. Langley and L. M. Rinehart, *Creating Logistics Value: Themes for the Future*, Oak Brook, IL: Council of Logistics Management, 1995.

2 Sunil Chopra and Peter Meindl, *Supply Chain Management*, New Delhi: Pearson Education, 2006.

3 T. H. Davenport, *Process Innovation, Reengineering, Work through Information Technology*, Boston, MA: Harvard Business School Press, 1993. Also see R. B. Handfield and E. L. Nicholas, *Introduction to Supply Chain Management*, Englewood Cliffs, NJ: Prentice Hall, 1999.

4 James B. Ayers, ed., *Handbook of Supply Chain Management*, Boca Raton: CRC Press, 2001.

5 D. Simchi-Levi, P. Kaminsky and E. Simchi-Levi,, *Designing and Managing Supply Chain: Concepts, Strategies and Case Studies*, New Delhi: Tata McGraw-Hill, 2003.

6 H. L. Lee, "Triple A Supply Chain," *Harvard Business Review*, 82(10), 2004, pp. 102–12.

7 J. J. Cronin, Jr, and S. A. Taylor, "Measuring Service Quality: A Re-examination and Extension," *Journal of Marketing*, 56, 1992, pp. 55–68.

8 C. Grönroos, "A Service Quality Model and Its Marketing Implications," *European Journal of Marketing*, 18(4), 1984, pp. 6–44; A. Parasuraman, V. A. Zeithaml and L. L. Berry, "A Conceptual Model of Service Quality and Its Implications for Future Research," *Journal of Marketing*, 49, 1985, pp. 35–48. Also see A. Parasuraman, V. A. Zeithaml and L. L. Berry, "Servqual: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality," *Journal of Retailing*, 64(1), 1988, pp. 12–40.

service.[9] McDougall and Levesque argue that expectation scores on a service quality instrument may bring in inefficiency and redundancy because people tend to rate their expectations higher than the actuality and their perceptions lower than expectations.[10] There is no agreement on the nature or content of the dimensions of service quality.[11] Alternatively, service quality is also defined on the basis of its attributes, such as physical quality, interactive quality and organizational quality.[12]

The objective of this chapter is to explore the contours of service quality in supply chain management through the lens of "gap analysis." The identification of this research objective was based on the gaps identified in the literature and insights gained from my previous experience, field visits and exploratory interviews with scholars and practitioners. Taking a cue from the methodology suggested by Churchill,[13] a list of potential questions was drawn up from the literature review for conducting exploratory interviews. Exploratory interviews were conducted with five practitioners at the senior level, four mid-level practitioners and four scholars. The objectives of these exploratory investigations were:

- to look at the big picture and understand the structure and functioning of service quality in the supply chain;
- to learn the "what" and "how" of knowledge flows among members of a supply chain and how they each could be looked at from a "gap analysis" perspective;
- to glean preliminary information on the interactions of members of the basic supply chain, i.e. supplier–focal organization–distributor.

Literature Review

Knowledge and Supply Chain

An organization's ability to create, acquire, integrate and deploy knowledge is believed to be the only competitive advantage in today's e-marketplace and knowledge economy. In addition to managing internal knowledge,[14] leveraging the knowledge distributed in its supply chain is critical for the organization's competitiveness.[15] Sharing knowledge with others allows the

9 Cronin Brady, "Some New Thoughts on Conceptualizing Perceived Service Quality: A Hierarchical Approach," *Journal of Marketing*, 5, 2001, pp. 34–49. Also see J. M. Carman, "Consumer Perceptions of Service Quality: An Assessment of the SERVQUAL Dimensions," *Journal of Retailing*, 66, 1990, pp. 33–5; Cronin and Taylor, "Measuring Service Quality."

10 G. H. G. McDougall and T. J. Levesque, "A Revisited View of Service Quality Dimensions: An Empirical Investigation," *Journal of Professional Services Marketing*, 11(1), 1994, pp. 189–209. Boller Babakus, "An Empirical Assessment of SERVQUAL Scale," *Journal of Business Research*, 24, 1992, pp. 253–68.

11 Brady, "Some New Thoughts on Conceptualizing Perceived Service Quality."

12 J. R. Lehtinen and U. Lehtinen, "Service Quality: A Study of Quality Dimensions," Working Paper, Service Management Institute, Helsinki, 1982.

13 G. A. J. Churchill, "A Paradigm for Developing Better Measures of Marketing Constructs," *Journal of Marketing Research*, 1(6), 1979, pp. 64–73.

14 V. Sambamurthy and M. Subramani, "Special Issue on Information Technologies and Knowledge Management," *MIS Quarterly*, 29(1), 2005, pp. 1–7.

15 J. H. Dyer and H. Singh, "The Relational View: Cooperative Strategy and Sources of Inter-organizational Competitive Advantage," *The Academy of Management Review*, 23(4), 1998, pp. 660–79.

organization to integrate knowledge from diverse sources.[16] In the context of a supply chain, knowledge sharing with suppliers and distributors through inter-organizational collaboration presents a window of opportunity that can be translated into competitive advantage. Similarly in the intra-organizational context, knowledge sharing across different functional areas fosters camaraderie, which translates into an enhanced level of performance. Systems based on information and communication technology (ICT) enable cost-efficient sharing of inter/intra-organizational knowledge. These systems break the barriers of space and distance and the temporal limitations of communication, and facilitate the creation, storage, transformation and dissemination of knowledge. Inter-organizational knowledge can be grouped into the areas of "why" and "how" to share knowledge, the impact of knowledge sharing and the management and advantages of knowledge sharing. Transaction cost economics[17] and socio-political theories[18] provide a rationale for an organization's predisposition to share knowledge with a trading partner and how these factors affect the focal organization's decision-making on knowledge. Trust is another important issue in inter-organizational relationships, and denotes the level of confidence of an organization in its partner under conditions of uncertainty.

Gap Analysis

A gap analysis research instrument[19] is a formal means to identify and correct gaps between the desired and the actual levels of performance, and has been used by several researchers.[20] The service quality gap is defined as:

$$SQ_i = \sum_{j=1}^{k} (P_{ij} - E_{ij})$$

where SQ_i is overall perceived quality of stimulus i; k is the number of attributes; P_{ij} is service quality perception of stimulus i with respect to attribute j; and E_{ij} is service quality expectation for attribute j for stimulus i.

The Research Gap

For organizations, service quality is viewed as the most important issue in achieving competitive advantage and financial success. Various models of service quality discuss and empirically test service quality in different service industries, such as retail, banking and hospitality. Service

16 S. Gavirneni, R. Kapuscinski and S. Tayur, "Value of Information of Capacitated Supply Chains," *Management Science*, 45, 1999, pp. 16–24. Also see H. L. Lee, K. C. So and C.S. Tang, "The Value of Information Sharing in a Two-Level Supply Chain," *Management Science*, 46(5), 2000, pp. 626–43; J. M. Swaminathan and S. R. Tayur, "Models for Supply Chains in e-Business," *Management Science*, 49, 2003, pp. 1387–406.

17 By reducing the transaction cost, an information system in a supply chain facilitates a high degree of coordination and increases the value of coordinated resources through economies of scale and vertical integration. Organizations choose governance structures that minimize transaction and production costs. Transaction attributes such as asset specificity and uncertainty determine the choice of the governance structure.

18 Socio-political theories articulate that inter-organizational relationships could exist because of some social and political forces, even though they may not be cost-efficient. An organization forms inter-organizational relations aiming primarily at gaining control over resources.

19 Parasuraman et al., "Servqual: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality."

20 F. A. Frost and M. Kumar, "INTSERVQUAL: An Internal Adaptation of Gap Model in a Large Service Organization," *Journal of Services Marketing*, 14(5), 2000, pp. 358–77. L. D. Rosen and K. R. Karwan, "Prioritizing the Dimensions of Service Quality," *International Journal of Service Industry Management*, 6(3), 1994, pp. 64–83.

quality is important in both service and manufacturing industries. However, the service quality perspective of information/knowledge sharing/flow in the supply chain remains a missing link in the SCM literature. The review of the literature demonstrates the importance of information/knowledge sharing/flows among partners in the supply chain and its service quality.

Service Quality in the Supply Chain: An Information System Mediated Model

This research work proposes a conceptual model for quality of service in the supply chain through information system linkages. Supply chain linkages refer to explicit and/or implicit connections that an organization creates with its suppliers and distributors through its information systems (IS). The model consists of the following links:

supplier → information system → focal organization → information system → distributor → information system → customer.

This model categorizes the IS role by facilitating the flow of information/knowledge among knowledge seekers and knowledge providers. The role of the information system in facilitating information flow is analyzed using gap analysis as a tool. This analysis results in two types of gaps: the forward gap, which is defined as coming from the direction of the knowledge seeker to the knowledge provider; and the reverse gap, which is defined as coming from the direction of the knowledge provider to the knowledge seeker. These forward and reverse gaps may emanate from inefficient information or weak knowledge management processes, a lack of an organization-wide integration of business processes, poor support systems or inadequate infrastructure within an organization. Figure 15.1 illustrates the forward and reverse flow schematically.

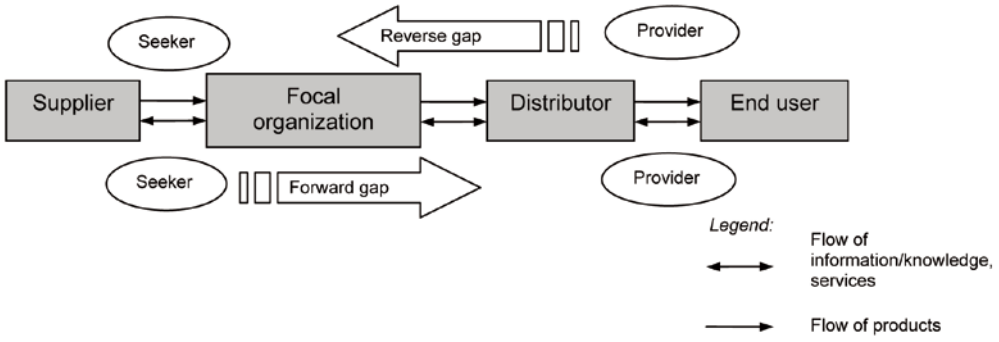

Figure 15.1 Conceptualization of Gaps across a Supply Chain.

The components of this model comprise the supplier (which represents the entity supplying the raw materials/services to the focal organization), the focal organization (the entity that converts these raw materials into finished goods and services), the distributor (the entity that distributes the products and services to the end user), the end user (the person who finally consumes the product and services) and the information system (the interface through which these entities communicate).

A satisfactory level of service quality is achieved when the difference between a user's perceptions and expectations of the product/service/process organization is zero or positive. User satisfaction is the result of the user's perception of the value received in a transaction relationship.

The forward and reverse gaps at the interface of these entities are the result of various sources

and are referred to as service quality gaps. These gaps along upstream and downstream supply chain entities represent a wide spectrum of issues related to the flow of information/knowledge. Addressing these issues becomes a prerequisite when the supply chain entities strive to have an integrated supply chain with a seamless information flow. Figure 15.2 depicts the various gaps at the interface of information systems across a supply chain. Figure 15.3 illustrates a decomposition of the gap between the supplier and the focal organization at a more detailed level.

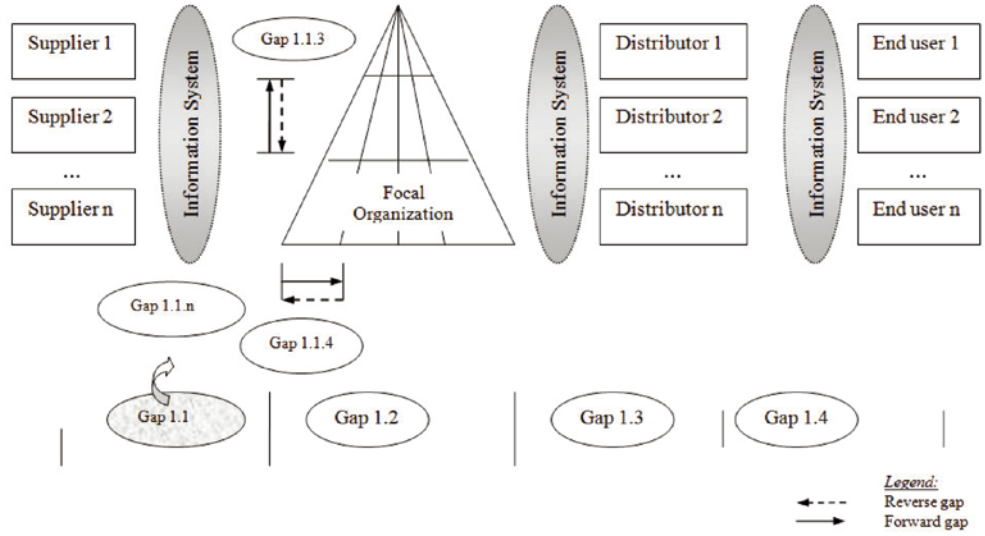

Figure 15.2 Gap Analysis across the Supply Chain.

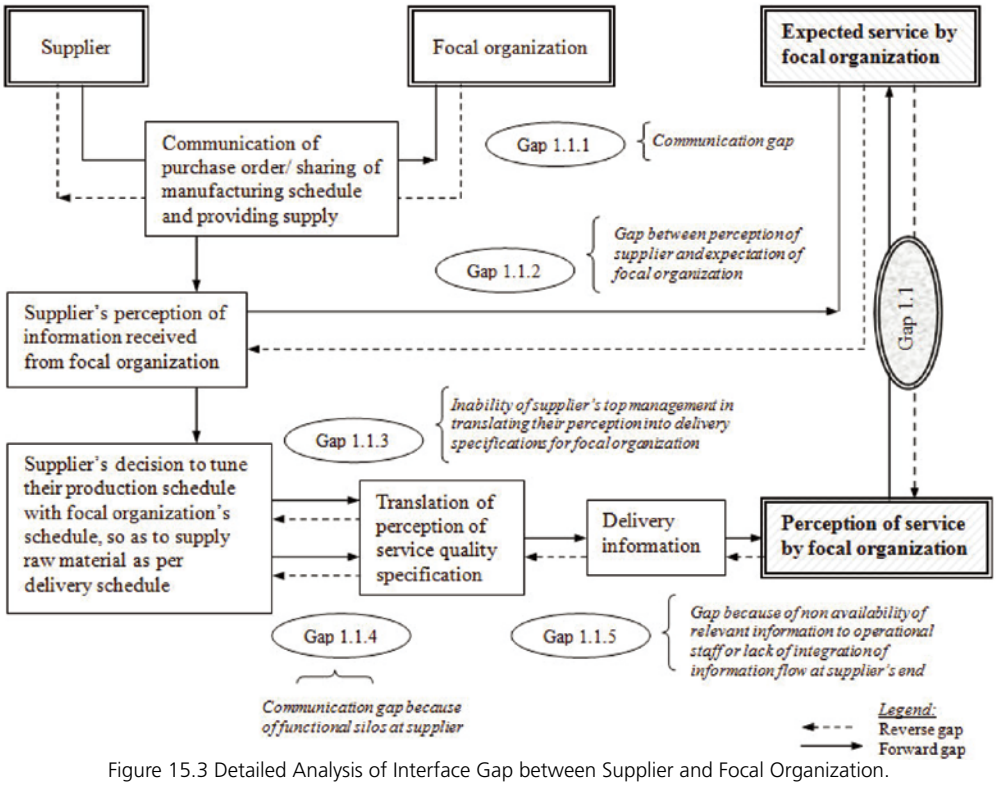

Figure 15.3 Detailed Analysis of Interface Gap between Supplier and Focal Organization.

Measurement of Gaps

The measurement of information/knowledge-mediated gaps at various interfaces across the supply chain requires qualitative as well as quantitative data. Various approaches are identified in the literature to collect these data. The appropriate approaches include survey researches and exploratory interviews.[21] Various researchers have used these approaches in the context of service quality and the supply chain.[22] In the context of the present study, IS-adapted SERVQUAL[23] can be fine-tuned to measure perceptions and expectations of service quality using a five-point Likert-type scale. Respondents may be chosen from each stakeholder of the supply chain.

Discussion: Bridging the Knowledge Gap

ICTs break the barriers of time and space in acquiring, assimilating and responding to market cues, thereby increasing an organization's capability to sense and respond to dynamic customer needs. Sharing information/knowledge among supply chain partners helps in translating these cues into actions that orchestrate the supply chain's behavior in real time. In order to bridge the knowledge gaps across the supply chain, an organization has to know the kind of service quality it intends to provide across its value chain. These gaps can be bridged through the deployment of knowledge resources. To identify knowledge gaps, an organization needs to model its business processes in order to identify where the information and knowledge actually reside. These chunks of information and knowledge need to be streamlined and integrated using ICT-based tools and the Internet. In a supply chain context, inter-organizational information systems will provide a seamless flow of information/knowledge across the entire value chain. To sustain the success and scaling-up of inter-organizational information systems, organizations need to involve all the stakeholders through informal cross-functional teams. Organizational learning and evolved best practices may be fed back through inter-organizational efforts to bridge the remaining gaps. Table 15.1 illustrates a selected list of indicators that can be used

Table 15.1 Select List of Indicators Associated with Knowledge Gaps in a Supply Chain

Indicators for identifying various gaps	Benefits from a reduction of gaps
Total cash-flow time	Improved level of coordination across the supply chain
Net profit vs. productivity ratio	Improved total order cycle time/total response time
Payment cycle time	Enable shorter production cycles
Total supply chain cycle time	Reduction in back orders
Supply chain capacity utilization	Effective stocking policies
Market-driven manufacturing schedule	Improved level of item fill rate (enhanced level of responsiveness)
Number of unfilled orders	Improved level of coordination across the supply chain
Number of skills-upgrading training programs	Reduction in forecast errors
Order delivery status and status of late orders	

21 B. B. Flynn, S. Sakakibara, R. G. Schroeder, K. A. Bates and E. J. Flynn, "Empirical Research Methods in Operations Management," *Journal of Operations Management*, 9(2), 1990, pp. 250–84; Cipriano Forza, "Survey Research in Operations Management: A Process-Based Perspective," *International Journal of Operations & Production Management*, 22(2), 2002, pp. 152–94; M. K. Malhotra and V. Grover, "An Assessment of Survey Research in POM: From Constructs to Theory," *Journal of Operations Management*, 16(17), 1998, pp. 407–25.

22 Cronin and Taylor, "Measuring Service Quality"; Parasuraman et al., "Servqual: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality."

23 William J. Kettinger and Choong C. Lee, "Pragmatic Perspectives on the Measurement of Information Systems Service Quality," *MIS Quarterly*, 21(2), 1997, pp. 223–40.

to diagnose the symptoms resulting from existing knowledge gaps and the benefits resulting from a reduction in the knowledge gaps.

Managerial Implications of the Model

This model of the service quality in a supply chain based on a gap analysis of the information/knowledge flow across the supply chain will be of immense help to managers. The model will allow them to visualize the flow of information/knowledge in a supply chain, thereby enabling them to identify any weak links in the information/knowledge flow and to work on these weak links to make the supply chain more information-driven, collaborative and dynamic, streamline business processes to make them more integrated and seamless, and identify the bottlenecks in the flow of information/knowledge. Removing these bottlenecks will provide timely information to the right person at the right place and the right time. It will improve managers' ability to make more informed decisions, thereby eliminating inefficiencies and improving overall productivity.

Limitations and Scope for Future Work

The model proposed in this study is based on a simple supply chain. Organizations across various industries may have different supply chain structures and different ways of performing business processes. Structures, roles and responsibilities within an organization and supply chain design will mold the type of gaps within the organization. Adapting this model across different industries will be an interesting area of future work. Further, this model is conceptual in nature and may be empirically tested by collecting data through a questionnaire survey. Future researchers may develop a scale to measure knowledge gaps or they may adapt an already existing scale such as the "IS SERVQUAL."[24] Data may be collected from a sector or from an industry within a sector. More focused studies can limit themselves to the use of one attribute, such as role agility in the quality of service in a supply chain. Another area of research could be studying how upstream and downstream members of a supply chain respond to these information/knowledge gaps.

Conclusion

In today's dynamic e-marketplace, the timely availability of the right information/knowledge in the right place provides a competitive advantage to organizations. The model proposed in this chapter will be a valuable tool in appreciating the role of synchronized information linkages in a supply chain. Synchronized information/knowledge flows in a supply chain make it more agile and help the supply chain partners align their business processes and adapt to the changing business environment. Using this model, supply chain partners can find gaps in information/knowledge flow in their own supply chain. The linking of databases across different operating sites of a supply chain will provide information about inventory/backlog status, future production plans and changing customer preferences to all members of the supply chain, which will then help them to shift or push/pull the boundary more towards the upstream part of the supply chain. Sharing information/knowledge enables the partners to engage in collaborative product development and new technology development.

24 Kettinger and Lee, "Pragmatic Perspectives on the Measurement of Information Systems Service Quality."

Technical Session V:

KM Standards, Regulations and Tools/Techniques

Chapter 16

The Intellectual Property System

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The importance of innovation, as well as the creativity issues pertaining to it, cannot be overstated in today's knowledge economy. The faster we innovate, the more creative we become as a society, as an industry or as a country, and the faster will be the pace of economic growth and the greater our competitiveness in the global economy.

It is very clear that, over the past few years, India has emerged from being merely a user of intellectual property (IP) to being an intellectual property producer. Its approach to the whole range of issues relating to intellectual property has become a delicate and complex subject. It is a complex subject because a legal framework is involved. There is also an administrative framework. There are stakeholders of all kinds involved. Thus, the Government of India need to proceed in a very careful and balanced manner. It has to take slow but very sure steps in the direction of creating a climate that fosters and encourages innovation and creativity. In this chapter, I will try to convey the message that India means business when it comes to issues of intellectual property rights, innovation and creativity.

India's Intellectual Property Rights Strategy

What is India's intellectual property rights (IPRs) strategy?

- *Meet our international obligations.* If we look at India's history, we can see that India has been extremely mindful of this fact. It has been very careful that, if there are international obligations to be met, they must be met. This is done within the stipulated timeframe, and here I would refer for instance to the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). There were certain requirements in order for India to meet the TRIPS mandate by a deadline of 1 January 2005, and India amended its legislation in order to become TRIPS-compliant by the given date.
- *Safeguard public interests.* One of the government's primary concerns is what is in the interests of the people of India, particularly in areas related to public health. In its legislation it has put in adequate safeguards to ensure that public health concerns are fully met.
- *Modernize the intellectual property rights administration.* It must be made transparent, user friendly and efficient. This is an absolute must if India wants to become a modern economy and have a place in the knowledge economy. IP today is in the situation that,

say, information technology (IT) was in 20 years ago. Then, IT was still a fairly unknown commodity; today, India is one of the world leaders in the field of IT.

- *Create awareness about IPRs.* Intellectual property today is still a subject that very few people are fully aware of, except for those who are producers or users of intellectual property. Thus it is absolutely essential to spread the message about what IPRs are all about, to sensitize the stakeholders and the people at large.

For the legislative framework, India has four pieces of legislation: the Patents Act, which was amended in 2005; the New Designs Act, 2000; the Trade Marks Act, 1999; and the Geographical Indications of Goods Act, 1999. These Acts are administered by the Ministry of Commerce & Industry. In addition there is the Copyrights Act, which is one of the major Acts on intellectual property that the Ministry of Human Resource Development looks after. In all this legislation, India has fully met its international obligations.

Patents Act

Patent law, I would say, is the most significant aspect of IPRs. Its salient features are:

- both product and process patents provided;
- term of patent – 20 years;
- examination on request;
- both pre-grant and post-grant opposition;
- fast-track mechanism for dealing with appeals;
- provision for the protection of bio-diversity and traditional knowledge;
- publication of applications after 18 months, with facility for early publication;
- substantially reduced time-lines.

India has introduced both product and process patents. From 1 January 2005, patents were introduced for drugs, food and chemicals. It has made provision for both pre-grant and post-grant opposition to bring transparency into the system and to ensure that it does not grant a wrong patent or, worse, a bad patent. It has introduced a fast-track system for the resolution of appeals against opposition cases, with an Intellectual Property Appellate Board specifically to look at such cases. Given India's rich bio-diversity, it has made provisions for the protection of that bio-diversity and its traditional knowledge. It has also put in some mandatory time-lines to make the system more transparent and to reduce discretion within the bureaucracy. So an application must be published by the nineteenth month after it was filed, substantially reducing time-lines.

India has made sure that there are safeguards in the Patent Law:

- compulsory licensing to ensure the availability of essential drugs at reasonable prices;
- provisions to deal with public health emergencies;
- a patent may be revoked if it is in the public interest, and also for security considerations;
- provisions to prevent the grant of patents based on frivolous or trivial inventions;
- a very specific provision to prevent the misappropriation of India's genetic resources and traditional knowledge.

Trade Marks Act

India's trademarks law, for both goods and services, is completely compatible with international standards. It is also possible to have collective trademarks. As a concept, well-known trademarks

are protected in India. The term is 10 years renewable, which is an international norm. There are criminal penalties for infringement, and also a simplified procedure for licensing and a fast-track mechanism for dealing with appeals on trademarks.

Designs Act

Design law is a relatively new area compared with patents and trademarks, but India has begun to recognize that design is a key element in enhancing the competitiveness of industries. As some people say, success is not by chance but by design. It is that small element of design that can really enhance the value of a product. In 2007, the Government of India announced a national design policy. It is also taking steps to upgrade the design education infrastructure in the country, to expand that infrastructure and to create a Design Council to come up with a brand that is identified with India. This is the most recent step in the area of design.

Geographical Indications of Goods Act

Geographical indications are also a very new area, and concern the registration of the origin of agricultural, natural and manufactured goods. This enables the consumer of a product to link it to a certain region or a certain area of the country. For instance, the saris that Indian women wear can be identified as coming from Chanderi or Pochampally or Kanjivaram or elsewhere. In addition, certain kinds of handicraft are associated with a particular geographical area. That is now also seen as an intellectual property. India has the potential to register thousands of geographic indications (GIs). This kind of IPR really covers the agro-rural communities. There have been success stories. For instance, in Chanderi, which is a very small township in the state of Madhya Pradesh, the cooperative society registered a GI. Now, only they can make the Chanderi sari, which must conform to a certain quality standard, and that has really helped the economic growth of that community.

IPR Modernization

The First Phase

The first phase of the modernization had an allocation of close to US$40 million and focused on the creation of state-of-the-art infrastructure, augmentation of human resources, computerization, creating awareness and training.

The Trade Marks Registry used to have a huge backlog – about 450,000 – of trademark applications, owing to a lack of human resources. Most of the applications had not even been looked at. A clean-up drive was carried out in 2005 and that backlog has been cleared. Previously, it would take about five to eight years to obtain a trademark. Now the registry is competitive – globally competitive, I would say – and is granting trademark registrations within a year or a year and a half. This is very good even by global standards.

With these milestones achieved and with the investment of a lot of money, four state-of-the-art IPR offices have been created in four metropolises in India. These were commissioned in August 2005 and May 2006, and human resources were increased to cope with the rising trend in applications for intellectual property. The offices have been computerized on a massive scale, with the aim of becoming fully paperless offices. We want them to match the best offices in the world, say the Japanese Patent Office or the US Patent Office. In July 2007, India launched the e-filing of patent and trademark applications, which only very few countries in the world have done. It is now possible to file a patent or a trademark application from one's home or office.

There is a dedicated website and on-line search facilities. Several steps have already been taken and many more will be made in the coming years.

The Intellectual Property Training Institute has been established, not just for training but also for sensitization awareness programs.

The Impact of Modernization

The systems modernization is having a clear impact on the sector (see Table 16.1). Whereas, in 1999/2000, only about 4,800 patent applications were received, in 2006/7 the figure was close to 30,000. It thus grew six-fold in a period of seven years. In 2007/8 I believe it will reach 40,000. The system is able to cope with the expansion. There is a renewed interest, nay a surge, in IPR issues. More importantly, of the patent applications, in 2004/5 only 1,911 patents were granted. In 2006/7 the figure had reached 7,359. In 2007/8, more than 10,000 applications could be granted, a five-fold increase in three years. Trademark applications have gone up about two-and-a-half times to some 100,000 per year. The number of people who are now interested in IPRs and the number of foreign companies that get their brands registered in India through trademarks have also grown. This spike in registration really showed after the backlog was cleared. Design applications have similarly more than doubled in recent years. The number of GIs has increased as well, being about 42 to date.

Table 16.1 Patent and Trademark Applications before and after Modernization

	Before modernization 1999/2000	After modernization 2006/7	Impact
No. of applications filed			
Patents	4,800	28,800	6 times increase
Trademarks	40,000	100,000	2.5 times increase
Average time for evaluation			
Patents	4–5 years	2–3 months	Speedy examination
Trademarks	2–3 years	3–6 months	

The revenues generated by the IPR offices have been incredible. Although they have spent only about US$3.97 million per year on administration and their huge staff of over 1,000 for the four offices, they have generated about 10 times as much revenue – US$40 million per year. This shows the efficiency of the system as well as the interest that IPRs have generated in India. At the moment, the revenues go into a consolidated fund of the government. Within the IPR system, we have tried to argue a case that this money, if it were recycled into our system, would mean that we would no longer need any other assistance. We could go ahead and undertake our own modernization and be completely autonomous.

Whereas the average evaluation time before modernization was 4–5 years for patents, it has now gone down to only 2–3 months. The average time for granting a patent, which used to be 6–10 years, is now down to 2–3 years; the 7–10 years for granting trademarks is down to only 2 years.

Whereas before there was no digitization of records, now the aim is 100% digitization of all records, which will make searching and other processes simpler. The processing of applications, which used to be done manually, is now done electronically. There is now a website. The filing of applications used to be done only on paper; now it can be done through e-filing. Paper-format journals have become electronic journals. Public site facilities have now been made available. India did not have an IPR training institute before, but we have one now.

The impact on human resources also has been large: a four-fold increase in staff dealing with patents and a doubling for distinct trademarks. Staff used not to be sent for training abroad. Now examiners go abroad at the rate of about 20–25 per year. The trademarks staff have to gain experience of the best systems globally.

The Challenges Ahead

The Indian Patent Office has recently been recognized by the World Intellectual Property Organization as an International Searching Authority and an International Preliminary Examining Authority. This puts it in an exclusive group of just 15 countries that have been given this recognition. It will, of course, mean that certain requirements have to be fulfilled, which it is hoped will soon become operational. The modern protocol for trademarks is being put in place, which will make India very competitive globally. International applications can be accepted through a single application, and it is likely that the number of applications will go up as a result. Very specific time-frames have been established to deal with these applications. They have to be processed within 18 months, which puts a certain pressure on the system. India is also dealing with a lot of bilateral cooperation agreements on human resource development, on capacity-building and on public awareness sensitization with France, Germany, Japan, the UK, the USA, Switzerland and the European Union Patent Office. The aim is to pick up the best practices globally and then to try to implement them.

Awareness creation is a challenge that covers the entire range of stakeholders: IT personnel, industry, academia, the judiciary, enforcement agencies, state governments, etc. Several awareness campaigns are proposed among stakeholders at the central level and the state level, involving industry as well as universities. We are further trying to modernize our existing infrastructure by doing whatever needs to be done to the physical infrastructure and making a large increase in human resources. Computerization will be a key area of the next phase, involving the upgrading of all the IT infrastructures in the IPR offices. A National Institute of Intellectual Property Management will also be established. The four key areas will be training, education, research and IP think-tank services. The building construction phase is about to begin, and it is hoped that it will become a center of excellence.

The rising trend in patent applications, trademark applications and grants can only mean that the concrete improvements in the systems are totally in line with the economic growth that India is witnessing. GDP growth rates have been about 9% for the past three years, compared with only 3–5% before. India's foreign exchange reserves, which in 1991 were only US$1 billion, are today over US$270 billion. Foreign direct investments, which are also an indication of India's credibility, are increasing. All these trends point to a clear correlation between how well you protect your intellectual property, how innovative a society you are, how creative you are and how rapidly your economy will grow. India is on the move.

Chapter 17

Knowledge Management Systems in an Engineering Consultancy Organization

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We are all aware that, over the last four to five years, "knowledge management" has become one of the industry's buzzwords. One question is: why now? Some reasons for the dramatic increase in the level of interest in recent years are globalization and competition, restructuring and downsizing, the sharing of best practices and successful innovation.

In the context of the industry that I represent, I would like to address the issues of globalization and competition. MECON is an undertaking by the Government of India under the Ministry of Steel. It is a small engineering consultancy organization, and it is now faced with global competition from companies such as Posco and Siemens, V.I. and many more from Italy, Germany and so on. There is always a lot of restructuring going on. There is always pressure, in that you cannot increase your human resources but you are expected to deliver more output. Downsizing is another issue. It is very hard to downsize when, at the same time, you are expected to perform better. The sharing of best practices has become very important these days. This is something that is good to hear, but discovering how to do it is even more important.

For us at MECON, however, what is important is that the marketplace has become increasingly competitive. We have to compete with global players that have very robust systems already in place. They are able to deliver things better, and we have to match them in this respect both in quality and in time.

What is knowledge management? Knowledge management can be understood as the explicit and systematic management of vital knowledge and its associated processes of creating, gathering, organizing, diffusion, use and exploitation. It requires turning personal knowledge into corporate knowledge that can be widely shared throughout an organization and appropriately applied. Knowledge management involves the identification and analysis of available and required knowledge, and the subsequent planning and control of actions to develop knowledge assets so as to fulfill organizational objectives. Knowledge management is not about information technology, but about capturing and using the tacit and explicit knowledge that resides in staff for the purpose of improving organizational effectiveness. It requires an organizational culture that supports and rewards sharing of expertise.

Most traditional companies' policies focus on the tangible assets of the company and leave their important knowledge assets unmanaged. The challenge of deploying the knowledge assets of an organization to create competitive advantage is becoming more crucial for the following reasons.

- The marketplace is increasingly competitive and the rate of innovation is rising, so that knowledge must evolve and be assimilated at an ever-faster rate.
- Knowledge takes time to experience and acquire. It does not happen overnight that you instantly become knowledgeable on a subject. First, you have to practice before you can say that this or that person is knowledgeable. And then, there is also the issue of whether the knowledge is tacit or explicit in its form before we can try to capture it. When it is tacit it becomes even more challenging.
- Employees today have less and less time to acquire tacit knowledge and to deliver. Early retirement and increasing mobility of the workforce are leading to the loss of knowledge. An important consideration for Indian industry, particularly for the older industries established in the 1950s, is that a high percentage of their workforce will soon be going into retirement. In the public sector 60 is the age of retirement. There will be a big exodus in 2008/9, and these are all knowledge workers. So if they do not now disseminate what they know to the younger workers before they leave, it will be difficult for many companies to carry on their operations.
- Most of our work is knowledge-based.
- Organizations compete on the basis of knowledge. So a consultancy organization such as ours competes on the basis of the knowledge that it has.

It is important to note that, unlike in the old days when it was considered that knowledge is power, today we need to emphasize that knowledge sharing is power. When you share knowledge, you are not going to lose; rather, you are going to gain importance in society and in your profession.

I shall now discuss the importance of knowledge management in MECON. MECON is a multidisciplinary company involved in designing, planning, engineering consultancy and contracting. It works in, basically, four strategic business units: metals, power, infrastructure and oil and gas. By 2012, the Ministry of Steel plans to achieve a production level of 100 million tons. All the steel plants under the Steel Authority of India Ltd. and many other major private players such as Essar, Jindal and Tata, are augmenting and expanding their operations in order to reach this target. In the process, MECON will be handling more than Rs 50,000 crores of investment until 2012. This is its main source of business revenues. Another area is power. It has done a lot of infrastructure projects, from roads to highways to flyovers to waterways. Then there is the carbon metal handling facility. MECON is also into re-manufacturing activities from pre-investment investigations to production selection, writing techno-feasibility reports, basic project engineering, retail engineering, procurement and contracting, construction and project management, industrial automation, software real-time applications, basic health studies, asset evaluation, engineering services for plant relocation and refurbishing, EPC (engineering, procurement and construction) projects, EIA (environmental impact assessment)/ EMP (environmental management plan) and other related studies. MECON can build a steel plant from scratch and handle the testing, which is also within its capability.

MECON's head offices are in Ranchi, which is the state capital of Jharkhand, around 1,300 kilometers from Delhi. It has a presence in major metropolitan locations. The company reached the peak of engineering excellence when it was chosen to build the second launch-pad project against stiff competition from other companies. In May 2005, the first rocket was launched successfully from the second launch-pad at the Satish Dhawan Space Centre. Many more successful launchings were done thereafter. We take pride in saying that we were part of bringing about this engineering marvel for India.

Therefore, as an organization, we need to understand our corporate knowledge asset, how to make use of it, how to maximize its returns and how to transfer it (particularly tacit knowledge) to the younger professionals who will be taking over responsibility for projects in the future. We started the process by asking our colleagues for help.

After listening to a lecture on knowledge management by an expert from Tata Steel, we invited him to come to MECON in August 2006. We also invited all the key technology section heads and service section heads to share their experiences and help us to understand the terminologies and basic nuances of knowledge management for industry. We then converted all these inputs into a participative workshop where the participants made suggestions about how we could make a small start at MECON. It was agreed to have an information depository system where everyone in the organization can retrieve relevant information they need and ask company experts if they have any questions. At this point it must be emphasized that this was a top-down movement, as it should be, to elicit participation from all levels.

The first step was to share existing knowledge and make implicit knowledge more explicit. We started knowledge-sharing sessions among the various projects in different technology sections, with representatives from the Human Resources Department acting as facilitators. We also identified the best practices in other industries. Young teams from MECON were sent to observe these practices, which can only enrich the quality of consultancy at MECON over time.

We established an apex committee, with members drawn from other knowledge communities who are practitioners. We instituted knowledge communities in our key technology sections – iron making, steel making, rolling mills, coke ovens, power plant and material handling. We also organized these in the service sections – electrical, civil, structural, architecture, hydro-engineering, furnaces and gases, air conditioning and ventilation, and contracting activities. These knowledge communities deliberated to arrive at a general framework. Then everyone sat down to evolve a common framework for the knowledge repository at MECON. With this in place, we went to our information technology (IT) enablers to help us develop an e-archive system.

Another tool that was set up was an on-line discussion forum, where participants can share views, raise questions and have somebody pick up the thread of the discussions. Employees can register and log on in the same manner as they would for any Web-based e-mail system. The e-archive has its own security system. Each department has a password that enables employees to access the different intellectual products in terms of technical specifications, drawings, design parameters, norms and standards. Everything about a project is posted, together with the dates of completion, so that everyone knows what has already been done. References are automatically built into the system. The system has robust security measures that instill confidence in our workers that the information will not be compromised.

Project-related knowledge sharing has become very important, such as interfacing problems encountered and other feedback during the execution of a particular project design. The project completion report addresses this aspect. Any innovative ideas that an employee may have can be disseminated through the on-line forum. When employees are sent abroad for training or to visit another facility, they must provide a sharing session upon their return. A summary of all the new knowledge gained is then uploaded into the system. For example, now that MECON's steel plants are going to be converted to 4,000 m^3 blast furnaces – there are currently only one or two in India, including one of Tata Steel – teams have been sent to visit other sites. When they come back, they conduct a session on what they have seen and

learned, and write a report about it so that others can also profit from the new knowledge. This is like tacit knowledge transfer, where knowledge is transferred from senior staff to more junior personnel. MECON has its own competency mapping model in which it tries to match people with lower competencies with those with higher competencies in a project scenario so that they can learn on the job. Thus knowledge updating is seen either in the form of on-the-job training or through structured training programs.

The difficulty of knowledge sharing has been eliminated. Knowledge is no longer the sole domain of individuals or even groups. This has helped increase MECON's productivity. It has also done away with work duplication. As a result of all these initiatives, 9,642 documents had been archived as of January 2008. These represent valuable intellectual property. It is now possible at any time to monitor the whole organization or a particular department or community. I am proud to say that the knowledge management system was developed in-house with almost no outside assistance. Although the system is working quite well, it has not progressed as much as we would like. Thus, we continue to work on further strengthening and enriching it.

Panel Discussion 2

Panel Discussion 2

Moderator:

Dr. Serafin D. Talisayon

Director for R&D, CCLFI, The Philippines

Serafin Talisayon: We are happy to have with us for this session two experts in knowledge management, Dr. Naoki Ogiwara and Dr. Praba Nair. We will start by asking Dr. Nair to say a few words to recap or highlight his impressions of the day. I will then ask Dr. Ogiwara to do the same.

Praba Nair: Instead of recapping, I will answer some of the questions I have been receiving. People have asked, "How do I go about starting KM in an organization? More specifically, how do I know which area to start with?" I think KM needs to be tied to the business strategy. If KM is done just for the sake of KM, chances are it might not be sustained. So what do we mean by "KM must be tied to the business strategy"? How do you identify KM projects? How will they help the organization to meet its business objectives? I think one of the first things that you need to ask is "What is the critical knowledge for the organization? Where are the knowledge gaps?" For an organization, you need to understand where these gaps are, based on the core competencies within the organization.

Let me give you an example of an IT service provider where I implemented a KM program. It was a very large company of about 3,500 people, with 30 years of history. One of the first things we asked when we initiated the KM program was, "Where should we start and what will make a difference in terms of the kind of knowledge that we are going to capture and the kind of knowledge we are going to disseminate?" We realized that the bulk of the company's experience was in project management. It had done a lot of large-scale IT implementation projects for both the public sector and the private sector. There was a lot of learning within the organization, but this had not really been "captured." The right hand did not know what the left hand was doing, and there was a lot of duplication of efforts. Therefore, the KM team decided to focus on capturing existing project management experience within the organization.

The company was actually able to reduce turnaround time in terms of implementing projects as well as the time it took to respond to tenders. In the past, they used to spend around two months putting a proposal together. The first month was usually spent trying to get information, trying to find out who had implemented such a program in the past, trying to identify who was the right person to talk to. Now that all such information has been placed into the system, the time spent searching for information has been greatly reduced. As a result, the time needed to respond to tenders has been reduced to only one month.

These were the immediate tangible results. It was about creating awareness of the initial success stories. Once people realize that KM does indeed make a difference, the rest of the organization will probably also want to implement KM in their own departments or divisions.

Naoki Ogiwara: Let me start by asking the audience a question. "What do you think is the appropriate department in which to start knowledge management?" There are four choices: the IT department, the HR department, the strategic management department or a specific business unit. Who says it should be the IT department? Please raise your hands. Nobody? How about the HR department? Oh, there are some. How about the strategic management department? A few more hands. How about a specific business unit? Okay, maybe that is the majority.

The answer is "none of the above." Recent data suggest that a successful knowledge management initiative is implemented by a cross-functional team that considers all systems throughout the organization. To undertake any change – whether in the HR system, the IT system or the business process in a given business unit – you need the involvement and participation of people right across the organization.

Question: How do Japanese corporations operating overseas start a KM initiative within the context of the host country's different culture?

Naoki Ogiwara: I think it depends upon the company. Some examples that come to mind are Toyota and Honda, which transfer their knowledge to many other sites in other countries. However, they do not transfer knowledge through IT. They send talented veterans to the host countries to teach their employees on-site, spreading knowledge management globally to their subsidiaries.

Question: Many organizations in India that have small budgets feel that KM is a cost-incurring exercise. To get buy-in from the top management, you must first establish a business case for KM. I want to know how to present the business case for KM effectively.

Naoki Ogiwara: What we suggest when we start a knowledge management initiative in an organization is that they find people from within their organization who already have buy-in for the idea. There are two types of such people: (a) an executive sponsor of KM (not necessarily the CEO), who can exhibit his or her passion or support for KM activities, or (b) someone we call a "guerrilla warrior," who can start KM (it takes a tough person to change people's behavior). If we cannot find such a person within the organization, then it becomes very difficult to start knowledge management or to make it successful. If you can find the right person with the passion to change the way you work or change the business you do, then there is a chance of success. As you achieve small KM success stories, then you can expand knowledge management activities company-wide. So, I recommend that you first look for people who have a passion for KM.

Praba Nair: One of the things that I have used effectively when embarking on a KM project, especially when the senior management are skeptical or not quite open to the idea, is to do a survey across the organization. I ask them a simple question: "How much time do you spend just looking for information?" Looking for information could mean finding the right document or the right person to talk to. On average, in most organizations people spend at least two to three hours doing nothing but searching for information. Then I multiply this figure by the number of employees in the organization and the average salary cost and I present the result to management. Most of the time, they are shocked because this is not productive time. This is wasted time. And then I ask "Would you like to save on this time?" Normally, the answer will be, and have to be, a "yes." Saving on this time would make a lot of difference to their bottom line.

Naoki Ogiwara: Benchmarking activities reveal that there are two types of people in an organization when starting a knowledge management movement. They are the positive and the skeptical. It is often said that you should deal only with positive people because there is really no time to convince the skeptics. Also, unless you have a number of successful cases, you cannot convince skeptical people. So the advice is to ignore them until you have achieved your first successful case.

Question: We have talked about productivity or quality management and its relationship to knowledge management. What is the difference between them? Are they just different ways of looking at the same thing? How do we look at them from a holistic perspective? Do you have examples of creative routines from the non-commercial sector, from civil society organizations or from non-governmental organizations (NGOs)?

Praba Nair: I think there are some companies that are not so concerned about the differences. They are really not interested in doing knowledge management; in fact, they are uncomfortable with it. I remember one organization that started the journey to become a learning organization and then when KM came around they became skeptical. They said, "Is it just another terminology but really means the same thing?" I said, "It does not matter what you call it as long as at the end of the day it helps you achieve your objectives." So focus on what you want to achieve and do not get hung up on the terminology.

Naoki Ogiwara: Regarding the second question, we have found that non-profit organizations such as the World Bank and the American Productivity & Quality Center itself also have their own creative routines that are unique or different from those of commercial companies. But I do understand that it is easy for commercial companies to justify a knowledge management movement because they are, ultimately, looking for profits. Whereas for non-profit organizations, sometimes it is very difficult to justify knowledge management because their goals are less clear. However, as long as you can describe the NGO's mission and objective, I believe there will be a way to describe its own creative routine.

Questione: How do you motivate people to accept the process of converting tacit knowledge into explicit knowledge?

Praba Nair: It is not a question of people being unwilling to share knowledge. Look at Wikipedia, where many people share their knowledge for free. Knowledge is similar to supermarket products that have an expiry date or a shelf life. Some people may think that they are retaining knowledge that is valuable. However, with the passage of time they may be holding on to something of decreasing value, because knowledge changes very fast. It is not that knowledge is power; it is really shared knowledge that is power.

Organizations use various mechanisms, such as incentive schemes, to encourage the sharing of information. At the end of the day, you have to look at organizational culture. For some organizations, incentives work, but in other organizations it is peer recognition that works. If your expertise in a given subject matter is recognized, chances are that you will be more willing to teach somebody who has just recently joined the organization.

Question: When we were working on starting KM, there was a need for a certain level of motivation or incentive to create a culture of knowledge sharing. However, others say that knowledge sharing should not be rewarded because it is something that employees are expected to do. In fact, they should be penalized for not sharing knowledge. Can you give me your thoughts about this?

Naoki Ogiwara: Again, I think it totally depends on the context of the organization. Some organizations do not need any incentives for knowledge sharing. Consulting companies, for instance, typically adopt a policy of "up or out": you either get promoted within a period of, say, two years or you leave the company. To get promoted, you have to show evidence that you are a talented consultant through the documentation resulting from projects. In this type of company, there is no need to reward knowledge sharing. In other types of company, incentives may be needed because the nature of the business or their work does not motivate employees to share knowledge. The incentive need not take the form of money. It can be the recognition of colleagues. Thus, it depends on the company culture, the nature of business or the organizational context.

Question: Do you think it is possible to apply creative routines in small and medium-scale companies?

Naoki Ogiwara: I believe they can be applied to any organization. My opinion is based on some of my experiences with relatively small companies (200–300 people). The difficulty is that sometimes a work process looks too routine and cannot be seen as creative. In this case, you need to view business processes from a knowledge management perspective so that you can grasp the essence of how they create knowledge. You can then use the knowledge-creating process in either big or small companies.

Question: You were talking about patterns of creative routines. Is it necessary to have only a single pattern?

Naoki Ogiwara: It might be possible to have multiple patterns but based in different departments in one organization. Ideally, I think it is better to have only one meta-process in one organization. If there are multiple patterns working in different departments and if you think that they make sense, then that is fine. But if it does not make sense in terms of the business context or business strategy, I do think that you should look for a different creative routine pattern. An example is a Japanese chemical company that is trying to change its creative routine. For more than two decades, its creative routine was focused on just one competitor, a company based in the United States. The creative routine was fine as long as it was able to keep up with its competitor and as long as it was able to produce products of at least the same level of quality and sell them very well through its strong sales network,. However, its market has recently been shrinking drastically. It has realized that its creative routine, which focused solely on competition and quality work, is no longer effective. Consequently, it is now trying to establish a more collaborative process with its clients so that it can understand their needs and also make different products or solutions based on a deeper understanding of its customers. This is a one example where a creative routine has become obsolete and was replaced by a different and stronger one.

Question: I am a bit confused here because KM emphasizes the sharing of knowledge. I have an agriculture background and I work in the bio-diversity sector. The CBD (Convention on Biological Diversity) regime states that knowledge-sharing mechanisms should be restrictive and that knowledge or intellectual property rights (IPRs) should not be given away freely. Is this not a contradiction?

Praba Nair: The question of intellectual property rights often crops up in knowledge management. This was a major issue in one of the academic institutions I worked for. Does the individual own the IPR or the organization? The researcher says that he spent time doing research so it should belong to him. On the other hand, the organization says that the employee was paid a salary for doing the research work, so rightfully the IPR should belong to the institution.

Where do you draw the line between them? Who really owns the IPR? Sometimes you need to adopt policies on this matter. This particular institution actually came up with such a policy and made all the staff sign it. Initially there was a lot of opposition to it, but over time there was a kind of understanding of the fact that ultimately the IPR belongs to the institution or the organization. Another issue is whether researchers can re-use the knowledge after they leave the organization. This may need to be addressed through additional policies.

Naoki Ogiwara: I think your question is also related to security, another difficult question in knowledge management. I would say that sharing knowledge always entails certain risks. What a company has to decide is which risks can be safely allowed and which risks should be managed. BP's simple answer is that it trusts its employees. As long as you have a good relationship with your employees, the risk is relatively low. Other companies are going the other way, and are adopting more and increasingly stringent security measures because, for example, there have been accidents such as losing a PC. So we should understand that sharing knowledge always entails risks. What we have to decide beforehand is what risk we can allow.

Question: How do we measure or define the key performance indicators to measure KM and its impact? Can you please give some examples?

Naoki Ogiwara: There is no single answer. You have to decide what is the best measurement based on your organizational strategy and your objective for knowledge management. For instance, if your knowledge management is designed to pursue innovation, you might want to measure the number of new products or the ratio of new product sales to total sales. If your knowledge management focuses on productivity and quality, as in Toyota's case, you might want to measure another indicator.

Praba Nair: At the end of the day, you have to ask yourself why you are doing KM. When you are clear about your objectives, the question should be, "Is it bringing about the results that you want?" Then you should probably tailor your measurement tools around that.

Naoki Ogiwara: Too often, companies adopt measurements such as the number of documents shared, which can lead to knowledge management itself becoming the objective. When you are starting, it may be a good idea to measure such things. But you should also remember that those are not the objectives. The objective is to increase your productivity, or to increase your sales or to foster innovation, and so on.

Question: Do Dr. Rory Chase's eight dimensions for measuring how organizations implement KM contradict your last point? We have to look at all these measures because we want to know where we are and where we want to go, or which track to choose from among many options, systems and methodologies. Please explain.

Naoki Ogiwara: Dr. Larry Prusak of Babson College, with whom I am currently working closely, says that the important things are difficult to measure. For example, you cannot measure friendship. I am not trying to avoid answering your question but, I think, sometimes this is true. It is very difficult to measure for instance the effectiveness of training. Maybe you can measure some other aspects, but it is very hard to ascertain whether a million-dollar training program is worth the effort or not. This often happens in knowledge management too. So, instead of measuring outcomes, what we often recommend is to collect success stories generated by the knowledge management initiative. If many people feel that it is worth company and personal efforts to continue with the KM journey, this is a good sign that your knowledge management movement is working very well.

Rory Chase: Actually, there are two sets of measurements taking place. The first set of measurements relate to the KM program itself. For example, the number of documents accessed, the number of documents put into a system, how active your community of practices is, or your skills competency training, are all measures that you can use to determine the effectiveness and efficiency of the KM program and how well you are doing in implementing it. On the other hand, the senior management board is generally not going to be interested in, for example, the number of hits on the knowledge asset library. What it wants to know is how well the knowledge strategy is contributing to the business strategy. So it is going to be looking at the traditional balanced scorecard indicators – customer satisfaction, innovation rates, etc. – metrics that they actually understand and act upon.

I can give you an example. The company selects KM measures that are very close to the business strategy measures and puts them on a traffic light: red, yellow and green. When the members of the board meet – they have one day to meet – they are looking at a lot of very detailed information, which they cannot all read. What they see is an item focusing on knowledge management – for example, skills competency training for the workforce. If everything is going well with this item, it will have a green sign on it. Thus, the board does not have to ask questions about it at all. If there is a yellow sign, this means that it is not doing as well as hoped. In this case, maybe one of the board members will ask a question about it. If there is a red sign, this means that the item is far behind in contributing to the business strategy. This is when senior managers start to ask more questions or ask for more information or more details. This is also the time when the KM team has to be ready with other sets of statistics. This is really how it works with different sets of measures: one for your own internal program, and a second for the senior managers.

Question: In big organizations, you are developing different products. On any new product, a multidisciplinary team does the brainstorming; they do the design. Then the product is tested. They produce the reports, and the product goes out. What is the role of the KM officer when the multidisciplinary team is working and when their own specialists produce the reports?

Serafin Talisayon: Let me paraphrase. In a multidisciplinary team that is doing product development up to its launch, what is the role of KM in such a set-up?

Naoki Ogiwara: There are many different answers. The bigger an organization becomes, the more difficult it is for knowledge to flow across departments because each department tends to focus on its own task. So one thing the CKO (chief knowledge officer) should do is to facilitate communication among and beyond departments, so that they can create better knowledge or they can share more knowledge that is useful to each department. This is very easy to say but it is extremely difficult to do, because in a large organization each department has its own objectives, its own measurements and its own tasks; thus, they tend to focus only on these tasks. If the CKO tells the departments to communicate with each other, the typical answer is that we have no time to communicate. The CKO needs to let people understand the objective of sharing knowledge. By sharing with other departments, all tasks become easier and processes happen faster. Once they understand the benefits of knowledge management, they will naturally share and communicate with other departments. This is a key task for the CKO. But again, this is very easy to say but very hard to do.

Praba Nair: If I understand your question correctly, you are basically asking about the infrastructure for the KM team. In the first place, in a very large organization you need to have a central KM team, which probably will decide on establishing a policy to set up the infrastructure to enable knowledge sharing across departments in the organization. The infrastructure could

mean creating the IT platforms, the various chat rooms or e-rooms for collaboration to take place. At the individual business unit level, however, you probably need one or two individuals who understand the needs of the business unit much better to support the KM activities in that particular business unit. So, the role of the central KM team is not really about generating knowledge, because knowledge resides in the business units. The role of the KM team is really to facilitate knowledge sharing and the flow of knowledge. This could mean creating various platforms, organizing CoPs, creating repositories for them to capture documents and doing other things that provide support for the business units.

Question: It is very inspiring to hear stories of very successful companies. But do you know of any successful KM implementations in SMEs in Asia?

Serafin Talisayon: The APO published last June 2008 "Knowledge Management in Asia: Experiences and Lessons," which describes 22 case studies of good KM implementation in nine APO member countries. It has a few examples of SMEs: the Dabawallas in India; Qian Hu in Singapore; and a medium-scale enterprise in the Republic of China. So, yes, there are examples of SMEs that have successfully implemented KM in Asia.

Praba Nair: I would add that SMEs might not call what they are doing "knowledge management," but they actually implement KM practices effectively. The CEO of Qian Hu, which exports ornamental fish, believes strongly in knowledge sharing but he does not know that we call it a "knowledge management system." He encourages his people to share their knowledge, to collaborate and to create collaborative workspaces. They also work with the people outside the organization and they collaborate and develop new technology with them. So, he may not call it "KM" but he is basically practicing KM.

Serafin Talisayon: We have talked about innovation, creative routines, SMEs, IPR problems, how to start KM. Many questions still remain unanswered, but I think that is part of our KM journey. Sometimes, asking the right questions is more important than getting the right answers. If what we have are the right answers for the wrong questions, we are really nowhere. So, with that let us thank our two resource persons.

Technical Session VI:

KM Applications in Organizations

Chapter 18

The Transformation of Innovation into Technology, Economy and Society

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Technology Planning Strategy

The economic structure of the whole world has changed as a result of technology advancements, as shown in Figure 18.1. The industry, information and service sectors now have a greater influence in the developing countries, including India. On the other hand, the influence of the agriculture and industry sectors in economic development is significantly falling in the developed countries. Economic freedom is quite visible in the developed countries that have more advanced technology.

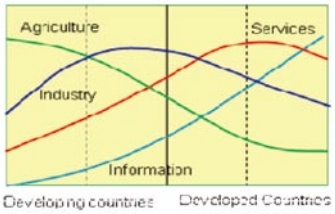

Figure 18.1 Stages of Development.

In order to achieve technology-oriented development in the priority sectors, technology planning must be integrated with national overall socio-economic development planning, as shown in Figure 18.2. A national-level macro plan, along with promotional directives by government, is vital for implementation. The process of technology planning must be dynamic. It must shift from import substitution, discarding non-productive projects. It must be selective and inward-looking in some areas for in-house development, and outward-looking in other areas for technology transfer and absorption, where the technology gap is high and requires high R&D costs/resource/time. Its essential components are:

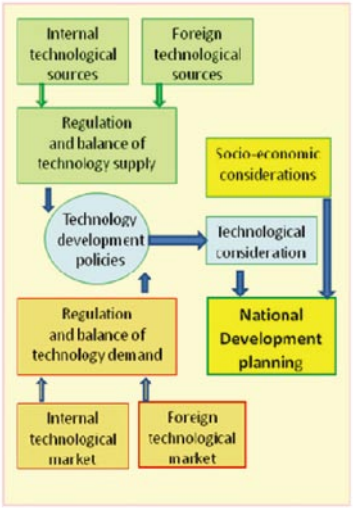

Figure 18.2 Technology and National Development Planning.

- technology forecasting, identification of technology gaps and probable time-frame available to bridge the gap to attain self-reliance;
- evaluation of technology options and identification of the route for technology updating – acquisition of technology/importation/adaption/in-house development–make some and buy some;
- advancement of technology development capability in the country;
- creation of a climate of acceptance about the need for technology change.

Technology is a systematic application of knowledge that leads to the production and marketing of goods and services. Humankind has made quantum leaps in living standards and socio-economic progress through the use of technology. A technology decision is strategic because it has long-term implications for the firm and for society. A company can flourish with the right technology decision or fail with the wrong choice. Technology has been responsible for major changes in agriculture, health, transportation, communications and industrial development. Technology has become an important factor to be reckoned with at the national level.

Technology generation and development are realized through either in-house R&D or acquisitions from the global technology market based on the technology strategy of the country, industry or company. A technology strategy is indispensable for coping with technological uncertainties in achieving the requirements of both short-term and long-term technology milestones. At the macro level, each country adopts a technology strategy to achieve its political, economic and social objectives and translates them into policies and mechanisms. For example, India may decide to develop its own capabilities in strategic areas such as defense, atomic energy and space, where technologies are closely guarded. The availability of resources, including financial resources, plays an important role in the formulation of a technology strategy.

At the micro level, in contrast, increasing international technological competition and implementing changes in requirements and market dynamics influence industrial and commercial firms when planning a dynamic technology strategy to enable them to sustain and grow their business. The technology strategy should have both a domestic and an international focus and complement other elements such as investments, manufacturing, marketing, suppliers, customers, partners, competitors, public policies, the ability to learn from the experience, and supplementing external expertise in selected areas. Linking business and technology strategy, establishing a relationship between corporate and public policies and reviewing the global context are absolutely necessary for technology generation and development.

Business is a system with many other sub-systems that determine business success. A given technology may play a major role and provide a competitive edge to one firm yet, at the same time, it may be minor for other firms. The acquisition of technology is preferred where the technology gap is high, in-house R&D is expensive and time-consuming, the customer preference is for acquired technology and better technology is available at a competitive price. On the other hand, in-house R&D is preferred where the technology gap is narrow, competitively priced technology is not available, technology transfer costs are high, the company has enough R&D resources and locally developed technology is of strategic importance. However, an effective technology generation and management scheme is necessary for firms to create a niche in the global market, which may arise from the following compelling drivers:

- a shorter product life cycle of technology;
- the globalization of markets;
- business is becoming more and more technology driven;
- significant reduction in the time between innovation and commercialization;
- the emergence of faster communications networks and the Internet – no more geographical barriers;
- liberalization of economies;
- research and development has become more capital and skill intensive.

Technology generation is illustrated in Figure 18.3. Technology is to be managed as part of the business system. Technology innovation must be integrated with the full range of the firm's other business processes, including production, marketing, finance, quality services and human

resources (HR). Managing technology essentially involves the following four central concepts.

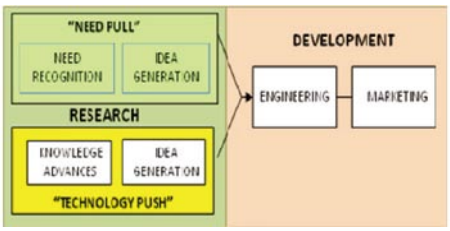

Figure 18.3 Technology Generation.

1. New ventures are centered on technology and involve two major risks – the development of a new product or service and the creation of a new market. Overall entrepreneurial management is a must.
2. Innovation implies the whole range of activities from creating new technical knowledge to implementing it in the business: basic scientific findings, laboratory or bench-level feasibility, developing a prototype/pilot plant, commercial introduction, widespread adoption and diffusion to other applications. The social and economic impacts are critical factors in the progress of the innovation chain. Not every innovation will go through all these stages. Some may reach a particular stage and go no further, or two or more stages may be combined. Not all innovations are based only on the scientific approach; they are also based on empiricism. This is covered in more detail below.
3. Planning and executing the research project pave the way to accessing and acquiring new knowledge. Also, the completion of a research project will yield new knowledge. A technology change creates new knowledge. R&D plays a major role in the present and future of the firm, and thus the management of research projects is critical because it has to be integrated with the other management functions such as marketing, finance and HR. The research process involves problem definition, research design, data collection, data analysis and interpretation of results. This is covered in more detail later.
4. The research infrastructure and knowledge management (KM) are important ingredients in national economic development. The intensity of competition within the country and international competition drive the firm continuously to leverage the knowledge from its experience and gain new knowledge from the market environment. Having a research infrastructure, including a KM system, is essential to create, use, retain, re-use and leverage knowledge in all aspects of technology management. The capture of both explicit and tacit knowledge, knowledge sharing and knowledge community collaboration are necessary to connect multidisciplinary experts to create/synthesize the new knowledge.

The Technology Life Cycle

The technology life cycle comprises four stages with varying development costs, marketing efforts and business returns. Figure 18.4 shows how the technology level varies against time during each stage.

1. *Innovation stage* – the birth of a new product, process or service. New ideas are generated based on "need pull" and "knowledge push" factors. In this "embryonic" stage, the time taken for development is high, as are the costs.

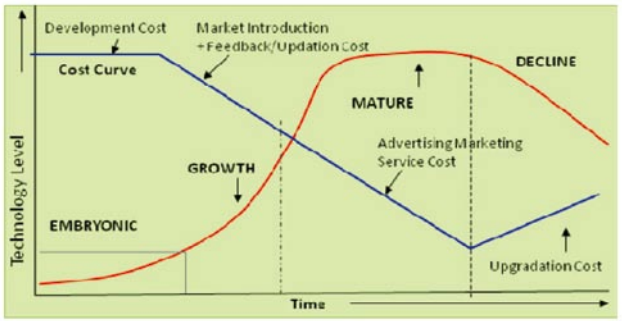

Figure 18.4 The Technology Life Cycle.

2. *Syndication stage* – commercialization of product and services. This depends on both the technical and the overall business approach towards market dynamics. During this "growth" stage, the technology undergoes certain modifications/upgrading based on feedback, cost reductions and revenue accruals. The growth phase is becoming shorter as the development time is compressed as much as possible.
3. *Diffusion stage* – market penetration of a new technology and acceptance by potential users. Both supply and demand factors influence the rate of diffusion. In this "maturity" stage, the firm gets maximum revenues and the costs incurred are on a steadily falling trend.
4. *Substitution stage* – "decline" in use and eventual extinction of a technology due to its replacement by another technology. Many technical and non-technical factors influence the rate of substitution. Costs are incurred to upgrade and extend its life to a certain level during this phase.

The product life cycle is becoming shortened. The timely availability of market knowledge and technological advancement during the development stage and after the product launch is essential. These are in addition to other business drivers. This also helps in timing subsequent product development and introduction. Further, knowledge-based engineering, virtual prototype manufacturing and testing, and concurrent collaborative methods are being exploited to reduce the development and introduction cycle time. Currently, the time-line from invention to innovation and transformation into a product for commercialization and diffusion is becoming shorter. The mechanism is already in place in many developed countries for the acquisition of knowledge as well as an integrated research infrastructure to foresee the future market and market segments. More opportunities still exist for Indian industry to develop its competitive technological capability by integrating various capabilities.

Innovation

Human need factors – the utilization and distribution of resources such as water, air, food, shelter, health, transportation, communications, education, work, energy and information – are of great concern to the socio-economic development of any nation. The requirements and availability of usable products, processes and services are trajectory variables that call for a faster pace of innovation at the national/enterprise level. For an optimum use of resources, technology transformation through innovation and growth through innovation are necessary.

Creativity is the basis for novel ideas to emerge while establishing a connection between the problem on the one hand and the contexts outside the problem area on the other. The transformation from ideas into successful products, processes or services through the embodiment, combination or synthesis of knowledge in the original is at the heart of the complex process of innovation. In the Indian economic structure, the generation of creative ideas or insights and the transformation of these ideas into innovative products through successful implementation are imperative for technology, business, market competitive positioning, conformance to regulations and socio-economic development.

At the micro level, enterprises innovate to sustain and/or improve on their performance and growth through distinct changes in efficiency, productivity, quality, competitive positioning and market share. Technology innovation is a successful exploitation of new ideas into a new or altered product, process or service. A few inventions or ideas are developed but very few are commercialized. Very few new products, processes or services have succeeded in the market. At the macro level, technology innovation could influence a breakthrough change in an industry (e.g. communications) or a group of industries, and might eventually emerge as an enabler

for overall national socio-economic development or a change in lifestyle of global society (for example, innovation in the electronics industry is multidimensional).

Types of Innovation

1. Business model innovation deals with building a multidisciplinary "business model innovation team," in which people from all the associated functions understand the social, legal, competitive and technological environment and iteratively generate alternative business model designs.
2. Supply chain innovation occurs during the sourcing of inputs – a new source of supply of raw materials/components/products from suppliers and the delivery of output products to customers.
3. Financial innovation is the process through which new financial services and products are developed, by combining basic financial attributes (ownership, risk-sharing, liquidity, credit) in progressive and innovative ways, as well as the reactive exploration of tax laws. To create opportunities, new financial business processes, services and products are continuously developed and launched to sustain growth.
4. Incremental innovations concern small or marginal value creation in terms of improvements in quality or productivity or value engineering for optimum costs along with the existing methods and technology used in the product/process/service. Such innovation is aimed at short-term goals by making minor changes over time to sustain the growth of a company without making sweeping changes to product lines, services or markets where competition currently exists. Work study, value analysis, organization and methods often influence such incremental innovations.
5. Breakthrough, disruptive or radical innovation involves major advancements in the process/product/service or a combination of major changes in all these or in any other combination. Such innovation enables the introduction of a totally new product/process/service with a substantial impact on quality, performance, cost and productivity compared with the existing product/process/service. Being new, strenuous effort is required to gain the acceptance of the market, but the rewards could be higher business growth if it succeeds.
6. New technological systems (systemic innovations) – in the course of time, a few radical innovations end up in a development cluster of several radical interconnected innovations that may give rise to a new industrial sector. Such a technological revolution is all-pervasive and affects many branches of the economy through product/process/service innovations. It also affects the viability of the existing products/services. Changes in the best practices set by the previous paradigm and in the influences result in a quantum jump in quality, productivity and performance. On the one hand, a technological revolution creates an opportunity for new capital equipment, new markets and new employment; at the other extreme, it kills the existing product/process/service and creates unemployment.
7. Social innovation is aimed at an unmet societal need or social processes through the development of new products, processes, services and organizations. The government handles several societal challenges such as poverty eradication by ensuring the supply of food, shelter, medical health care and public transport and by minimizing the effects of traffic congestion, an aging population, child labor, a fast-growing population, security, flooding, a lack of communications and infrastructure, and unemployment. For example, the low-cost car design innovation by Tata Nano would be a more affordable car for many Indians.

Sources of Innovation

Most successful innovations occur in organizations and industries. The recognized sources of innovation are "manufacturer innovations" that are developed and sold, "end-user innovations" for personal or in-house use, "breakthrough innovations" from formal research and development, and "incremental innovations" that emerge from practice. User innovators may choose to reveal their innovations freely through "open sources." In such networks of innovation, the creativity of the users or communities of users can further develop technologies and their use. Innovation is either "supply driven" (based on new technology) or "demand driven" (based on social needs and market requirements).

The Innovation Process

Innovation is a complex process that links developers, users, consultancies and standards bodies and is aimed at discovering and nurturing new ideas into successful implementation. The process is focused on the following tasks.

1. "Building a new understanding" of both consumers and technologies provides an essential foundation for successful innovations. This stimulates innovative ideas and aids in management decision-making.
2. "Finding new angles" might inspire unexpected insights and ideas, uncover new dimensions and view things from a different angle.
3. "Nurturing the new ideas" with time, space and encouragement without casting aspersions on new ideas as being irrelevant, costly, risky or unnecessary prevents potential ideas being missed or killed off.

Following the "spark" of an idea, innovation becomes a project that requires a structured approach to manage and commercialize it. The innovation funnel is a tool for managing the innovation process, improving on the time to market by providing a step-by-step method and indicating clear time-bound deliverables for each stage. The innovation funnel provides a graphic structure for generating and screening alternative developments and finally evolving into a product concept. A variety of different product and process ideas enter the funnel for investigation, but only a fraction become part of a full-fledged development project (see Figure 18.5).

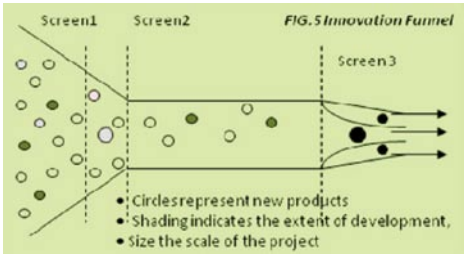

Figure 18.5 The Innovation Funnel.

The funnel illustrates how innovation goals, innovation actions, innovation teams and innovation results interact with each other to create change in any organization. Managing the development funnel involves three very different tasks or challenges. The first is to widen the mouth of the funnel – the firm must expand its knowledge base and access to information in order to increase the number of new product and new process ideas. The second challenge is to narrow the funnel neck – ideas generated must be screened and resources focused on the most attractive opportunities. The third challenge is to ensure that the selected projects deliver on the objectives anticipated when the project was approved. Firms rely primarily on their R&D to generate ideas for technologies, products and processes. These actions flow towards the neck of the funnel, where many will be eliminated. The neck of the funnel is constrained by two arrows – goals and teams. These constraints loosen or tighten depending on the availability of teams and the definition of goals. The results flow from the narrow end

of the funnel and represent information concerning the outcomes of the implementation of goals, actions and teams.

The Integrated Approach and KM

Market strategy. Owing to changing market needs, technological progress and competition, firms must constantly innovate and introduce new products, processes and services at a predetermined period or as needed by the market. Market innovation activities need to be based on performance, the potential market and competitors' current business status and future plans. Firms have to pay increasing attention to market forecasts and align or realign their business plans and development activities accordingly.

Market leadership quality. The transformation from invention into innovation is possible only when the proposed innovation yields benefits to customers, investors and the firm. This transformation requires a competitive technological environment, a process, skilled resources, venture capital and the support of government regulatory institutions. For the transformation of novel ideas into an innovative product/process/service to occur, the decisive factor is the willingness of the firm to take on the investment risk for all the required resources and business strategies. India needs a more fluid economic structure that will provide economic freedom for organizations to start or close down a business without any restrictions. Then entrepreneurs would take more risks and innovate. The situation has been changing in recent times.

Integrated infrastructure and penetration. At the micro level, the structure and functioning of the firm's business process, product development and technologies need to be aligned with market dynamics and connected with every process and the workers. A knowledge-driven firm ensures this connection and provides transparency. At the macro level, in a knowledge-based firm, R&D centers in the industry, research societies and companies, educational institutions, universities and scientific communities need to be connected on a need-to-know basis. Such networking facilitates collaboration among innovators, leverages knowledge quite quickly and is cost-effectively independent of its location, geography or economic or demographic diversity. These close-knit networks also provide information on innovative products, processes, facilities, applied research and patents. In a knowledge-based industry, communities of like-minded people are connected and could enhance each other's innovation and energies to assimilate collective intellectual capital. Innovation is stoked by the exchange of ideas among such clusters.

A knowledge management system is a digital nervous system connecting everyone and everything, as shown in Figure 18.6 (this is my own perception). KM has formidable possibilities to enable knowledge creation, knowledge connectivity, information flows on best practices/lessons learned and product development knowledge and customer knowledge. It can create value in an organization that could eventually result in overall societal development. The business process needs to be connected and seamlessly integrated end-to-end across the company or among the associated firms and industries or government entities. A globally connected eco-system facilitates effective communication and a high-speed response between the knowledge seeker and the knowledge provider, who might even be a "global brain." KM enables collaboration employee-to-employee, employee-to-work, employee-to-customer, employee-to-external environment and employee-to-life. KM creates knowledge-based relationships and develops a culture of responsible collaboration.

Organizations and their employees are connected through direct and indirect knowledge networks. In this virtual environment, multiple entities could come together without the end

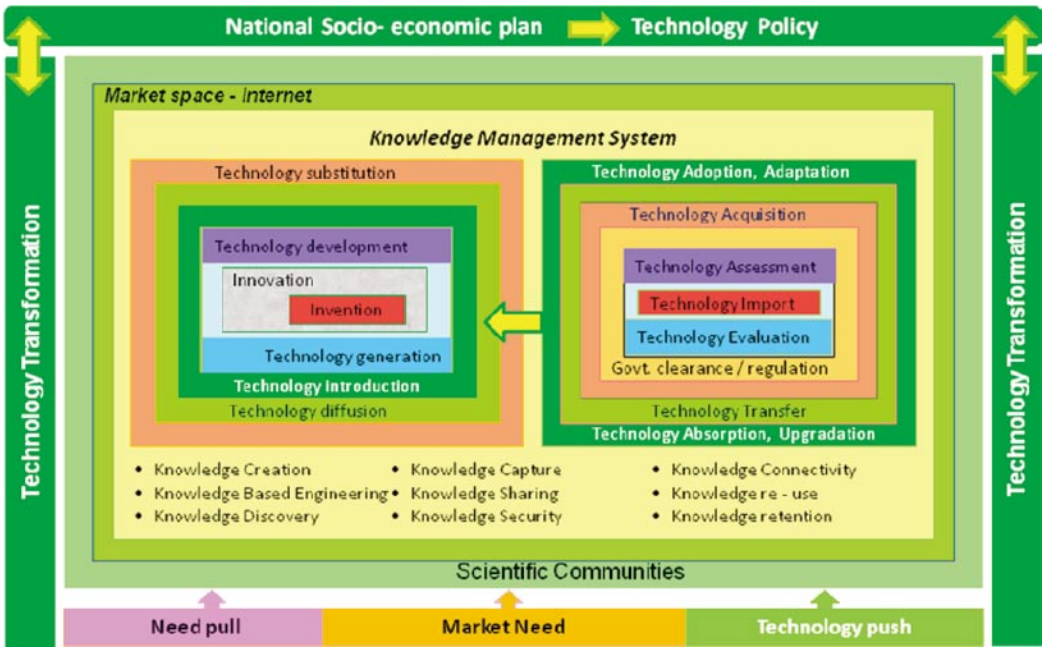

Figure 18.6 Technology Management and Knowledge Management.

consumer even realizing it. Such a move would obviously require an immense sharing of innovations, scientific research projects and information. Traditional boundaries as we know them between organizations will become immaterial. KM creates naturally and effectively scaled knowledge communities on-line by enabling learning-while-doing and doing-while-learning activities. KM helps the enterprise to expand into new locations and gives a virtual look and feel to every business unit operation in all locations. Organizations can increase the efficiency of their innovations by improving access to experts, tapping into past innovations and creating conditions of orchestrated serendipity. KM enables all the kinds of innovation described above and promotes knowledge creation and retention on a continuum during the data life cycle alongside the market dynamics, areas of uncertainty, employee churn rate and other risks.

Current trends. Markets and opportunities will become so fluid and fast changing that they will cease to exist in the conventional sense. To capture these opportunities, the roles of consumer, competitor and company will often have to come together in nebulous forms hitherto unheard of. Competitors in one area will join hands to form companies and leverage synergies in others; customers will participate in the organization to improve products or become the focal point of the company itself; and potential or horizontal competitors will become customers. For example, Connect Rural India over the Internet – an international consortium including Indian and US companies as well as the World Bank – is planning to establish thousands of rural Internet centers in India to bring government, banking and education services to isolated villages. The project intends to bring Internet-based services to individuals who must often travel long distances to conduct banking or business with the government. The goal is to serve rural villages with populations of more than 5,000 in the state of Karnataka. The project, subsidized by the state government, will include money to train residents in computer skills. The centers, connected to the Internet by either land lines or satellite links, are each to consist of 5–10 inexpensive "thin clients," simple computer systems that are more rugged and less expensive than personal computers. The state of Uttar Pradesh has drawn up a pilot project to use solar power to run computers in village schools amidst the rural power crisis.

Measures of Innovation

Individual and team-level assessments can be conducted through surveys and workshops. The Skandia approach, EFQM (European Foundation for Quality Management) and balanced scorecards can be used in business measures related to finances, processes, employees, customers, renewal and development. For a successful innovation process, the following steps are necessary.

1. Customer focus – customer need or involvement is necessary in innovation projects.
2. Climate of change – the desired climate and environment must be encouraged by management.
3. Committed style – top management must realize that R&D has a determinant input but probabilistic output.
4. Combined operations and structure – a multidisciplinary and multifunctional approach.
5. Creative communication skills, monitoring and control.

The causes of the failure of innovations could be external and/or internal to the firm. Internal causes of failure can be divided between causes associated with the cultural infrastructure and the innovation process itself. Common causes of failure within the innovation process in most firms can be poor insight into the market, poor leadership or participation in teams, poor goal definition or alignment of actions, poor communication or access to information, poor empowerment, poor commercialization, poor monitoring of results and a poor or non-existent KM system.

Technology Forecasting

Technology forecasting (TF) enables a firm to predict the future well in advance so that actions can be taken to meet the likely challenges with respect to the characteristics of useful future technological machines, procedures or techniques. It ascertains customer acceptance and willingness to buy a new product, identifies the existing technology life cycle and emerging new technologies from infancy, provides insights into adoption rates of the new technology, forecasts sales, and so on. TF indicates the possibilities, limits, reference standards and warning signals, and describes the alternatives.

Prospective customer identification, interviews, prototypes, field testing, focus groups, test marketing, Internet polls and KM collaborative tools can be used in conjunction with TF to gain confidence in the market. The degree of control the decision-maker can exercise based on the forecasts may vary from "absolutely no control" to "partial control" to "full control," depending upon the nature of a situation. However, the quality of the decision will be improved by technology forecasting. The main technology forecast approaches are as follow.

1. *Exploratory forecasting,* which extrapolates into the future from past performance or experience. The methods used are detailed below.
    a. Intuition – opinion polls/panels/brainstorming/Delphi/scenario development.
    b. Extrapolation – linear/exponential/substitution/trend/correlation (extrapolation of past data to predict future trends or characteristics of technology).
    c. Growth curves – Pearl curve (used where the diffusion success allows for easy substitution) or Gompertz curve (success of diffusion does not allow for easy substitution).
    d. Technology monitoring – information scanning, screening, evaluation and utilization.
2. *Normative forecasting*, which begins from the future by postulating a desired or possible state of technology development to satisfy a specific need. The methods used are the

relevance tree (divergent views for a single problem or the convergence of many sub-systems), morphological analysis (allows all combinations of alternatives) and the mission flow diagram.

These methods can be taught and learned, described and explained, and provide a procedure. There are a number of alternative methods of forecasting:

- no forecast – facing the future blindfolded; no attempt is made to determine the future;
- anything can happen attitude – nothing can be done to influence it in a desired direction;
- glorious past attitude – assumption that a glorious past guarantees a glorious future;
- window-blind forecasting – the attitude that technology moves on a fixed track, like an old-fashioned roller blind, and that the only direction is up; it fails to recognize that there are other directions;
- genius forecasting – an intuitive forecast.

A forecast may go wrong when the forecaster ignores related fields or an innovation is superseded by another technical approach that the forecaster ignored, or it may be due to inconsistency between forecasts. Because of these problems, it is often necessary to combine forecasts of different technologies. Therefore, rather than try to select only one method that is most appropriate, it may be better to try to combine the forecasts obtained by different methods. If this is done, the strengths of one method may help compensate for the weaknesses of another.

Technology Search Strategy

Market conditions and the requirements of utility value may vary very dynamically and can also change in an ad hoc manner. For the sustenance and growth of the firm, a technology roadmap, technology scouting, technology assessment and technology evaluation are indispensable to bridge the know-how and know-why knowledge gaps. The basic trigger signals for a technology search stem from a technology change, growth requirements, aging products, falling sales and capacity utilization. The following technology search strategy aspects could aid in the identification of a technology solution:

- review of available past technology solutions;
- review of technologies that are under development and the status of their progress;
- identification of emerging technologies;
- development of future technology and its effect on human development and estimate of likely business volume;
- bundle of technology solutions required;
- technology scanning;
- scanning of competitor activities;
- interactions with customers, consultants, institutions and multinational corporations;
- visits to trade fairs, seminars, research institutes, universities and user organizations;
- feedback and failure analysis;
- tendering in the domestic and international markets for sponsored research or joint development, licensing or acquisition.

When selecting any of these vehicles, one must consider the nature of the technology need, the available resources and constraints, the type of organization from which the technology is sourced, the potential impact of the technology and the stage of development, and the inevitability of the ongoing needs of the sourced technology.

Technology Scouting

Technology scouting (TS) involves the identification and assessment of external technology sources to reinforce and leverage technology development programs within the firm. TS must be undertaken with a focus beyond looking for sources of already known technologies. It must look out for new technologies across a wide range of technical fields or industries for novel solutions. The scouting process includes a number of steps.

1. The identification and deconstruction of technology needs to the most fundamental level in order to recognize similar requirements in other applications.
2. The range of industrial and technology application experience among the scouting team.
3. Looking at technologies that are still at a very early development stage or those outside mainstream technology development programs. These are the primary sources for disruptive or high-impact technologies that require long-term investments but may not be useful for a near-term product development program. However, a production-ready technology may not yield state-of-the-art performance improvements. An organization must design a scouting process that will address both of these extreme requirements by adapting a pipeline or a portfolio approach so that it can embrace the depth and breadth of knowledge, geographic distribution, including national/international markets, and the availability of knowledge within the time-frame.
4. An emphasis on technology transfer and strategic integration into the roadmap.

The formulation of technology scouting processes must be done as part of the business cycle without becoming dependent or a burden on a few. An essential component of this process is leveraging everyone's strengths. Once the basic level of knowledge need is articulated, the science and technology and acquisition communities can work on translating ideas into possible solutions.

Technology Assessment

This is the process of a macro-level purposeful review and objective analysis of the implications of new technology development for society or target groups, including its secondary and unintended effects. It brings out the impact of technology changes and systematically appraises the nature, good or bad effects, status, significance, long-range focus, cost/benefit balance, cause-and-effect relationship, diverse environments and application, provides a balanced appraisal for policymakers, assesses the alternative courses and presents findings. Methods of technology assessment could be:

- problem oriented – establishing limits, targets, spatial coverage, time-frame, social benefits;
- technology oriented – technological options, establishing the boundaries, forecasts;
- society oriented – mutual interaction between society and technology, economic sectors, stability, population and mix;
- based on impact identification, analysis and evaluation – expert review of the economy, environment, etc.;
- based on policy analysis – formulation, comparative analysis, synthesizing, promotion, regulation;
- based on effective communication – conclusion, trade-offs, cost, publicity, diverse constituencies.

The Technology Information Forecasting and Assessment (TIFAC) set up under the Department of Science and Technology is involved in technology assessment. To remain competitive, firms need to carry out technology assessment on a continuous or on an as-needed basis, depending upon the nature of industry. KM collaborative tools are very useful for:

- community building – for concurrent on-line access independent of location/state/country, review and analysis of past trends, current status, technology alternatives and future objectives;
- knowledge creation – assimilation and accumulation of technology knowledge, faster report generation with automated or semi-automated tools;
- knowledge sharing – effective communication to the public of all attributes and analysis of technology assessment among experts and regulatory authorities involved in a given technology assessment;
- knowledge retention and retrieval as and when needed over long periods of time;
- knowledge discovery – technology impact, cost and society.

Technology Evaluation

Prior to technology acquisition, competing technologies are compared by assigning weights to different performance parameters and their effect on business before making a final decision on the selection of the technology. Technology evaluation (TE) is done based on known or defined parameters such as level of development and sophistication, cost of technology acquisition, break-even point, pay-back period, commercial data, pollution, hazards and risks. TE deals with the effects of the adoption of a given technology with respect to the firm only. The information is obtained from the licensor and other related sources under a secrecy agreement but the data are not available to the public. The Department of Scientific and Industrial Research has done several post mortem studies on the comparison of technologies. The KM steps referred to in the previous section are also applicable to technology evaluation.

Appropriate Technology

Technology is generated from R&D with special consideration for the environmental, cultural, social and economic aspects of the community it is intended for. Appropriate technology (AT) is generated by taking into consideration the satisfaction of basic needs, human resource development, its compatibility with social system development, resource development, low cost, the preservation of existing jobs, the consumption of less energy, the use of indigenous raw materials and services, local culture/development, low levels of skills, waste recycling, non-polluting to the environment and compatibility with the political system. A technology appropriate at the time of its development may no longer be needed at a different time, even in the same place. Likewise, technology developed in one location or country may or may not be appropriate in another location or country at the same time or even at a different time. Thus, technological appropriateness is not an intrinsic quality of any technology but is derived from the environment in which it is utilized and also from the objective functions used for its evaluation. For example, a coal-based technology for power generation that was appropriate at a given time and that became inappropriate through technology substitution may again be considered appropriate owing to resource constraints. Some drugs may be appropriate all over the world, but some may not.

AT is technology that ordinary people can use for their own benefit and the benefit of their community or that does not make them dependent on systems over which they have no control. AT is a term that can thus have multiple interpretations depending on the context, the end user and the generator. Market dynamics will dictate the development of a global knowledge network across various strategic business units and the collaboration needed to provide the required information for objective planning and simultaneous usage at different locations with small variations or application at predetermined periods at different locations. Most multinational corporations are already following this approach. Indian industry may need to accelerate its efforts in this direction so as to enhance exports and business volume.

Technology Acquisition, Development, Transfer and Development

Technology Acquisition

New technology can be acquired through in-house R&D or from collaborators through technology acquisition by purchase. Collaboration is the fastest way to bridge the technology gap, but a dependence on collaboration is not a good thing. The role of self-reliance in technology acquisition will be the primary focus, after technology import costs vis-à-vis in-house R&D costs. The ability and technological capability of buyer and seller are critical considerations before arriving at collaboration agreements on the best possible terms. A technology transaction is unlike a simple sale of goods and services; rather, it involves a "give and take" relationship spread over a long period, 5–10 years at a minimum. It is not possible to define very clearly all facets of a technology transaction because it is driven by the quality of the technology and by market competitiveness. The will and spirit of a collaboration agreement are more important than the written phrases and clauses. The buyer needs to consider the technology leadership, market position, value system, cultural background, management style and economic level of the prospective or current collaborator. The role and relationship of the technology facilitators from both the licensor and the licensee are the most important criteria in the success of technology collaboration.

Technology Generation

R&D efforts are required to generate technology and technological competitiveness. Technology development is necessary for making marketable products, processes and services. R&D supports current business, provides new ventures and explores new technology bases. R&D projects include basic research and invention, applied research, engineering prototype and testing, production – pilot/testing/modification–and initial production and sale. The process of technology generation is illustrated in Figure 18.7. In addition to the generation of "useful" technologies, R&D knowledge and its capabilities contribute towards effective technology collaboration tie-ups and absorption. The various inputs required for the generation of technology are also shown in Figure 18.7.

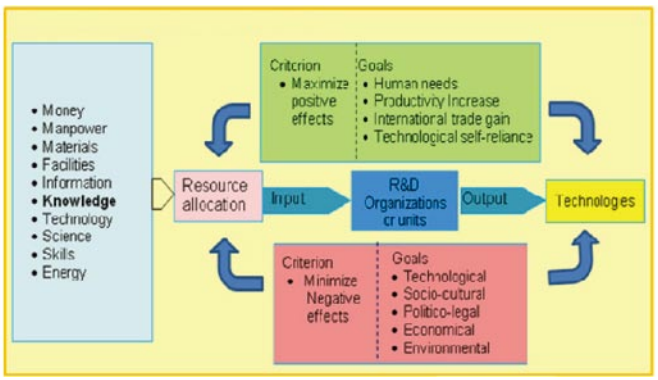

Figure 18.7 The Process of Technology Production.

The research types are generally classified as follows.

- Exploratory research, which is used for the exploration and investigation of the relationship among variables. It may involve a literature survey (understanding past experience), an experience survey (looks at divergent views) and case studies (insight-stimulating experience). This research provides the hypothesis.
- Conclusive research, which is used to test the hypothesis and to draw a definite conclusion. It could be descriptive or experimental research.

Science organizations can be autonomous research councils, special commissions, institutions under ministries, industrial R&D establishments, cooperative research associations, universities,

or private institutions. The government has given these institutions functional autonomy over their own policies for recruitment, the producer–user relationship, the import of technology and accountability.

Technology Development

The determinants and their interrelationship in technology development, from research to substitution, supply-side factors, demand-side factors, co-coordinating organizations and supporting facilities, are shown in Figure 18.8.

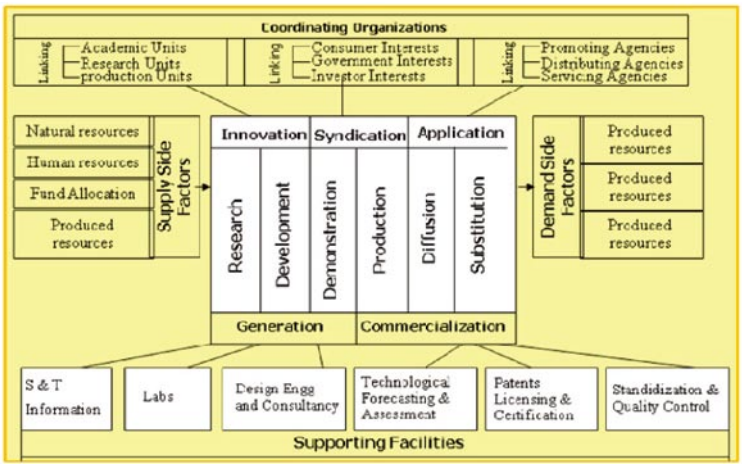

Figure 18.8 Technology Development.

A firm can adopt any one or a combination of the following technology development approaches, depending on needs and resources.

1. *In-house R&D*. R&D strength and activities are dependent upon the technology policy of the company and the nature of its business. In large companies, each department has R&D laboratories in addition to the company-level corporate R&D for major projects. Industrial R&D is mostly for a product or process with specific objectives and time schedule but not related to basic research. Incremental developments are most common in developing countries, whereas advanced countries give more emphasis to new technology or the new application of technologies.
2. *Cooperative R&D*. A group of companies in a particular industrial sector promotes an R&D center as a society with special expertise and facilities of a common nature so as to meet the larger interests of these participating companies (e.g. the Ahmedabad Textile Industry's Research Association or the National Council for Cement and Building Materials in Delhi). The government provides grants as a percentage of their turnover. Cooperative research facilities are used for projects that are not of a secretive nature for the business. A substantial part of the initial research may be done in this kind of research facility, while the critical or finer details for competitiveness are done at firm level.
3. *Contract research*. A firm may contract part of or full technology development to an R&D facility or a set of institutions and/or consultants. Market knowledge and management capabilities are needed to coordinate and monitor all activities.
4. *R&D collaboration*. A firm may collaborate with another firm in areas of common interest. Such inter-firm collaborative practice is very common in advanced countries owing to the shorter technology life cycle and costs (e.g. micro-electronics, bio-technology). The

firm may also collaborate with public or privately funded R&D institutions on a case-by-case basis where results and expenses are shared. The Government of India encourages such collaboration between firms within the country as well as between countries. Such an approach could avoid large costs for technology development.

5. *Research societies*. Large companies or industrial houses set up research societies, where the R&D activities undertaken are mostly related to the broad interests of promoting companies in consonance with national interests. The government encourages such initiatives and provides tax concessions.
6. *Research companies*. The large corporations involved in innovative technology enterprises conduct R&D activities on a commercial basis. The development costs and profits are recovered from the sale and transfer of technologies. This is a very common concept in the advanced countries but it is yet to gain popularity in developing countries.

Knowledge about the above organizations and practices is vital when doing a SWOT (strengths, weaknesses, opportunities and threats) analysis with respect to technology generation and development. A KM system can greatly facilitate these requirements.

Technology Transfer

Any technology can be used by the firm that developed it or can be transferred through collaboration to another firm, or both firms can use the same technology simultaneously. It is also possible that the technology is transferred only after a certain period of maturity and used over a definite time-frame in a country. The important reasons for purchasing technology are: it involves little or no R&D investments; it can be used quickly; and it can have lower technical and/or financial risks. The factors concerned with technology transfer include the following.

1. Transplantation of technology – a critical variable owing to the varying contexts and/or the purposes of the application of the technology between licensor and licensee.
2. A sense of opportunism. A technology package comprises product design, production facilities/techniques and management systems, including marketing, quality control, materials procurement, testing, maintenance and repair. Knowledge is in the form of documentation, embodied in technical assistance, on-the-job training, a knowledge-based engineering expert system, manufacturing process automation, etc. The know-how inherent in a technological system is general knowledge, system/product-specific knowledge and firm-specific knowledge on the overall activities of the business. All of this knowledge contributes towards building technology capability.
3. A rich variety of mechanisms and relationships. The process can vary from routine people-less passive transfers to turnkey contracts where the licensor takes full responsibility for all phases of the contract:
   - licensing – arrangements may vary from mere permission to technical assistance/training such as a turnkey approach, a full-fledged technology licensing agreement, one-time purchase, vetting on new designs, or buying only a few designs and developing the rest;
   - suppliers of materials and parts – effective for know-how transfers with regards to technical support, information and manufacturing;
   - equipment supplier – operations and maintenance procedures and processing know-how transfers along with supply of plant and equipment, e.g. chemical plants;
   - outright purchase – complete manufacturing and operating specifications, drawings, know-how, performance data and technical assistance;
   - acquisition of the company or business owning the technology;
   - joint ventures and joint bidding;

- franchising of trademarks and technical, management and marketing know-how;
- any combination of the above approaches.

4. The nature of the transferred technology and how it is transferred are critical to the success of the technology transfer process. The agencies involved include government departments, financial institutions, industries, technology transfer agencies (in some kind of collaboration), venture capital companies and R&D consultants. The modes of technology transfer are:
   - passive – knowledge transfer only, without assisting in application;
   - semi-active – the firm's agent screens available pertinent information for technology development without active participation in the application of the technology;
   - active – knowledge transfer and assisting in application of the technology; the agent is fully involved and acts as a bridge in the technology transfer;
   - horizontal – transfer of technology from one firm to another, generally located in a different country;
   - vertical–transfer of technology from R&D to a firm; the technology is new and usually originates in the same country; commercial viability to be established.
5. The transfer capabilities of the licensor and the absorption capabilities of the licensee with regard to skills and experience in system design, manufacturing and availability of special equipment/raw materials, etc.
6. The pricing of technology: lump-sum payment, installment payment or down payment for surety or preparation of technology package, royalty advance payment, and royalties by lease payment. The rate is related to the net value of production, sales volume or value added. Fees are paid for the position or deputation of technical experts, and training at the licensor's site or at the licensee's venue. Factors such as the nature of know-how, patents, copyrights and trademarks influence licensing costs and royalties.
7. Market territory, which includes domestic sales and exports to other countries.
8. Monitoring the technology transfer process with time-bound milestones for phased documentation, training, creation of additional manufacturing and testing facilities, introduction into the market, scaling up design and production for various customer needs/demands/supply and its terminal points for further tie-ups with the same or alternative sources, including in-house R&D.

Technology Absorption

After the identification of the technology, the "project formulation" process begins with feasibility report preparation, technology negotiations, government approvals, foreign collaboration agency approvals, funds and land acquisition, and environment and state regulatory clearances. "Project implementation" follows through technology transfer, training, procurement and payment. Technology needs to be absorbed and is applied according to the market requirements, scale of production, raw materials, cost levels, quality standards, social aspects and employment and environmental regulations. The organization develops its capabilities to understand, absorb and reproduce "know-how" and "know-why" obtained from the collaborator, and upgrades and achieves self-reliance and technological competitiveness. In addition, the current outlook is changing towards an export market.

Adoption of a technology is a process where the need of the buyer is crystallized and the collaborator makes the necessary changes before the technology transfer is initiated. The change may be scaled up or down or the modification can be done as part of the technology package so that the technology conforms to the prospective market requirements as far as possible.

1. *Adaptation*. The technology is adapted and put to use in the production facilities and then undergoes any needed alteration to suit indigenous conditions. The change need may arise out of practical difficulties in manufacturing/testing, substitution of indigenous raw materials, productivity improvements, product modification, quality enhancement or production technology change.
2. *Absorption*. The technology is analyzed and unpacked using research linkages. This involves a "know-why" exercise by investigating the design of the product, the raw materials/components, the processes and the services. Know-why R&D projects are to be undertaken alongside the implementation of a new technology so that the technology is absorbed fully and upgraded and alternatives are found in due time, thereby avoiding continuing dependence on the collaborator.
3. *Optimization*. Involves value engineering, product/process performance enhancements, energy saving and productivity and quality improvements done on the collaborator's technology.
4. *Improvements and upgrading*. Efforts to upgrade the technology include extending its know-why capability to a higher range of products with enhanced features or scaling up the existing manufacturing facilities.

Technology Absorption and the Indian Industrial Situation

In many technology collaboration schemes with developed countries, Indian industry has gained some experience in effecting the transfer of technology under the "maturity" or "decline" phase of the technology life cycle. However, this kind of technology transfer is acceptable only because India started technology development nearly 100 years behind the developed countries. Of course, India is bridging the technology gap with thousands of collaboration schemes and by re-engineering and building capabilities in certain strategic areas during the 60 years since its independence.

The Department of Scientific and Industrial Research (DSIR) initiated the Technology Absorption and Adaptation Scheme (TAAS) to accelerate the efforts of Indian industry in technology absorption. The Indian government has also ordered the submission of reports on annual returns for technology implementation and absorption. The government encourages technology absorption so that importation is reduced and exports are increased, in addition to other benefits such as lower product costs, process cost savings, self-reliance, foreign exchange savings and technology competitiveness. On another front, most of the Indian collaborations are quite effective in absorbing "know-how" knowledge. This situation may be due to the non-availability of "know-why" knowledge, or because Indian industry is still struggling to build basic and application technology knowledge towards commercialization, or because it has yet to initiate a switchover from a "follower" style owing to a lack of policy direction or the pursuit of short-term business gains. In certain strategic areas, India is building its own technology capability. However, a new outlook is absolutely necessary for "know-how" and "know-why" knowledge creation to achieve technological competitiveness, economic prosperity and economic freedom. The technology absorption constraints and recommendations are summarized below.

- Lack of attention to technology absorption, and more of a buy-and-sell short-term business attitude. A focus on technology absorption is recommended.
- Absence of benchmarking and compulsion to be internationally competitive. An export outlook is necessary.
- Inadequate attention to improving imported technology. The focus is only on incremental development activities without substantial enhancements in terms of business or technology capability. Know-why knowledge is useful and multidimensional, and is necessary for the development of competitive technology.

- Poor insights into the market and a failure of commercialization owing to a lack of connection between the business group and R&D entities. A more collaborative approach between R&D and the business group is needed.
- Minimum resource allocation. There is a skill scarcity on account of the lack of differentiation or recognition for skilled personnel in terms of remuneration and career development. A better differentiation or recognition scheme would lead to innovation and technological progress.
- Seeming institutional and cultural biases against basic engineering skills and innovation. The government, firms, institutions and society at large should have a greater role in shaping the culture towards realizing the importance of technological and engineering disciplines.
- The dominance of the isolationist approach by individual strategic business units, or conducting R&D without a business outlook and a lack of an integrated approach among R&D, industry and institutions. It happens too that corporate executives and business units both expect R&D proposals from each other. It is a perception that institutions and universities are more focused on basic science projects and business firms focus on the "application of technology," and the divide between them is wide. Collaboration among these agencies is more important than a continuing dependence on collaborators for long-term technological competitiveness.
- User preference for products based on imported technology. Performance, quality, cost and marketing are critical parameters in promoting indigenous technology, which calls for continuous innovation.
- Minimal involvement of R&D personnel in the assessment, negotiation, transfer and implementation of technology. A participative management style and skill development including specialization/communication by training and continuing education are essential.
- Modernization and augmentation of existing R&D with a knowledge-based engineering capability and an integrated collaborative network in which the scientific communities are connected on a need-to-know basis. The KM system – comprising the accumulation of existing explicit and tacit knowledge, knowledge creation by enabling access to the latest information and community building, knowledge capture through a structured system and the prevention of knowledge loss, knowledge codification/re-use and the prevention of duplication or reinvention, knowledge sharing and administered dissemination, knowledge security, knowledge processing and discovery, and the creation of a list of experts in different disciplines, a list of laboratory facilities and a project directory – is very necessary for research and technology development.

Technology Diffusion

Technology diffusion refers to the spread of a new idea, product, service, method or technology and its increased acceptance, usage and application. The success of innovation depends upon the extent of the diffusion. In the more advanced countries, highly innovative research firms sell their innovations and technologies to larger corporations that have the infrastructure and capability to commercialize them. Firms think of diffusion only when the previous technology has become obsolete and adequate returns have already been obtained on the earlier investments. Indian industry, in general, is not in a position to diffuse technology because the technology has been acquired from an external source. Technology diffusion does not just happen – a well-managed diffusion system is necessary. Firms and institutions must aim for a horizontal transfer for the diffusion of their domestic technology to a foreign market by adapting it to different needs. A technology that becomes obsolete in one country or market may still be considered new in another market. Technology diffusion

enables a successful transfer from R&D organizations and academic institutions, and yields better returns on investments. The diffusion process encompasses individual action, applying basic research, industrialization, commercialization and full-scale diffusion. Diffusion has the following perspectives:

- traditional – treats diffusion as a marketing effort to expand beyond the target market;
- adoption – is most often used for the diffusion process because this approach focuses on various channels and modes of communication so as to influence a diverse group of potential customers to adopt the technological innovation;
- technological – focuses on technical skills, tools and the user environment for the implementation or use of the technology innovation;
- infrastructure – concerns the availability of the necessary energy, transportation, terrain, weather and communication facilities for diffusion in the target region;
- regulatory and social – looks at the effects of government policies and the development area where the technology is going to be used;
- models – is a development model to predict the behavior of the potential user;
- comprehensive – uses all of the above perspectives in developing a diffusion strategy.

Technology Change

Technology change (TC) is a process by which economies change over time with respect to the products and services that they produce and the processes used to produce them. More specifically, TC may involve a change in output, processes, materials, machinery or equipment. TC has an impact on the way work is performed or on the efficiency or effectiveness of the firm. It affects the relationship between labor, capital, skills, production and the delivery process. TC is all-pervasive and effects changes in many branches of the economy through innovation in products, processes and organization. TC sets a new paradigm and directly affects existing best practices, products, processes, services and economic viability. It can bring about a quantum leap in performance – lowering costs or increasing productivity. However, the introduction of a new range of capital equipment, for example, requires a new set of skilled human resources and employment of laid-off workers elsewhere. A technological revolution has the capability of creating new industries.

Information technology (IT) synthesizes the convergence of previously distinct and separate technologies, such as electronic components technology, computer technology, communications technology and associated software developments. TC has affected all of these technologies, but the outcomes in each technological change had a strong interrelationship and aided the growth of new technologies, which have now come together in the computer and communications sectors over a period of 50 years.

Changes in Products

TC drives changes in product features, enhancements of performance, the convergence of technologies and change in the form of new products and their alteration by replacing conventional electro-mechanical or electronic components. TC features value addition in terms of manufacturing and assembly, the shortening of a product's development life cycle and integrating it into a larger system.

Changes in Services

TC entails different possible tangible and intangible benefits:

- stagnant personal services – direct contact between the service provider and the customer (e.g. OHP, Xerox);
- substitutable personal services – direct contact is replaced by technological alternatives, e.g. electronic security and surveillance, automatic washing machines;
- progressive services – use of equipment and direct contact, e.g. airline customer service;
- disruptive services – do not require personal contact, e.g. e-mail; the transportability of services led to their internationalization, changes in barriers to entry and increased transparency of markets owing to the widespread availability of information.

Changes in Process

TC promotes a hands-off approach and aids the incorporation of higher levels of skill and function into the equipment (e.g. computer-controlled machines). It increases flexibility, and continuous production becomes feasible in certain cases. Higher automation leads to lower labor costs and enables horizontal links to materials handling, integrated process control, resource planning and a reduction in the workforce and requirements for skilled personnel. However, all these applications require the training and re-training of skilled human resources.

Changes in Organization

TC demands a new form of organizational structure, but change is perhaps not happening fast enough. Organizations must be able to innovate and produce competitively. TC facilitates integration between firms, partners, vendors, customers and experts. It also increases office productivity and effective coordination.

The Macro Effects of Technology Change

1. Increasing knowledge intensity of production. Product development and the product life cycle are continuously becoming shortened through continuous innovation in all business activities. Firms are required to spend more and more on R&D to be competitive, and R&D as a high-risk cost is on the increase. TC enables access to global markets and provides high returns for successful innovation.
2. Greater mismatch of skills. TC affects the skill mix of employment. Labor is being replaced by capital equipment, giving rise to concerns about a reduction in employment. Some segments of labor have no economic value at all. TC causes scarcities and surpluses in different occupations.
3. Erosion of developing countries' competitive advantage of having a huge labor force. Cheap and abundant labor is becoming less important. Labor costs are falling owing to automation and giving rise to economies of product mix rather than economies of scale.

Venture Capital

Finance is a vital ingredient for the setting up of technology-based firms, which bear more risks owing to the high costs involved in technology generation and development. Finance is required on more liberal terms because of the high risks and uncertain returns. Firms must have an awareness of the various financial schemes available in their country. Adequate financial assistance may not be available for individuals, R&D institutions and private agencies because the regular commercial banks are hesitant to provide financial assistance even at normal commercial interest rates. Venture capital funds are now available for agencies that have the technological knowledge and are willing to take up the challenge of commercializing innovative products and services. In India, venture capital funds are available from the IDBI Bank, the Risk

Capital and Technology Finance Corporation, promoted by the Industrial Finance Corporation of India (IFCI), VECAUS III, promoted by the IFCI and Unit Trust of India (UTI), and the Technology Development and Information Company of India, promoted jointly by ICICI Bank and UTI.

Intellectual Capital

Intellectual capital (IC) is an intangible knowledge asset that comprises both soft intangibles, such as employee skills and capabilities, culture, expertise, loyalty, know-how, know-why, trademarks, brands and unique organizational systems, and hard intangibles, such as patents, copyrights and data-based software. A major portion of IC is the tacit knowledge that resides in people's minds. When employees retire, their uncaptured knowledge is lost to the company. To preserve IC, employee knowledge needs to be documented, codified and shared. This is referred to as intellectual assets. A firm needs to encourage its employees routinely to disclose and record IC through the KM system. Intellectual assets that are protected under the law are called intellectual property.

The IC value driver is its intrinsic characteristics, such as its scalability and the fact that it can be applied simultaneously and repetitively without diminishing its value. It is difficult to reproduce by competition, as is possible with tangible assets. IC is viewed as a key differentiator and competitive advantage that enables a firm to reap the highest market value. Intellectual assets drive a firm's capitalization. In the leading US knowledge-driven companies, the market-to-book ratio is about 6. Other competitive sources, such as moving to global market positioning and vertical integration, are less sensitive to a firm's growth compared with IC. IC value detractors are partial excludability (spillovers, fuzzy property rights, inherent risks), sunk costs and non-tradability.

> *Two fundamental developments – one economic and political, the other technological – have dramatically changed the structure of corporations and have catapulted intangibles into the role of the major value driver of business.*[1]

The total resource portfolio and its distribution are shown in Figure 18.9. Intellectual capital is the result of the combination of the following resources.

- *Human capital* is tacit knowledge, which is based on competency (specific knowledge and abilities, IQ, empathy, the ability to build personal networks, the ability to participate, attitude), behavioral traits (motivation, endurance) and intellectual agility (the ability to innovate, imitate and adapt). The rise of the knowledge worker is the key to a significant increase in the value of human capital.
- *Organizational capital*. All the things that remain in the organization, such as accumulated knowledge (created, captured and managed by the firm during value creation), brands, trademarks, product concepts, service offerings, processes, systems, organizational structures, databases, software and culture.
- *Relational capital*. All the firm's relationships that are directly business related (collaborators, customers, vendors, partners, distribution channels, lenders, unions) and those that are indirectly business related (media, regulatory bodies, government, pressure and interest groups, educational institutions, R&D laboratories, standards

1 Baruch Lev, *Intangibles: Management, Measurement, and Reporting*, Washington, DC: Brookings Institution Press, 2001, p. 9.

organizations). It is relatively easier to value and track relational capital in terms of market share, customer/supplier retention, defection rates and per-customer profitability.

Relational and human capital are not completely owned by an organization, because the presence of an employee cannot guarantee access to his/her competence.

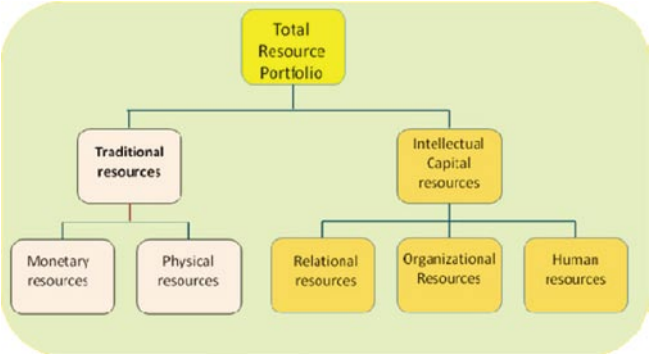

Figure 18.9 Resource Distinction Tree.

MAKE and IC Rating

The MAKE (Most Admired Knowledge Enterprises) awards are administered by Teleos, an independent knowledge management and intellectual capital research firm. Firms file nominations for the yearly MAKE award and winners are screened by a panel of Fortune 500 business executives and leading KM and IC experts. MAKE identifies, acknowledges and honors leading organizations worldwide that are creating value for their stakeholders by transforming new as well as existing enterprise knowledge and intellectual capital into superior products, services and solutions. MAKE recognizes both companies and public/non-profit organizations that are engaged in increasing social capital.

The IC rating is an assessment of the intellectual capital or a valuation of the intangible assets of knowledge-based companies. The IC rating evaluates the current status of the critical intellectual capital upon which the company is dependent for future sustenance and growth, its risk profile, and recommended plans for the renewal and innovation process that will shape the future of the company.

It is proposed that the Indian government should formulate an equivalent or better recognition award or IC rating standards for all kinds of multidisciplinary organizations, particularly public sector undertakings, universities, R&D institutions and government ministries. This approach could encourage companies to assimilate existing and future new knowledge for healthy competition in science and technology. Above all, it might pave the way for India to become a technologically competitive nation and a knowledge-based society, with the possibility of becoming a knowledge superpower.

Conclusion

In the proposed knowledge-based industry, organizations and their employees are connected in a virtual environment through direct and indirect networks via a knowledge management system. In this virtual environment, multiple entities can come together without boundaries and the conventional roles of consumer, competitor and company can be transformed

entirely to address fluid markets and opportunities that are rapidly changing. It is opined that competitors in one area may join hands to form companies and leverage synergies in other firms, customers can participate in the organization to improve products and customers may become potential competitors. The KM system will create a way forward through knowledge creation, collaboration, accumulation, use, re-use, dissemination and retention for future generations, as illustrated in Figure 18.10. Above all, there is a need for KM and cultural change to turn over a new leaf for the transformation of innovation into technology, economy and society.

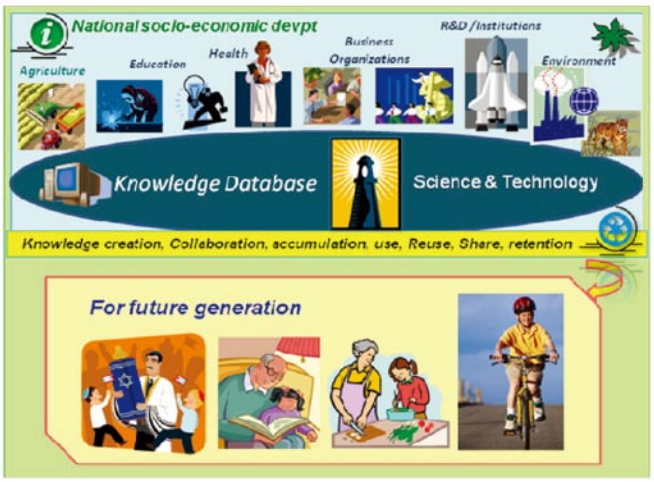

Figure 18.10

Chapter 19

A New Infrastructure for Managing Knowledge in High-Value Outsourcing

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Background

It has been suggested that any task that can be decomposed, codified or digitized can be offshored.[1] In the Indian information technology (IT) industry, this focus has led to the perfection of processes by Indian IT companies whereby they excel in rapidly breaking down programming and technology delivery tasks into sub-components, shipping them offshore, then re-assembling and testing them before delivery. This excellence extends to quality in terms of conformance to specifications and highly structured methodologies, including well-developed knowledge management (KM) systems to serve as an organizational memory and to reduce reinventing the wheel by re-using codes and procedures.

The Transition from Cost to Increased Value and Partnership

The primary reason for offshoring in the past has been cost.[2] However, as outsourcing has become increasingly common, it no longer remains a source of competitive advantage for clients in locations such as the United States and some parts of Europe. We hear our clients moving away from the question "How can I lower costs?" to "How can I maximize value from my offshore investments?" To deliver increased value, Indian IT firms have to move away from the well-defined, predictable work that they have primarily performed so far, and move towards value addition for clients. This is easier said than done; it needs a mind shift from vendor to partner, and it also deals with an increase in the intrinsic knowledge that must be handled by Indian IT firms.

The other dynamic force driving this process is the parity that the Indian IT companies have achieved with each other in the traditional outsourcing markets. In order to de-commoditize

1 United Nations Conference on Trade and Development, *World Investment Report 2004 – The Shift towards Services*, New York and Geneva: United Nations, 2004, at http://www.unctad.org/en/docs/wir2004ch4_en.pdf.

2 Jack Harding, FSA Forum, June 2005, http://www.fsa.org/publications/forum/article.asp?id=242.

their services[3] and move the basis of competition away from price, Indian IT companies are attempting to move away from being vendors delivering a standard service to being partners to add value to the relationship. This means that, in addition to the extrinsic knowledge that they possess and handle so well on behalf of their clients, they must also be able to handle an increasing amount of contextual and intrinsic knowledge necessary to move to high-value outsourcing.

This shift is illustrated in Figure 19.1, which details the typical organizational set-up for traditional outsourcing, and Figure 19.2, which shows the new set-up for high-value outsourcing with its increased need for communications and a sharing of knowledge on a real-time basis. This also leads to a blurring of boundaries. In traditional outsourcing, the management structure is such that the transaction costs would make high-value outsourcing prohibitively expensive.[4]

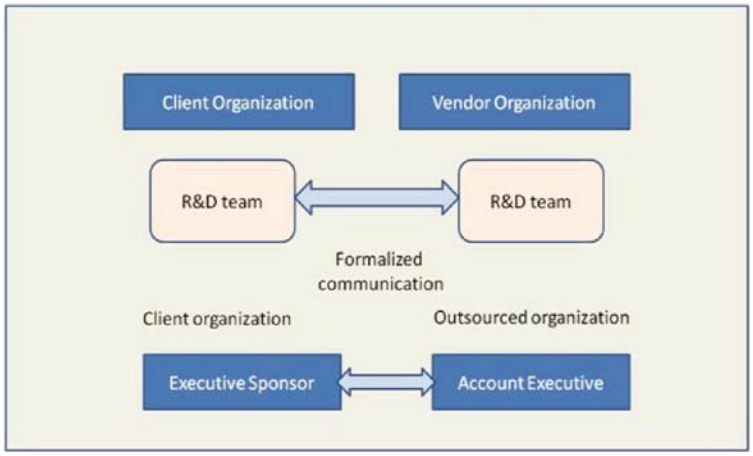

Figure 19.1 Traditional Outsourcing.

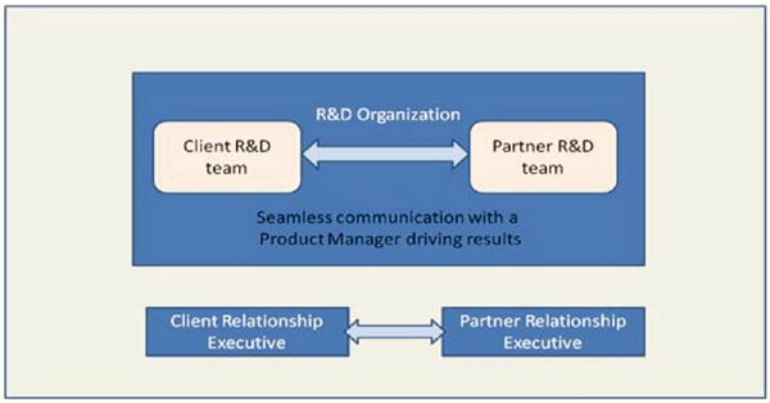

Figure 19.2 High-Value Outsourcing.

3 Clayton M. Christensen and Michael E. Raynor, *The Innovator's Solution: Creating and Sustaining Successful Growth*, Boston, MA: Harvard Business School Press, 2003.

4 "Offshore Outsourcing and the Relative Value of Growth: A Conversation with Katzenbach Partners," Knowledge@Wharton, University of Pennsylvania, 11 January 2006, at http://knowledge.wharton.upenn.edu/article.cfm?articleid=1345.

Approach by IT Companies to Managing New Knowledge Needs

We see two approaches being taken within the industry to enable this move to high-value offshoring.

The predominant approach has been to use improved KM tools to capture contextual and intrinsic knowledge better; these players in the industry are approaching the problem from a tooling perspective. To capture contextual information better, they create procedures that allow for rapid changes and delivery of the change requests. These are some of the efforts being made to bridge the gap in terms of the speed of the response and in the intrinsic knowledge gap. A particularly effective way to bridge the intrinsic knowledge gap is to use stories and end-user scenarios to capture, demonstrate and communicate the real requirements to the extended team.

We believe that the utility of this approach for high-value outsourcing is limited. This approach relies on more of the same remedies that have worked so far, which are an attempt to impose order on a rapidly changing world of business decisions. The approach works well when outsourcing vendors deal with technology for products; a different solution is needed for working with business knowledge.

We have already seen the establishment of a new infrastructure for making high-value outsourcing happen. Instead of creating a better knowledge management tool, this approach accepts that business decisions that are part of the high-value outsourcing process remain difficult to capture into systems. Instead, it focuses on enabling the sharing and creating of common knowledge between the host company and the vendor by establishing a communication infrastructure using the likes of unified communications. This is illustrated in Figure 19.3. Companies such as Microsoft and Cisco are creating solutions that enable this communication to happen.

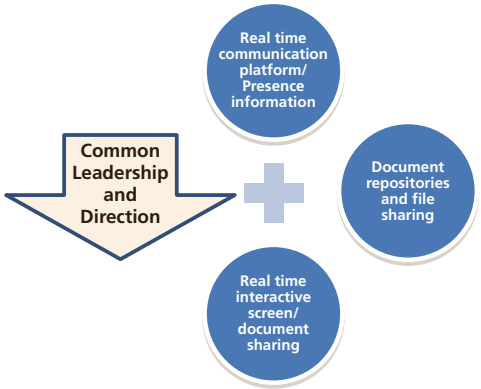

Figure 19.3 An Effective Infrastructure to Share Knowledge for High-Value Outsourcing.

Documents are still shared among the teams, but they are united under a common leadership and they communicate to establish a given context (Figure 19.4). The definition of quality changes from "conformance to specifications" to "delivering the right product." Conformance to specifications is what made Indian IT companies so successful in the world market. Now, they need to excel at partnering with their clients to make the clients even more successful.

Figure 19.4 The Changing Meaning of Quality for High-Value Outsourcing.

Networking made it possible to outsource routine work. Now, unified communications are making it possible for high-value work to move to outsourced locations and vendors. Pervasive

and integrated communications will enable the transfer of higher-value work, because they allow a shared context and real-time sharing of information and context across the world. The need for high-value outsourcing is here to stay. The geographical relocation of progressively higher-value work is inevitable, particularly since the major offshore markets are growing rapidly themselves.

High-Value Outsourcing Case Study

This case study illustrates the changes and the new knowledge infrastructure needed to move to a high-value relationship. It describes the experiences of a major Indian IT services company serving a Japanese client in a high-value outsourcing relationship to develop new medical instruments in partnership. Internally, the Japanese client has a high degree of rich, interactive communication between its various teams; this interaction is often informal, and there are many implied requirements. As a partnership, it expects the Indian firm to deliver on the explicit as well as the intrinsic requirements.

The Indian IT company approaches the relationship as a traditional outsourcing engagement using processes to capture requirements, to detail test plans and to deliver quality in conformance to specifications. However, this approach misses out on a number of intrinsic and implied requirements. There is no knowledge process to capture and deliver on these expectations.

Our model predicts that this will result in client unhappiness over what it sees as a lack of ownership; a faulty requirements capture process; and intransigence in handling changes. The Indian IT firm will typically try to fix these issues with more processes. These will not be successful unless the underlying knowledge-sharing and capture process is addressed as detailed in this chapter. In reality, we found that the complaints from the client matched the predicted problems:

- inadequate management of requirements;
- no validated software development methodology;
- lack of domain (application) knowledge of software module in the bigger picture;
- poor handling of change requests;
- lack of ownership among offshore teams.

This situation may be remedied by taking the following actions in addition to addressing skill deficiencies in the offshore team:

- establishing real-time communication channels (chat, conference, voice, video);
- establishing real-time knowledge sharing (files, access to common shared repositories, e.g. using SharePoint);
- moving the team structure under a single leader, as in Figure 19.2; the leader is responsible for delivering outputs from the combined R&D teams; work is no longer split between onsite/offshore locations.

Chapter 20

Knowledge Management for Competitive Advantage in the Steel Industry

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Introduction

Most organizations pursue knowledge sharing in order to innovate faster, to speed up their response to workplace demands and customer demands, and to increase productivity and workforce competence. Knowledge sharing is not merely a simple exchange of information, but affects relationships and helps in establishing a culture of sharing and learning from each other. Knowledge management can be the answer to several organizational problems, be it employee turnover, culture clashes or innovation stagnation. At the Visakhapatnam Steel Plant (VSP) there are many operations, technologies, practices and problems. Much similar equipment is used in different parts of the company. Similar problems exist in different parts of the plant and an available solution can be adapted to avoid loss of time in reinventing the wheel.

Need for Knowledge Management

Knowledge management (KM) has been used and understood in different ways by different people. Many times people do not distinguish between data, information and knowledge. Based on the type of industry and processes involved, every industry has developed systems and procedures as a part of their process requirements. These standards, systems and tools may form a part of the basic business tools required for the improvement of the process; in other industries they are the tools used to leverage the knowledge base of the company. So KM depends on the business need, the purpose of the knowledge, the target population and the means of managing the identified knowledge.

What then is knowledge management? One widely accepted definition is: "KM is a systematic process of identifying, capturing and transferring information and knowledge to help make best decisions, exploit business opportunities and innovate."[1]

1 Daryl Morey, Mark Maybury and Bhavani Thuraisingham, eds, *Knowledge Management: Classic and Contemporary Works*, Cambridge, MA: MIT Press, 2000.

What Made Visakhapatnam Steel Plant Go for KM?

To be a continuously growing world-class company, VSP has clearly laid down objectives to meet its corporate vision and mission. The introduction of KM at VSP is in line with the objective of "instilling the right attitude among employees and enabling them to excel in their professional, personal and social life." KM at VSP aims at providing a platform for employees to share their experience and knowledge and developing a culture of learning from each other.

Having identified the need, the next most important thing is to understand what sort of knowledge we require with respect to achieving our business goals and that will give the company a competitive advantage. The volume of operations, problems and issues that confront the company dictates its efficiency, thereby affecting the profitability of the company. To deal with these issues, we at VSP have various systems and tools in place. The most important and unique feature that can be exploited and built upon at VSP is the vast and varied experiential knowledge of its employees. This tacit knowledge can be tapped and effectively utilized to boost organizational knowledge.

KM at VSP

Although the concept of IT-based KM has assumed greater importance recently, knowledge management has already been implemented within the organization in some form or another. Developing standard procedures, job protocols, operating procedures for maintenance and operations (SMP, SOP), policies, computerization of processes, training and developmental activities and the like were practiced as part of the ISO quality system before the KM concept came into vogue (Figure 20.1). In addition, at VSP we have a suggestion scheme, quality circles (QCs), quality improvement projects (QIPs), samalochana and departmental safety committee (DSC) meetings, which have all helped the company realize a lot of cash savings. They have also helped develop good group learning habits.

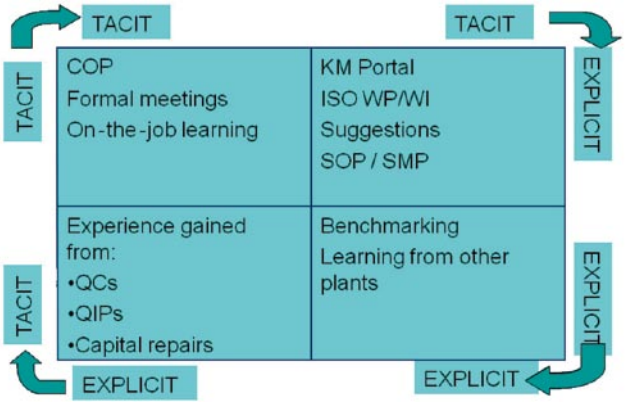

Figure 20.1 Example of Knowledge Created in Four Modes at VSP.

Quality circles. Many critical and long-standing problems have been solved by small groups through the sharing of knowledge among the members. The QC movement at VSP is a process of synergy in small groups, which leads to better interpersonal relationships, better leadership and communications, a high level of enthusiasm and morale of team members that ultimately result in better organizational harmony, a commitment to a new work culture and a sense of belonging to the organization. In addition, there have been huge savings from operations year after year.

Quality improvement projects. Whereas quality circles involve all employees, the QIPs involve only the executives. QIPs work on identified projects for upgrading the quality or condition of the process or equipment. This is a forum where the knowledge of the group is leveraged to arrive at an optimal solution to the problem. In the process of finding a solution, the group members explore various opportunities available in VSP and elsewhere. At the end of the project, every member gains knowledge from colleagues as well as from other areas.

Suggestion scheme. The suggestion scheme at VSP aims at providing an opportunity for creative thinking among employees so as to utilize their full potential for advancement and to bring about improvements in their day-to-day work through the application of their experience and knowledge. Many improvements suggested by employees have been recognized and rewarded. The suggestion scheme has provided an additional forum for mutual cooperation and leveraging of individual knowledge for collective initiatives in fostering production and productivity, reducing costs and improving quality.

Samalochana. This forum is unique to VSP. Here people from different disciplines come together to discuss the problems and issues they have confronted during a given period. Sharing and learning from the experiences of other members is the key outcome of these meetings. It is at this forum that the operations of a department are discussed in one place to review the difficulties that surfaced and the solutions that have been worked out.

Departmental safety committee meetings. Every incident provides several opportunities to improve procedures and avert future accidents. The DSC meetings discuss all the near-miss incidents during the period so that preventive or corrective action can be taken to avert accidents. The objective is to learn or know about the problems faced by others in the company and not to repeat the same mistakes.

KM cells. In an attempt to overcome recurring production problems at a steel melting shop (SMS), a formal knowledge management system was established within the SMS department. KM cells were also formed in a few other departments, such as Mills, Sinter Plant and Central Maintenance. All these efforts have resulted in developing a knowledge base and a culture of sharing and learning from mistakes. But they have remained local to those departments.

All these schemes have no doubt helped VSP in creating an environment of learning and thus help the organization to enrich its knowledge base. However, there were some missing links, such as capturing the judgment and tacit knowledge based on an employee's experience and codifying it through a robust system for easy retrieval and accessibility by all employees across the organization. Many times, a problem encountered in one area has already been solved elsewhere in the organization procedures, but people are not aware of it. Thus, the need to integrate the knowledge base across the organization is the need of the hour.

GNANA: The KM System at VSP

Based on the confidence gained from the initial projects, a full-fledged knowledge management program called "GNANA" was launched as an organization-wide initiative in 2004. Since KM is a relatively new subject and its application varies from organization to organization, a literature survey was done and the necessary information collected through the Internet. Some exchanges were held with some of the prominent organizations that have already implemented KM.

GNANA at VSP essentially encompasses the following three features:

- capturing the tacit knowledge of employees to bring improvements, save costs and minimize the chances of repeated mistakes within the organization;
- providing a platform for employees to learn from the explicit knowledge available from different sources in the world;
- creating a culture in the organization where knowledge sharing becomes a habit by encouraging and motivating employees appropriately.

The whole process is based on a "bottom-up" approach and there are no fixed targets to drive it. The KM structure at VSP (see Figure 20.2) closely integrates the efforts of K-Propagators, heads of departments (HODs), K-Veterans and the core team. The core team is responsible for the coordination of KM activities in VSP. A phased approach was adopted and initially awareness sessions were conducted covering all the engineers and officers of the company. Also, an apex-level structure was put in place to monitor and guide KM activities in the company. The entire effort in this direction envisages giving more emphasis to the quality of the content rather than only to the quantity.

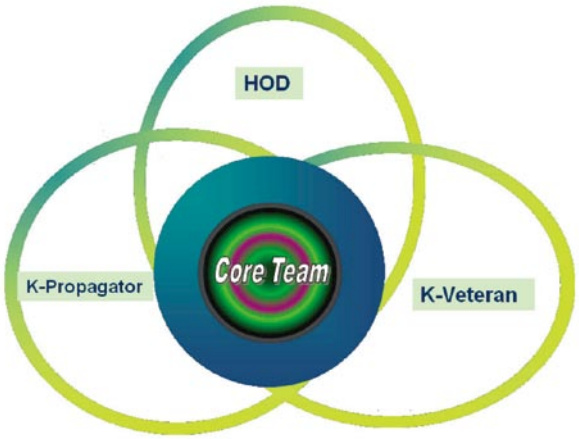

Figure 20.2 KM Structure at VSP.

GNANA is a system based on expert evaluation via a knowledge management portal (see Figures 20.3 and 20.4). A piece of knowledge (called a K-Chip) submitted by an employee is automatically sent to a knowledge expert (K-Veteran) for an evaluation of its quality depending on the category/sub-category chosen. The whole range of Vizag steel processes is divided into more than 60 categories, each with four to five sub-categories. If, after the evaluation, the K-Veteran approves the submission, it gets integrated into the database as a K-Asset. If it is not approved, it will become an I-Piece.

Figure 20.3 GNANA Home Page.

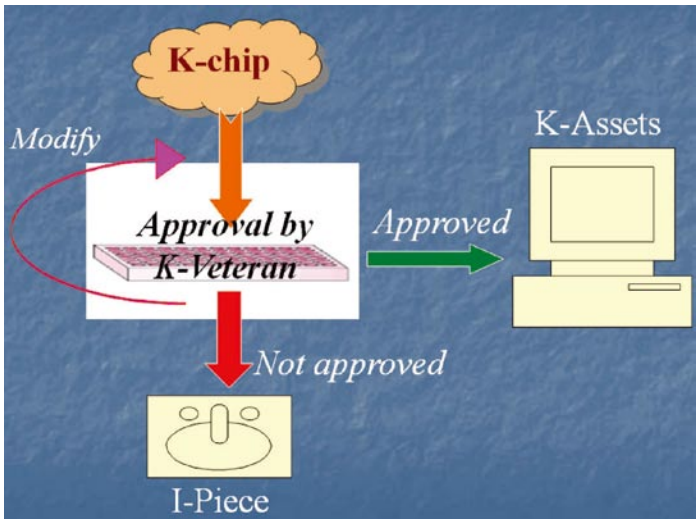

Figure 20.4 Evaluation System.

Recognition is given to the K-Author for preparing the I-Piece and resubmitting it in accordance with the guidance or comments of the K-Veteran. The K-Veteran gives it a rating on a 10-point scale depending on the content and its value to the readers. Only K-Assets – not the K-Chips or the I-Pieces – can be viewed by all. The users of a K-Asset are provided with the facility to rate the item (once only) on its usefulness or worthiness. Readers are free to discuss or give their feedback on the K-Asset.

It is always difficult to part with one's knowledge. In addition, busy and tight production schedules make it difficult to find the time to share or learn from others. Efforts are required to tap this knowledge and to make employees see the benefits of sharing and learning. Encouragement in the form of monetary and non-monetary awards has been considered. The names of significant contributors are published in the in-house magazine *Ukkuvani* to encourage employee participation.

To recognize and reward the quality contributors, a reward and recognition scheme (GNANA Puraskar Yojana) was launched in 2005. As a part of the scheme, people who have contributed significantly are rewarded by the chairman or director of the company at an exclusive function. The awardees are also invited along with their spouse to a dinner hosted by a director or chairman-cum-managing director (CMD). Every month, monetary rewards are also given out under the scheme to encourage people to make their submissions and promote wider participation.

The progress of GNANA can be seen from:

- more than 6,500 K-Chips have been submitted;
- more than 5,500 K-Assets have been approved;
- on average, 100 log-ins per day have been achieved;
- more than 400 average hits/day have been recorded;
- nearly 33% of executives have contributed to the KM portal so far.

Other Initiatives under GNANA

Although GNANA caters to the needs of VSP employees by capturing knowledge from employees through the KM portal, it lacks interaction and the instant transfer of knowledge.

To address this we have started "K-Groups" (communities of practice, or CoPs). Communities of practice are groups of people who share a passion for something and who know how to do it. They interact regularly to learn how to do it even better.

This is a voluntary endeavor of people driven by the passion to excel in their work. People with similar interests and concerns come together with the support of management/superiors to enrich their knowledge through face-to-face interactions, conversations and communications. This helps the organization to create business value by breaking the silos of knowledge and developing group knowledge. The whole effort is directed towards establishing a network of people and a network of knowledge through them. We have formed 17 CoPs in the plant areas which function regularly.

Learning from KM Implementation Efforts

1. Finding time. Typically, executives are preoccupied with their basic job of production or maintenance, and KM is sometimes seen as just one of many initiatives. They often feel they cannot spare the time to record their experiences.
2. There is no single tool to meet all the functional, departmental or cultural needs within VSP.
3. Technology is only an enabler for effective knowledge management. It is not the solution in itself. CoPs are organized to bring about direct interactions among the employees.
4. Having a proper measurement and monitoring system helps in tracking the progress of KM so that suitable interventions can be made for possible improvement.
5. Some common questions are "Why should I share?", "What is the benefit to me?" People should be encouraged to participate voluntarily if quality is to be ensured.
6. Addressing people-related issues should be the main KM concern, and not the systems or tools.
7. KM delivers over a longer time-frame and requires patience and perseverance. People should not be oriented towards short-term gains only.
8. Rewards and recognition can motivate only some people. The benefits to the individual of sharing and using the system should also be visible.

Conclusions

In the context of the organization, it is important to identify the kind of knowledge that is to be managed. This should be the starting point when launching a KM initiative. There should not be any doubt that the initiative is in line with the organization's goals and priorities. A common problem in most KM programs is that individuals do not share their knowledge. People will willingly share what they know if they think that it is important for their work and if they are encouraged to do so. The biggest challenge in KM implementation is how to change the organizational culture from "knowledge is power" to "knowledge sharing is power." For knowledge management initiatives to succeed, participation by employees is the key issue. The process and the technology play only supporting roles.

Organizations are striving to become learning organizations by institutionalizing knowledge management. They are doing this because the benefits of KM are clearly visible. The effective utilization of resources, the reduction of costs, customer satisfaction, improving on products and services, developing a culture of sharing and encouraging teamwork are only a few of the benefits. Although we find some benefits of KM at the level of the organization, the opportunities for sharing across organizations in a country and across the globe should be explored. This will not only help companies to improve their business but also contribute towards the effective utilization

Question-and-Answer Session

Moderator:

Vinay Kumar Nangia

Head, Management Studies,
Indian Institute of Technology, Roorkee

Question: For the successful knowledge management system that is in place in your organization, I assume that a change in the mindset and skills set of many engineers needed to happen first. However, I am also aware that this is something that is very difficult to accomplish, and probably took a long time. What have you done to overcome this problem?

Avinash Rao: You are right in thinking that we needed to spend more time giving what I call domain knowledge. Although a person may have the technical skills, we still needed that person to have domain knowledge. In the context of the Indian IT industry, discussions about domain knowledge have been occurring ever since the industry started. What usually happens today is that, when you hire specialists in the industry, for example in financial services, you hire a chartered accountant, who brings with him the domain side of things, and then you hire a technologist, who does the programming job. This model works very well if you are doing only maintenance work under the traditional outsourcing set-up. What happens in high-value outsourcing is that there is the expectation that at least one person understands both the domain knowledge and the technology. This is something that we do not currently have. It is necessary to invest in hiring a few people in a domain. The pressures in a company actually work against this. First, to maintain profitability, companies need to have a certain percentage of employees who are fresh recruits. It is much easier to train new recruits in the technology than in domain knowledge. In addition, to get growth rates of 25% per year, you need more experienced people to staff new projects. What tends to happen in many companies in India is that people get moved to a different project after 18 months. This destroys any domain knowledge that they may have picked up along the way. Increasingly, however, people are spending about four to five years on a particular project. This is not because of the wisdom of Indian IT companies, but because some clients insist that certain people stay with the project for at least five years if they are to give you the business. We are only now beginning to see high-value outsourcing in this light. It will take some time to develop solutions for this problem.

Question: You used the term "common leader." What do you mean by this? Who is this common leader and what is his role?

Avinash Rao: The term I used was "common leadership." What is happening today is that we have a push from Indian companies to have projects managed from India. When outsourcing began, it was mostly based on the staff augmentation model or "body shopping." The client says that he will pay you for the time of, say, 20 people who must have this skill profile and whom they will then manage. Over time, as the industry matured, Indian service companies started offering to solve clients' problems here in India. The business set-up started moving away from the staff augmentation model to a project-focused structure, with the leadership for its development

being provided by a program manager in India. However, now things are starting to change and the wheel has turned a full circle. Under the traditional outsourcing set-up, it was quite easy to manage and deliver a project out of India. Now there needs to be a global team in a project, usually working on something that has to be developed quickly. Having two team leaders, one for the client side and one for the Indian vendor side, no longer works. The dividing line between the client and the Indian company has blurred. There is only one expected output and only one person leading the entire effort. The responsibility now rests with one common leader.

Question: I come from the agriculture sector. Most of the time when we do outsourcing for IT purposes, they do not understand our domain and we do not understand their domain either, so how do we interact with each other?

Avinash Rao: If you are doing maintenance work, what you need to understand is the technology, and we at Wipro understand the technology very well. This is something that has worked well for us. We also understand a lot of domains, but we do not understand them well enough for high-value outsourcing.

Question: You have shown us a portal where this KM improvement is being uploaded. Is there any review mechanism? When best practices have been established and uploaded to the portal, how does the software ensure that there is no repetition?

Bhaskara Rao: Yes, there is a review mechanism. The knowledge veterans and knowledge brokers review the entire structure and the progress every month. From these review meetings, they examine the necessary inputs, the problems encountered, any additional facilities needed and what needs to be included in the portal. Any duplication, such as the repeated appearance of a knowledge asset, will be taken care of by the knowledge veteran.

Question: My first question is, do you have domain knowledge documented in a knowledge bank? Another question is, when you send your team abroad, are they already fully trained in both domain and technical knowledge?

Avinash Rao: We do have a knowledge bank. I have worked in a good number of large IT companies and all of them have impressive knowledge management systems. They all have very detailed systems on how to capture knowledge, such as a grading system and peer review. There are also systems that will tell you who the experts are inside the organization. If you want to search for a certain expert in a given area, you go into the system and say "I want to know who is an expert in large-scale computing." The system will tell you, this is the person, this is what he has worked on, and you can reach out to that person. The system also gives you information on articles that the company has and projects that the company has done. However, the process of getting to all the knowledge that is being captured is much more difficult to master in those knowledge management systems. I think that this is true for knowledge management systems in general. However, this has not been a problem in the way that KM has been implemented in these companies.

On the second question, do the people we send abroad have both domain and technical knowledge? The truth is that the Indian IT services industry has done a phenomenal job of delivering a large number of excellent projects around the world using the people that it has. Two years ago, we were talking about a talent shortage. We solved that shortage by training BEC students. Soon you will have companies casting their nets over a wider audience. They are very good at training people on the technologies. They have used some key people who are typically technical architects who understand the domain, who can translate customer

requirements into technical requirements. They are the bridge that converts domain signals into technology signals, if you will.

Question: But in my opinion, a person should have specific domain knowledge in outsourcing. Suppose a client tells you that it wants you to modify some billing system. If you do not know what a bill is, then how will you design the system? Thus, if you put a little more investment in making domain knowledge up to date, then it will help the outsourcing business.

Avinash Rao: I agree with you that we do need to make that investment.

Vinay Nangia: I think that one of the things that you are asking about is normally in the realm of the domain expert and the IT expert who work together. They do it all. Slowly, domain knowledge is becoming integrated.

In this regard, I would like to share with you a very interesting anecdote from when I was working closely with the IT group of the Department of Information Technology on a non-formal educational platform. They wanted to develop a banking certificate course and we were sitting on the board discussing the syllabus. The chairman was from one of the largest companies in India doing outsourcing work; another member was the HR chief of another large IT company doing outsourcing. We had experts from the banking side and experts from the IT side. It was very interesting that, when we started talking about the syllabus, the people from the banking side were talking about the Indian banking system all the time. Those from the outsourcing side, who were very senior people, talked all the time about the American banking system. Because they were doing outsourcing business, they were concerned only with European or American banking systems and were not at all interested in Indian banking. We had a problem developing a syllabus that would satisfy the needs of both groups.

Question: We seem to be talking here only of large companies, not SMEs. I would like to know how a computer literacy problem can be addressed in SMEs (small and medium enterprises) or even among farmers.

Bhaskara Rao: I am from manufacturing industry, and we have to look at things in a different way. Our company, the Vizag Steel Plant, has 17,000 employees. Only 5,000 of these are engineers; 5,000 are lower-level employees who had problems with tacit knowledge in the beginning. But now, I am very happy to say that we have started to solve the computer literacy problems with the provision of computers and the establishment of an intranet for all the employees to use. Many of our employees already use computers in their day-to-day activities. However, it will definitely take some time before we can provide computers to all our employees, thus making them computer literate. Our situation is unlike that of the IT companies, which are service-oriented companies.

Question: If we are thinking of small and medium enterprises, each SME does not have sufficient critical mass to have its own knowledge management system. Does this mean that we have to talk about them using a completely different model, where a group of SMEs or a network of SMEs have to come together to share knowledge? Thus, on one side, you have knowledge from the corporate sector, and then on the SME side you will have to have a shared modern network. We have just mentioned computer literacy; how many SMEs use computers on a daily basis? There is also the language angle: how many SMEs are confident with using English?

Serafin Talisayon: May I make a comment? Mr. Avinash Rao pointed out that certain skills and procedures suited for traditional outsourcing may be counterproductive when used in higher-value outsourcing. For example, if you are going to deliver according to specifications, it

is very useful to have skills in Six Sigma, ISO, etc. But, if you are going to partner with your client for collaborative problem solving or for collaborative product design and delivery, these skills become a disadvantage. I can see now that there is a need to address the question of how to transform people who are already very good in productivity and quality management tools to have more of the knowledge management and knowledge innovation skills that will be needed for things like high-value outsourcing and many other tasks that are now coming to the fore.

Rory Chase: I think that it is very good that clusters of SMEs were mentioned. In Europe there is now a trend to enable sprawling organizations that do not have the individual resources to implement knowledge management to band together. This is happening in places like Spain and in Italy with their textile and ceramic industries. Within regions in these countries, they have created associations and sourced out sponsoring agencies. They have organized themselves into a group of small organizations, which are then assisted in developing certain knowledge management systems. Although there is competition among many of the SMEs, what typically happens is, rather than talk about proprietary activities, they are now more concerned about those things that affect the industry as a whole. For example, if you have a ceramics industry where there is competition from another part of the world, they all look at ways in which they can reduce the cost of their activities or tackle their safety issues. They look at ways of using knowledge management so that they can improve on their safety measures. There are common activities where SMEs can benefit from knowledge management. This usually happens within the same language area so they do not have to be concerned about the issue of language in a given knowledge management system. I think that if you are concerned about this, if you do not think you have money in your own organization to sponsor those kinds of activities, talk to your trade association or to the government which can sponsor your particular activity. Find out whether in fact a group of SMEs can work together in a joint activity.

Naoki Ogiwara: I would like to add an example from Japan. In Tsubame, a very small town in northern Japan, there are many very small manufacturers producing silverware such as spoons and knives. Until very recently they were struggling to stay in business because Chinese companies are able to manufacture much cheaper silverware. They got together many times to discuss the issues, and realized that their capability is not in making spoons or knives but in grinding. So they created a kind of guild community, and started grinding not only small things like spoons or knives but also larger items such doors. They also realized that, if they banded together, they would be able to afford to undertake joint marketing activities. Now their businesses are doing very well. As Rory said, creating a kind of network, guild or cluster is good for SMEs.

Question: Is KM really a tool or a technique for productivity improvement, or is it only a philosophy like TQM?

Rory Chase: I say that it is neither. I think that it is much more than just a tool or a technique. In the 15 years that I have been involved with knowledge management, I have seen that KM has enabled organizations of all types – profit or non-profit, public or private sector – to be more efficient or effective, to reduce costs or to improve productivity. On the other hand, my understanding of philosophy is that it is an approach to life, or a way of life; many times, a philosophy is not grounded in reality. But I find that knowledge management does deliver results. Knowledge management is an approach to achieving an organizational mission statement – whether to manufacture something, to provide a service or to do something for the citizens. I think that it is the only way organizations in the knowledge economy can increase efficiencies on an ever-increasing scale and improve the standard of living of the individual person.