

Technology: A Foundation for Economic Development

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Abstract

The world has now become closer together as one global village, thanks to the technological progress. No doubt, Technology brings development with it and, when managed properly, creates wealth for individuals, companies as well as nations. This paper discusses the role of management of technology, demonstrates the impact of technology, defines the necessary ingredients, brings out the details about the drivers of change, in creating economic growth, organizational competitiveness and prosperity and demonstrates the impact of technology on fostering national development and improving competitiveness. It also discusses the responses needed by governments of developing countries, recommends strategies to be followed by corporations, etc., with a special attention on the Human Resource Development effort required to prepare a workforce capable of supporting the change.

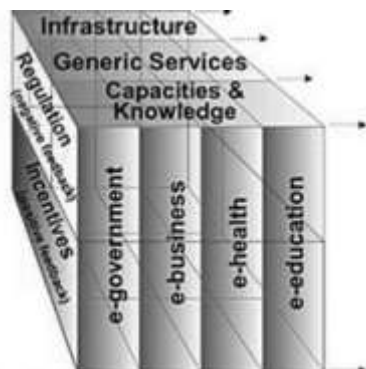
Introduction

Technology is vital to economic development, to progress of society and to the improvement in the quality of life. Technological progress has brought with it improvement in communication, transportation, information dissemination, and has brought the world closer together as one global village. Proper management of technology is what creates wealth for nations, companies, and individuals. It forms the determines national and multinational corporations and all successful enterprises realize that business competitiveness is no longer a matter of luxury but a matter of survival in an increasingly global, fiercely competitive marketplace. The distinction between developed and developing economies lies primarily in the ability to effectively manage resources and technological assets.

Developed economies rely heavily on innovation to bring high added value to customers, command high prices, and maintain market dominance. Innovations and improvement in information and communication technologies commanded by industrialized countries bring about not only fundamental changes in the core institutions of those countries, but also the emergence of new knowledge-intensive products, services, industries, and inter-organizational forms. In order for developing countries to avoid being marginalized, they must formulate strong public policy, and their companies must improve the way they manage technology and innovation.

This paper discusses the role of management of technology in creating economic growth organizational competitiveness and prosperity. It demonstrates the impact of technology on fostering national development and improving competitiveness. It also defines the necessary ingredients for enterprise competitiveness in the current environment.

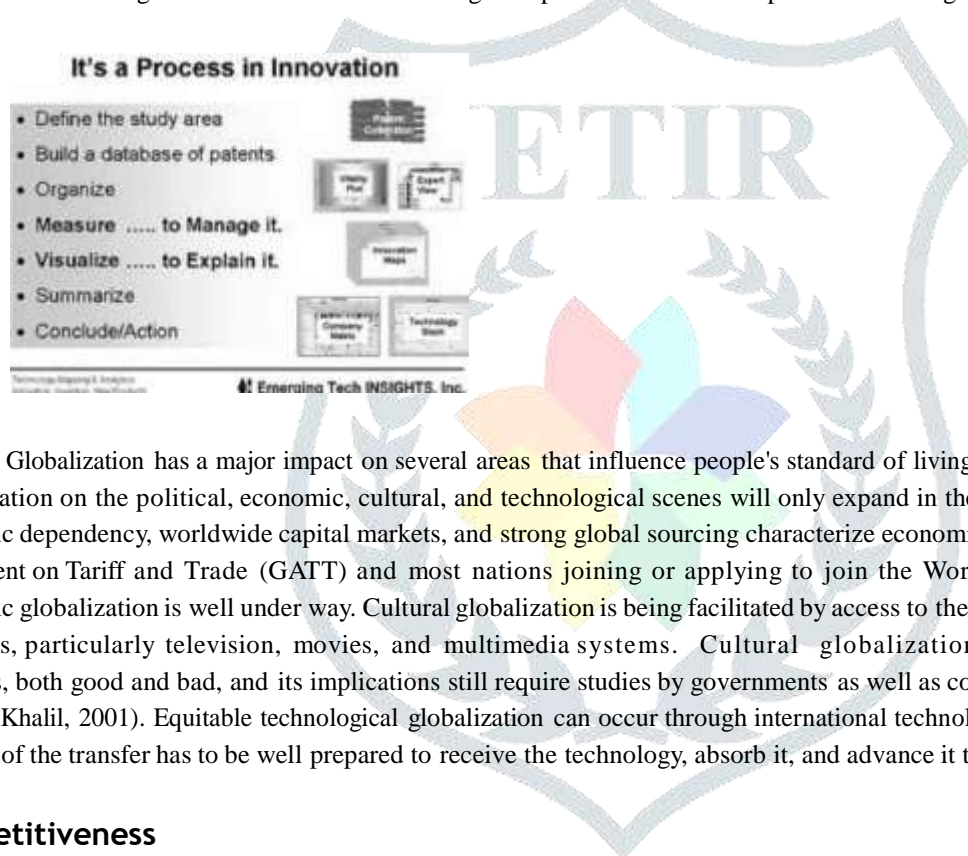
The paper covers the drivers of change in the new economy of the twenty-first century. It then discusses the responses in public policy needed by governments of developing countries. It also recommends strategies to be followed by corporations in these countries. Special attention is given to the human resource development effort required to prepare a workforce capable of supporting development and for competing in a global market place.



The technology revolution that we are witnessing today has its strength in information, communication, and improved knowledge. It contributes to the augmentation of intellect and know how. This adds totally new dimensions to human development. This revolution will, once more, bring major changes in patterns of work, job markets, and social behavior. It will contribute to improvement in productivity and carry with it major potential for economic growth and improvement in the quality of life. Changes will occur in this new knowledge era, and it will bring with it new challenges, a new economy, and a renewed need to examine public policies needed to harness its potential.

Technology in the Process of Globalization

Advancement and proliferation of technology has brought the world closer together into one small global village. The explosion in information and communication technologies has permitted information, news, and personal and company communications to flow easily across boundaries. Innovations in transportation and logistics have allowed movement of people, technology, and goods across international borders, permitting an integration of economies around the world. The influence of the Internet on the growth of e-business is creating an upheaval in business practices and organizational structures around the world.



Globalization has a major impact on several areas that influence people's standard of living and quality of life. Effects of globalization on the political, economic, cultural, and technological scenes will only expand in the future. Increased trade, mutual economic dependency, worldwide capital markets, and strong global sourcing characterize economic globalization. With the General Agreement on Tariff and Trade (GATT) and most nations joining or applying to join the World Trade Organization (WTO), economic globalization is well under way. Cultural globalization is being facilitated by access to the Internet and to communication networks, particularly television, movies, and multimedia systems. Cultural globalization has many consequences for societies, both good and bad, and its implications still require studies by governments as well as companies in order to deal with its effects (Khalil, 2001). Equitable technological globalization can occur through international technology transfer. However, the host receiver of the transfer has to be well prepared to receive the technology, absorb it, and advance it through innovation.

Competitiveness

Competitiveness is the process by which one entity strives to outperform another. For a company, being competitive implies that it has the ability to produce a product or provide a service, in a timely and cost effective manner, which meets the test of the marketplace and the needs of customers. To maintain its competitive position, the company must continue to outperform its business rivals. In today's business environment, competitiveness is no longer a matter of luxury but a matter of survival in the global marketplace.

Investment

Investment is the base of all economic activities. It includes investment in productive facilities, R&D, capital equipment, as well as investment in people through education and training.

Productivity

Productivity is the efficiency of utilization of resources. The level of technology used, the investment in capital equipment, the performance of the workforce, and the effectiveness of the management system influence it. Productivity is both a determinant and an indicator of national competitiveness (Council on Competitiveness,

Trade

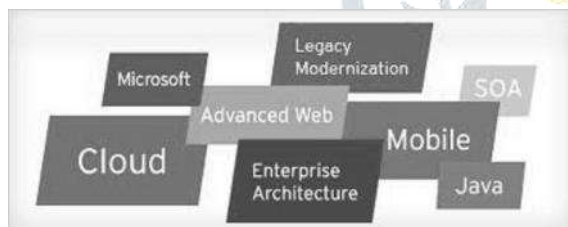
Exporting to other nations is essential for increasing wealth. High export levels are indicators of a nation's industry success. It is a reflection of the efficiency of its productive enterprises and the quality of its products. Growth rate and levels of export are indicators of national competitiveness. Currency exchange rates can influence the magnitude of exports and should be traced.

Standard of Living

A high standard of living is the goal of every nation. It is the crown of the competitiveness pyramid and the reward for citizens living in competitive nations. A nation's wealth can be expressed in terms of its Gross Domestic Product (GDP). An index for the standard of living is GDP per capita. The distinction between developed and developing countries lies primarily in the ability to effectively manage resources and technological assets to be competitive. It is, however, impossible to think of developing countries as a homogeneous group due to the emergence of some countries faster than others. Therefore, an analysis of each country's special circumstances, weaknesses, and strengths is more appropriate.

Globalization of Technology

Technology-based strategies must keep pace with nuances in the changing global economy. The most notable paradigm shift for practitioners of ED to understand is the expanded globalization of technology, which in turn has intensified the focus on localized assets and resources. In today's global economy knowledge, technology and innovation are firmly embedded in globally-traded products and services.



Corporate production processes are captured within a global value chain, in which specialization can easily be outsourced. Firms and enterprises are more networked, more linked and more distributed than ever. The corporate world is also finding more ways to facilitate innovation internally and expand its reach in areas of research and development. These trends have drastically changed the role of human capital in the economy. Managerial, professional and technical positions - or 'knowledge workers' - are now the largest occupational category. Competition has intensified for the most talented scientists and engineers at global, state and regional levels. Simultaneously, the global economy is more accessible for these very people to work as entrepreneurs and launch their own technology ventures independent of corporate structures.

Imperative for Regional Connectivity

Given the increasing globalization of technology, regions must consider new strategies in addressing regional competitiveness and economic growth, and their primary response since the 1980s has been industry cluster development. The art of cluster development was formally introduced, articulated and made famous by Harvard Business School Professor and renowned business strategist Michael Porter in 1990. Traditional cluster development theory is the notion that all the assets, value chains and required skills must be contained within a proximate geographical location. Economic development is then promoted within the cluster by improving the competitiveness of one or several specific business sectors. Bendis had the opportunity to implement a cluster development strategy with Porter as part of the Council on Competitiveness Clusters of Innovation. This strategy helped to build

aerospace and defence vehicle and plastics manufacturing clusters in Wichita, Kansas.

However, the evolution of distributed and networked business models compels us to examine the cluster model of ED. For instance, the growth of outsourcing means that larger, fully-integrated corporations are now becoming divested both operationally and geographically. A large pharmaceutical or defence company can be thought of as a network of smaller enterprises, divisions and suppliers. In this context, cluster development acts as a mechanism to provide focus and advise strategy through the alignment of industries and technologies into thematic areas to address growth. However, further tools must be developed to capitalize on strategies that promote innovation not just to support clusters, but to galvanize innovative activity throughout a region.

In today's environment, regions need to alter their approach from technology-based ED to innovation-based ED. The local knowledge base -including local researchers, scientists, entrepreneurs, government officials and representatives of business and industry- constitutes the region's critical assets in fostering innovation. The regional talent base often reflects the location's legacy industries. For example, Detroit's knowledge base has been historically centred on the automotive industry. With the automotive industry faltering, a new ED approach must be implemented beyond the development of industry clusters. Innovation-based economic development requires Detroit to leverage its regional human capital, but for the purpose of achieving innovative outcomes beyond the automotive industry. Detroit has well-educated people with specialized skills, but to the region's detriment they have been focused on a single, failing market.

The next component to be understood is how technology is emerging in the region's industry and local research activities. The regional alignment of key enabling technologies and the local knowledge-base form competencies that can then be directed towards innovation. Innovation-based ED solutions, then, lie in understanding the connections among these key assets in the regional economy: value must be extracted systematically and the available resources aligned as part of a regional strategy. Co-author Richard Seline has worked in numerous US regions over the past decade through his consultancy New Economy Strategies.

This experience has led to the conclusion that determining whether a region is a hub (that is, a significant concentration of most of the necessary assets and attributes for a given industry) or a node (a concentration of one or two highly critical elements of an industry's value chain) in specific unique regional competencies fosters appropriate discussion and debate on its ability to concentrate resources, leadership and ultimately collaborative responses on fostering innovation-based ED. Due to the efforts of Seline and New Economy Strategies Greater Detroit, for example, now has a roadmap for collaborative initiatives that will promote innovation in the region. The New Economy Strategies perspective on global hubs and nodes. The knowledge of science, technology and the current global paradigm with respect to numerous regions in the USA highlights the need for regional connectivity. To achieve the full potential of a regional economy, all assets and players in knowledge industries, scientific advancement and technological innovation must be connected. Investment in science, technology and innovation acts as an engine for long-term development, and is an essential ingredient to achieving many critical elements of the Millennium Development Goals.

What role do science, technology and innovation play in building India's future, and what are the resource requirements needed to create effective public and private partnerships

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