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CONTENTS

Sr. No.	TITLE & NAME OF THE AUTHOR (S)	Page No.
1.	AN INVESTIGATION ON EMPLOYEES' JOB SATISFACTION IN NUCLEAR POWER PLANT AT KUDANKULAM, INDIA <i>DR. T. VIJAYAKUMAR & SANKARI PRIYA</i>	1
2.	CRITICAL FACTORS FOR SUSTAINABLE CHANGE MANAGEMENT PROCESS: A REVIEW <i>DR. MITA MEHTA, LALITA DEVI & VEENA RAI</i>	4
3.	MANAGEMENT STRATEGIES TO CAPITALIZE AND ENHANCE HUMAN POTENTIAL IN INDIAN MANUFACTURING SECTOR <i>PRABHJOT KAUR, SAMRIDHI GOYAL & KAWALPREET SINGH</i>	10
4.	IMPACT OF E-TRUST ON E-LOYALTY <i>DR. ANDAL AMMISSETTI</i>	14
5.	KNOWLEDGE ECONOMY AS AN EXTENSION OF INFORMATION SOCIETY WITH REFERENCE TO INDIA <i>GEETU SHARMA</i>	18
6.	DYNAMIC RELATIONSHIP TECHNIQUE FOR COMPLICATION REDUCTION IN BIG DATA <i>SELVARATHI C</i>	21
7.	CONSUMER ATTITUDE TOWARDS THE BRANDED APPARELS IN MEN IN THANJAVUR DISTRICT <i>K. NALINI</i>	27
8.	FINANCIAL HEALTH THROUGH Z SCORE ANALYSIS: A CASE STUDY ON SELECTED PHARMACEUTICAL COMPANIES <i>NIRMAL CHAKRABORTY</i>	29
9.	AN APPROACH TO EVALUATE SOFTWARE QUALITY MODEL <i>DEEPSHIKHA</i>	35
10.	TRACKING THE INDEX FUNDS WITH FAMA FRENCH THREE FACTOR MODEL <i>DR. SHIKHA VOHRA & SHIVANI INDER</i>	38
11.	SOCIAL AUDIT REPORT CARD OF SOCIAL PERFORMANCE <i>DR. S. K. JHA</i>	42
12.	STRATEGIC POSITIONING AS A GROWTH STRATEGY IN COMMERCIAL BANKS IN KENYA <i>ESTHER WANJIRU MAINA</i>	45
13.	RURAL EMPLOYMENT DIVERSIFICATION IN INDIA: PROGRESS TOWARDS THE MILLENNIUM DEVELOPMENT GOALS IN INDIA <i>SANGHARSHA BALIRAM SAWALE & NEHA RAKESH NAMDEO</i>	51
14.	RELEVANCE OF TALENT MANAGEMENT IN BUSINESS STRATEGY OF AN ORGANISATION <i>POOJA SHARMA</i>	55
15.	THE COLLECTIVE ACTION OF 'GOTONG ROYONG' SOCIETY IN ELECTRICITY INFRASTRUCTURE DEVELOPMENT IN REMOTE ISLANDS <i>ENI SRI RAHAYUNINGSIH</i>	58
	REQUEST FOR FEEDBACK & DISCLAIMER	66

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KNOWLEDGE ECONOMY AS AN EXTENSION OF INFORMATION SOCIETY WITH REFERENCE TO INDIA

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ABSTRACT

For the last two hundred years, neo-classical economics has recognised two factors of production: labour and capital. This is now changing. Information and knowledge are replacing capital and energy as the primary wealth-creating assets, just as the latter two replaced land and labour 200 years ago. In addition, technological developments in the 21st century have transformed the majority of wealth-creating work from physically-based to "knowledge-based." Technology and knowledge are now the key factors of production. With increased mobility of information and the global work force, knowledge and expertise can be transported instantaneously around the world, and any advantage gained by one company can be eliminated by competitive improvements overnight. The only comparative advantage a company will enjoy will be its process of innovation—combining market and technology know-how with the creative talents of knowledge workers to solve a constant stream of competitive problems—and its ability to derive value from information. We are now an information society in a knowledge economy.

KEYWORDS

Knowledge, Economy, Information, Society, Transformation.

INTRODUCTION

We are living through a period of profound change and transformation of the shape of society and its underlying economic base ... The nature of production, trade, employment and work in the coming decades will be very different from what it is today." In an agricultural economy land is the key resource. In an industrial economy natural resources, such as coal and iron ore, and labour are the main resources. A knowledge economy is one in which knowledge is the key resource. It is not a new idea that knowledge plays an important role in the economy, nor is it a new fact. All economies, however simple, are based on knowledge about how, for example, to farm, to mine and to build; and this use of knowledge has been increasing since the Industrial Revolution. But the degree of incorporation of knowledge and information into economic activity is now so great that it is inducing quite profound structural and qualitative changes in the operation of the economy and transforming the basis of competitive advantage. The rising knowledge intensity of the world economy and our increasing ability to distribute that knowledge have increased its value to all participants in the economic system. The implications of this are profound, not only for the strategies of firms and for the policies of government but also for the institutions and systems used to regulate economic behaviour.

WHAT IS KNOWLEDGE ECONOMY?

"Capitalism is undergoing an epochal transformation from a mass production system where the principal source of value was human labour to a new era of 'innovation mediated production' where the principal component of value creation, productivity and economic growth is knowledge." Defining the knowledge economy is challenging precisely because the commodity it rests on "knowledge" is itself hard to pin down with any precision. Perhaps for this reason there are few definitions that go much beyond the general and hardly any that describe the knowledge economy in ways that might allow it to be measured and quantified. The Knowledge Economy is emerging from two defining forces: the rise in knowledge intensity of economic activities, and the increasing globalisation of economic affairs. The rise in knowledge intensity is being driven by the combined forces of the information technology revolution and the increasing pace of technological change. Globalisation is being driven by national and international deregulation, and by the IT related communications revolution. However, it is important to note that the term 'Knowledge Economy' refers to the overall economic structure that is emerging, not to any one, or combination of these phenomena. Various observers describe today's global economy as one in transition to a "knowledge economy", as an extension of "information society". The transition requires that the rules and practices that determined success in the industrial economy need rewriting in an interconnected, globalised economy where knowledge resources such as know-how, expertise, and intellectual property are more critical than other economic resources such as land, natural resources, or even manpower.

WHAT'S NEW ABOUT THE NEW ECONOMY?

"In the 21st century, comparative advantage will become much less a function of natural resource endowments and capital-labour ratios and much more a function of technology and skills. Mother nature and history will play a much smaller role, while human ingenuity will play a much bigger role." What makes the emergence of the knowledge economy important is that it is, in some significant respects, different from the industrial economy we have known for most of the last 200 years. Those differences include the following:

INFORMATION REVOLUTION

The IT revolution has intensified the move towards knowledge codification, and increased the share of codified knowledge in the knowledge stock of advanced economies. All knowledge that can be codified and reduced to information can now be transmitted around the world at relatively little cost. Hence, knowledge is acquiring more of the properties of a commodity. Market transactions are facilitated by codification, and the diffusion of knowledge is accelerated. Codification is also reducing the importance of additional, duplicative investments in acquiring knowledge. It is creating bridges between fields and areas of competence and reducing the 'dispersion' of knowledge. These developments promise an acceleration of the rate of growth of stocks of accessible knowledge, with positive implications for economic growth.

KNOWLEDGE, SKILLS AND LEARNING

Information and communication technologies have greatly reduced the cost and increased the capacity of organisations to codify knowledge, process and communicate information. In doing so they have radically altered the 'balance' between codified and tacit knowledge in the overall stock of knowledge. In essence, creating a shortage of tacit knowledge. As access to information becomes easier and less expensive, the skills and competencies relating to the selection and efficient use of information become more crucial, and tacit knowledge in the form of the skills needed to handle codified knowledge becomes more important than ever. Information and communication technology investments are complementary with investment in human resources and skills. The skills required of humans will increasingly be those that are complementary with information and communication technology; not those that are substitutes. Whereas machines replaced labour in the industrial era, information technology will be the locus of codified knowledge in the knowledge economy, and work in the knowledge economy will increasingly demand uniquely human (tacit) skills – such as conceptual and inter-personal management and communication skills.

INNOVATION AND KNOWLEDGE NETWORKS

The knowledge economy increasingly relies on the diffusion and use of knowledge, as well as its creation. Hence the success of enterprises, and of national economies as a whole, will become more reliant upon their effectiveness in gathering, absorbing and utilising knowledge, as well as in its creation. A knowledge economy is, in effect, a hierarchy of networks, driven by the acceleration of the rate of change and the rate of learning, where the opportunity and capability to get access to and join knowledge-intensive and learning-intensive relations determines the socio-economic position of individuals and firms.¹³ Firms must

become learning organisations, continuously adapting management, organisation and skills to accommodate new technologies and grasp new opportunities. They will be increasingly joined in networks, where interactive learning involving creators, producers and users in experimentation and exchange of information drives innovation.

LEARNING ORGANIZATIONS AND INNOVATION SYSTEMS

In a knowledge economy, firms search for linkages to promote inter-firm interactive learning, and for outside partners and networks to provide complementary assets. These relationships help firms spread the costs and risks associated with innovation, gain access to new research results, acquire key technological components, and share assets in manufacturing, marketing and distribution. As they develop new products and processes, firms determine which activities they will undertake individually, which in collaboration with other firms, which in collaboration with universities or research institutions, and which with the support of government. Innovation is thus the result of numerous interactions between actors and institutions, which together form an innovation system. Those innovation systems consist of the flows and relationships, which exist among industry, government and academia in the development of science and technology. And the interactions within these systems influence the innovative performance of firms and ultimately of the economy. The 'knowledge distribution power' of the system, or its capability to ensure timely access by innovators to relevant stocks of knowledge, is therefore a major determinant of prosperity. Global competition and production. Strategy and location.

INDIA AS A KNOWLEDGE ECONOMY: ASPIRATIONS VERSUS REALITY

The Indian vision of a knowledge-based economy will be realised only when it is based on the foundation of a robust industrial economy. To be truly beneficial, the rain of IT must fall at the right place, in the right quantity, at the right time and for the right purpose. THE Indian software industry has compiled an impressive track record over the past decade. Entrepreneurs, bureaucrats and politicians are now advancing views about how India can transform itself into a knowledge-based economy by riding the information technology (IT) bandwagon. Isolated instances of villagers using e-mail are cited as examples of such transformation. Likewise, e-governance is being projected as the way of the future. There is no dearth of fascinating stories about IT-enabled changes. But, there is little discussion about whether such changes are sustainable and effective when other areas of the economy continue to lag. For example, 79 per cent of India's population lives in villages with limited basic infrastructure. Over 60 per cent of the population is considered literate, but with literacy being defined as the ability to read and write simple words in any language, acquired with or without formal schooling. This criterion is so basic, that it is almost irrelevant in the context of a knowledge economy. Yet, Central and State governments have projected IT as a vehicle for social and economic transformation. Are we putting the cart before the horse here? Even if the focus on IT is justifiable, how must IT policy be designed so that the nation is benefited in a balanced way? In this commentary, we discuss the implications of India's intensive focus on the IT sector. We argue that India should aggressively pursue manufacturing- and agriculture-based industries to build a robust industrial economy that can be made more efficient with IT. IT projects can certainly be pursued within the private sector. However, government policy should not be heavily skewed in favour of the IT industry when its benefits to society are unclear and when its role within the broader framework of national development has not been adequately articulated. Further, policy-makers should moderate their obsession with IT as a panacea for India's socio-economic problems.

INDIA AS A KNOWLEDGE ECONOMY

The value of IT depends greatly on the existing level of economic development. IT can make existing assets and processes more effective and efficient, but cannot compensate for the lack of a basic infrastructure. What is appropriate for a developed economy is not necessarily appropriate for India, where basic elements of infrastructure including quality education, healthcare, electricity and drinking water remain in short supply. The impact of IT is best understood when the differences between industrial and knowledge-intensive ventures are recognised. Industrial growth derives from investments in large-scale infrastructure (such as railways, roadways, power grids and dams). Such infrastructure supports the growth of physical-asset intensive industries (such as the steel and transportation industries) that create and move physical entities (such as goods, water and people). These ventures employ numerous workers with limited education and skills, and can uplift large sections of society. In contrast, ventures in the knowledge economy usually involve the production of knowledge-intensive goods (like software), and the large-scale capture, movement and utilization of information using sophisticated network infrastructure (such as computers, cable, fibre and routers). Beyond the physical labour required for initial construction, building and maintaining such infrastructure requires specialized knowledge. Despite the hype of the "new economy", the fact is that economic development is cumulative. The industrial economy made agriculture more productive. The productivity of agricultural labour skyrocketed with the use of industrial and biological innovations including tractors, irrigation systems, fertilizers, pesticides and genetically engineered seeds. Historically, industrial innovation in developed economies has created great wealth and improved living standards across societal divides. This progress has set them up in an ideal position to create and exploit knowledge as they transform into knowledge-based economies. Crucially, the greatest source of productivity and growth attributed to the knowledge economy derives not from the knowledge economy itself, but from its effects on the industrial economy. For example, IT can enable supply chains and factories to work more efficiently. The "leapfrogging" argument, whereby India skips heavy infrastructure building and transforms directly into a knowledge economy, is therefore suspect. Proponents of leapfrogging describe how isolated villages without conventional telephones have directly adopted cellular phones. The example provides excellent symbolism. However, the underlying principle is not scalable to the level of the national economy where many complex sub-systems work together. Consider the transportation sub-system. The laws of physics do not allow IT to substitute the physical movement of goods by a "virtual" movement. A lightning-fast information network will not in itself help achieve faster and cheaper transport. Better roadways and railways will.

IT, JOB GROWTH AND GOVERNMENT POLICY

Indian IT firms have focussed on developing and delivering IT services to advanced economies. Even if India became the world's software factory and the most optimistic projections of IT-related jobs (including jobs in call centres and design centres) were upheld, this industry will employ at most a few million people. In a nation with over a billion people, this constitutes but a dent in the employment statistics. Further, a social planner should be concerned not just with the creation of wealth, but also with its distribution across social divides. The IT industry holds limited potential for wealth to trickle down to the poorer sections of society. Unlike a steel plant, IT engenders few opportunities for the uneducated. Any transfer of wealth from the IT sector (for example, by taxing the IT sector to fund social spending) would be achieved through the heavy hand of government. In fact, the rapid growth of IT will likely lead to a digital divide in the short term, where the rich and educated are empowered and enriched by IT and the poor are oblivious to its impact. Before embracing IT, Indian policy planners must carefully evaluate whether investments in other areas would yield higher, and more equitable, returns. For example, consider the jute industry. The country needs to be particularly careful not to give short shrift to the manufacturing sector. China is not known for its strengths in IT, although it now has some presence in the area. But, what China has accomplished in terms of its core industrial base is striking. Foreign direct investment (FDI) in China was of the order of billion in 2000 despite all the noise about alleged labour and human rights abuses. Chinese exports exceeded 0 billion in 2000, with the United States alone accounting for 0 billion of these exports. In fact, the value of "footwear" exported annually by China to the U.S. (worth about .2 billion) itself compares with or even exceeds the total value of India's annual IT exports. Why are these numbers relevant? Exporting footwear creates millions of jobs for citizens who lack sophisticated skills. According to some reports, a total of 34 million export-related jobs have been created in China, with exports to the U.S. alone accounting for over 20 million jobs in the last decade. These jobs have improved living standards for a substantial fraction of Chinese society. There is much we need to learn from China about how the manufacturing sector can deliver robust and equitable economic growth. Taiwan, Malaysia and South Korea have also flourished using similar approaches. In contrast with manufacturing, the direct benefits to IT (such as employment in IT jobs) are likely to flow to the few who already have the benefits of education. The trickle-down effects of IT (such as cleaning and maintenance staff for IT firms) are likely to be modest or non-existent outside the large cities. It is also time to discard the notion that the manufacturing sector is inherently less appealing because it may involve some physical labour. In the more advanced economies, a skilled factory floor worker is frequently paid more than a call-centre employee. Empowered with technology, the factory worker can add value at a remarkable rate. In India, the reverse often holds. Mundane call-centre jobs, often outsourced from more developed economies, absorb well-educated, English-speaking workers whose abilities could be employed much more productively elsewhere. The actions of governments in India tend to be biased in favour of the IT sector. The government needs a more balanced policy, one that ensures that the core industrial sector is not ignored in the rush toward IT.

IT AND EDUCATION

IT is fashionable to say that India's population constitutes its greatest asset. This viewpoint is misleading. People are assets only when they participate meaningfully in the cycle of value creation and consumption by exercising buying power, or creating products and services of value, or by creating and harnessing knowledge. A large fraction of India's population does not meet, or even come close to, this asset standard. To transform such a situation, a renewed focus is required on the two pillars that have supported the growth of every successful economy – a strong infrastructure core and widespread access to education. Now to discuss the IT-education interface.

IT AND CULTURE

A Knowledge Economy is characterised by a culture of innovation. For such a culture to take root, innovation must be rewarded and intellectual property must be protected. A culture that truly enhances innovation supports the view that to try hard and fail is perfectly fine. Yet, the Indian psyche has historically been averse to blessing the risky venture. This attitude transcends into the corporate arena. Consider how static the Indian automobile industry was for three decades before the refreshing winds of competition brought about rapid change. Competition breeds innovation. While one side of the cultural coin pertains to the incentives for innovation, the flip side pertains to its protection. Ideas, unlike property, cannot be protected by building a fence around them. Intellectual property protection is not a purely economic issue; it also has important cultural dimensions. The economic angle can be addressed with stronger patent laws and punitive procedures. However, the cultural angle will decide whether such protection can be enforced meaningfully. Addressing the cultural angle is a challenge.

THE ROAD TO TECHNOLOGY

A society that is deeply divided by social and economic fissures must think carefully about how it achieves economic and technological advance. The path, in some ways, is more important than the outcome itself. In the Indian context, particular attention needs to be paid to when, where, and in what form IT and other technological advances are encouraged. There are, indeed, many low-hanging fruits to be harvested. For example, a recent article in The New York Times described how a fisherman working off the coasts of Kerala used a cell phone on the seas to obtain information about spot market prices for fish at Kochi and Kollam. The fisherman netted the equivalent of an additional, 000 in annual income merely by deciding to deliver his catch to the more remunerative market each time his boat came in. This striking example of how simple information flows can enhance market efficiency can be replicated in many ways, and in many markets. However, the stakes are quite different when it comes to the formulation of a national IT policy. Any national policy requires some trade-offs between the benefits to industrial sectors, regions and classes of people. In formulating a national IT policy, the quest for superior technology must be moderated by an understanding of its implications at the social level – what might be good for a private company or an entrepreneur may not always be good for society and vice-versa. Successful technology adoption will move in measured steps, at a pace and in a direction that are in harmony with changes in the socio-economic fabric. The role of the government in ensuring such harmony should not be underestimated. This is especially true in India where the government remains responsible for a significant fraction of the economic output, and where it is actively reshaping rules and regulations as the country integrates into the global economy. Information technology can change the way a society communicates, collaborates, lives, works and plays. The growth of the IT sector in India symbolises the potential of Indian industry to perform at world-class standards. This success demonstrates much of what can go right when the spirit of human enterprise is given free rein. However, the success of IT at the corporate level in India cannot solve its economic and social challenges. Just as copious rainfall can lead to dramatic floods, an obsession with IT and the knowledge economy is not useful. To be truly beneficial, the rain of IT must fall at the right place in the right quantity, at the right time and for the right purpose. Neither does the aggressive pursuit of IT represent the sole, or even an obvious, pathway to a first class economy despite the glowing success of high-profile IT companies.

CONCLUSION

Technological developments in the 21st century have transformed the majority of wealth-creating work from physically-based to “knowledge-based.” Technology and knowledge are now the key factors of production. With increased mobility of information and the global work force, knowledge and expertise can be transported instantaneously around the world, and any advantage gained by one company can be eliminated by competitive improvements overnight. The only comparative advantage a company will enjoy will be its process of innovation—combining market and technology know-how with the creative talents of knowledge workers to solve a constant stream of competitive problems—and its ability to derive value from information. We are now an information society in a knowledge economy where knowledge management is essential. This page lists and rates Internet resources related to the field of knowledge based economy and knowledge management in the new information society.

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