Productivity in a Knowledge-based Economy: Some Implications in Social Science Research'

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"One day, a man in rural China will be able to get a master's degree online and then start a business in cyberspace, all without leaving his village."

Larry Ellison
CEO of Oracle

First of all, allow me to thank the National Research Council of the Philippine (NRCP) and the Don Mariano Marcos Memorial State University (DMMMSU) for inviting me, on the occasion of its 21'' University Foundation Day Celebration, to address this body on a topic that has been sapping much of our energy, brainpower, consensus-building skills, not to include, patience and tolerance, for the past few months at the University of Northern Philippines (UNP). This is Information of Technology (IT).

In this paper, I will belabor to present my own framework of the knowledge-based economy. With this, I will show first that productivity is a function of IT. Second, through the framework, J will explain the vital role of research, particularly social science, in attaining productivity. Third, which you may find to be the most important, as it will directly impinge on your research proposal preparation this afternoon, I will present three IT studies undertaken in our University as well as researchable areas which some of you may choose as your title for your thesis or dissertation or plain research.

It is my prayer, then, that I will be able to square off effectively the objectives of your theme "Forging Ahead Towards Productivity in a Knowledge-Based Economy."

Conceptual Framework

Shown in Figure I is the framework with which I will develop and discuss my paper. The generation and utilization of knowledge result to greater productivity in the economy. Greater productivity and efficiency in the economy will help attain the vision of the administration in making the country as Knowledge Center of E-service Hub of Asia. In the generation and utilization of knowledge, there are three sectors that must play vital roles, to wit: the government, industry, and the academe.

• Paper prepared and presented at the Academic Forum held on the occasion of the 21'' University Foundation Day Celebration of DMMMSU at the Graduate College, DMMMSU, San Fernando City on 12 January 2002.

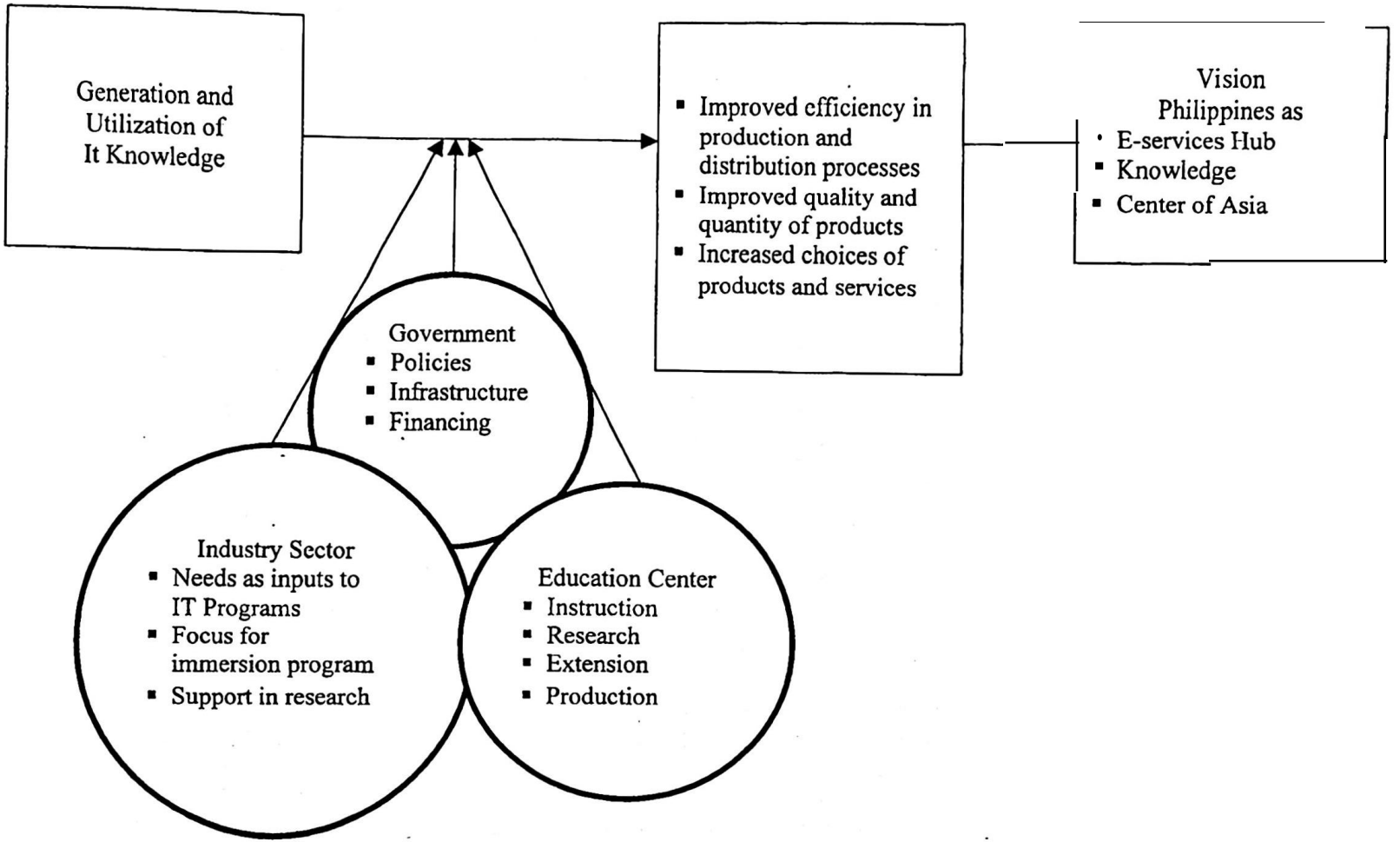

Fig. 1 Knowledge-Based Economy Frameworks

The government must provide relevant policies as well as infrastructure and funding support to the industry and the academe. The academe, through its four-fold function of instruction, research, extension, and production., should address the IT needs of the industry. The industry, on the other hand, must provide the venue for the immersion of IT students as well as absorb the graduates for employment.

Knowledge-based Economy

Knowledge-based economy is the generation and utilization of knowledge for the creation of wealth. Knowledge, as embodied in human capital and in technology, has become central in many economically advanced and technologically developed countries (Alabastro, 2001).

In the past the primary sources of wealth were land and natural resources. The crucial production factors were muscles and brawn. Now, brainwork and technology, particularly, Infonnation Technology, are considered as the creators of wealth, a phenomenon known as the knowledge-based economy.

The old foundation of success which were land, gold, and oil are all gone. The answer now is knowledge. The world's wealthiest man, Bill Gates, owns nothing tangible – no land, no gold or oil, no factories, no industrial processes. For the first time in history, the world's richest man owns only knowledge.

In classical economics, growth is explained in terms of the contributions of the traditional elements of labor, capital, and land. Technology is treated as a "residual quantity." But as early as 1957, MIT economist Robert Solow had shown that technology could account for about 80% of growth. Thus, technology is not just a residue, but a major factor. More recently, MIT President Charles Vest stated that one half of the growth in the US economy over the last *50* years is due to technological innovation (Vea, May 2001).

Information Technology or "IT" is the collective term for the various technologies involved in processing and transmitting of infonnation, which include computing, multimedia, telecommunications, microelectronics, and their interdependencies. Also called "informatics" or "telematics," the term IT is now often used to refer to the convergence of various information-based, broadcast and mass media communication technologies (Guidelines on the Registration of IT Enterprises, Accessed 2002 January I0).

There are several opportunities in the Philippine IT landscape. The country can build its capability in the design and manufacture of large-scale integrated circuits and microprocessors and of microprocessor-based process in monitoring and control. Software design, along with information and data services, has become areas where the country has established certain advantages. Developments in telecommunications technology offer new opportunities for the country's professionals (e.g. medical practitioners, engineers, etc.) to engage in distance professional services – where the

presence of the professional is not required to provide such services. Knowledge-based industries are an area where the country can develop a competitive edge (IT21).

Indeed, analysts have identified two developing countries in the world that will become the center of software development and data management. to wit: India and the Philippines.

Building-up Human Capital

We have young English-speaking population comprising the workforce whose capabilities can be quickly enhanced through well-designed training programs. In building up capabilities, the following must be considered:

- Technology and information become obsolete quickly. Therefore, educational institutions should not only keep up with developments; they must also be prepared to meet the demand for re-skilling and for shorter professional courses.
- Use of technology does not necessarily mean better teaching and learning. Thus, educational institutions must assess and evaluate periodically the use of internet as a platform of instruction.

Government Policies to Promote Knowledge-based Economy

In 1997, then President Fidel V. Ramos adopted IT Action Agenda for the 21 Century (IT21) with the following vision:

- By the tum of the 21" century, the Philippines will have laid the infrastructure for every business, every agency of government, every school, and every home in the Philippines to have access to information technology.
- By the year 2005, IT use will be pervasive in daily life. Philippine companies will be producing competitive IT products for world markets.
- Within the first decade of the 21" Century, the Philippines will be a Knowledge Center in the Asia-Pacific: the leader in IT education, in IT-assisted training, and in the application of infonnation and knowledge to business, professional services, and the arts.

The goal bas been: the Philippines as Knowledge Center of Asia.

Likewise, President Gloria Macapagal Arroyo has identified information and communications technology (ICT) as the "foundation of future economic development." In the words of President, "ICT will jumpstart our old stalling economy and make it leapfrog into the new economy" (SONA 2001). Moreover, the President stressed the need for high-speed connectivity at low cost. In this connection, she urged GLOBE and SMART to properly interconnect.

The President also promised that rules should promote rather than regulate IT Specifically, she stated that she wanted to ask the cellular phone companies to stop charging on dropped calls.

With these developments, the following must be considered:

The need for new orientation along science and technology, industry, **and** education.
This means acknowledgment of the following:
- o Central role of the firm,
- o Importance of the national innovation systems, **and**
- o Requirements for infrastructures and **incentives which encourage** investments in research and training.

Productivity

Productivity improvement has now **bcom a** byword in ***th*** **pivate and the** public sector; in cognizance of the limited resoures **that we have and th ndl to** compete globally and, likewise, sustain our economic growth

But what is productivity? Productivity like efficiency rfrs to **th raro** between output and input (Wu, July 1973). Productivity and efficiency **inerase** mum **the ratio of** output to input increases. Output is defined as the goods and sen±es prhea Thus, productivity and efficiency increase when there is an increase in the final output **of goos** and services without proportionate increase in the inpt of human et?rt or of her factors of production.

Specifically, productivity is used to denote the relationship of output to input such as manpower (or capital or land). 'The most commonly used definition ot productivity is real output per hour of work or per man-hour, l the past when bra nd muscles were crucial, productivity was relatively low, Now that brainpower and advanced technology are used as inputs, productivity is indeed higher,

Consider the incrcased productivity of the personnel at tho Otley of' the Registrar, Accounting, Cashier, and the Library Services if the system nd pr'cN have been automatcd. Likcwisc, faculty members can significtly cuhe thct teaching competencies by using computer-aided materials and multi-med facilities.

In the industry sector, as a result of automation and computeriztion, it i Nun that there is improved efficiency in production and distribution prccsscs, improvod quality and quantity of products, and increascd choices of products and serviccs.

However, the following concerns have been identified (Tan, May 2001):

- The academe does not seem to respond to the IT nccds of the industric.
- The academic training does not include skills nccdcd by the industry.
- The academic training is too theoretical.

It is this context that the Commission on Higher Education (CHED) has adopted the strategy for bridging academe and industry. This is government-funded, industry-based, and academe-assisted program. With this program, the Commission has continued to:

- upgrade academe and making it more relevant.
- support a short-term post-college training program for graduates of IT education.
- undertake training programs aimed directly at generating employment.

Implications in Social Science Research

Social science is any field of knowledge-dealing with human society, such as, public administration or development administration or development management, economics, education, sociology, history, ethics, politics, etc. Accordingly, social science researches are those undertaken along the aforecited fields.

The objectives of undertaking social science researches along IT, therefore, are as follows: 1) generate and utilize IT knowledge to enhance productivity; and 2) to assess and evaluate whether or not the use of IT has improved productivity in the workplace.

Shown in Table 1 are social science researches with focus on information and communication technology (ICT) undertaken in UNP and other higher education institutions (HEI) very recently.

Table 1. Social science researches focused on ICT undertaken by UNP and other HEIs.

TITLE	AUTHOR	CLASSIFICATION	FIELD OF KNOWLEDGE	STATUS
Information Technology Program: Its Relevance to the Business and Industrial Establishments in San Fernando City	Mariano Apilado, Jr.	MAED Thesis in UNP	Technology Education	Completed (March 2000)
Design and Application of the UNP Enrolment Processing System	Rodones Ramos	MPA Thesis Equivalent in UNP	Technology Education	Completed (March 2000)
Effectiveness of the Integrated Tax System of Bureau of Internal Revenue, RDO, Laoag City	Florante Aninag	MPA Thesis Proposal in UNP	Public Administration or Development Administration	On-going
Computer-Aided Instruction of the School of the Future Program: The CLSU Experience	Z. Florendo-Mateo	Research in CLSU, Nueva Ecija	Science Education	Completed 2000
Technology and Social Relations: A Gender Perspective	Amaryllis T. Torres	Research in UP, Diliman, Quezon City	Technology Education	Completed 2000

Abstracts of Social Science Researches with Focus on JCT

Study #1

Title: Infonnation Technology Program: Its Relevance to Business and Industrial Establishments in San Fernando City, La Union

Author: Mariano Apilado, Jr.

Classification: MAED Thesis submitted at UNP

Findings:

1. The IT programs offered by Computer Education schools in San Fernando City were very relevant along the following areas: objectives, curriculum contents, and instructional processes.
2. The IT graduates, who were eventually employed by business and industrial establishments satisfactorily met their standards.

Study#2

Title: Design and Application of the UNP Enrolment Processing System

Author: Rodones Ramos

Classification: MPA Thesis Equivalent

Finding: The enrolment system, indeed, reduced significantly the time with which the graduate students enrolled themselves.

Study #3

Title: Effectiveness of the Integrated Tax System of the Bureau of Internal Revenue, RDO, Laoag City

Author: Florante Aninag

Classification: MPA Thesis

Finding (initial): Despite the computerized system on revenue collection, there were years when collection decreased. Where lies the problem? This is the bottom line of the study.

Study #4

Title: Computer-Aided Instruction of the School of the Future Program: The CLSU Experience

Author: Z. Florendo-Mateo (Central Luzon State University, Munoz, Nueva Ecija)

Classification: Research

Finding: The Grade V and VI elementary pupils who utilized computer-aided instruction lesson had higher achievement scores in Math and had shown a more positive attitude towards the subject than those pupils subjected to activities directed by the teacher.

Study #5

Title: Technology and Social Relations: A Gender Perspective

Author: Amaryllis T. Torres (University of the Philippines, Diliman, Quezon City)

Classification: Research

Findings

1. Information technology is gendered. While the leadership of the field is in the hands of men, those who fuel the industry through the production of microcomponents are women.
2. Global capitalism also exacerbates class and national differences among women themselves. While Third World women produce IT components at low wages and insecure work conditions, women of developed countries are among its consumers.
3. Technology also interacts with class and gender roles. In the past century, many household conveniences have been invented to alleviate household drudgery. These have reduced women's housework time, but only in the developed countries and for Filipinos who can afford them. However, these inventions have not drawn more men to participate more significantly in household work.

Table 2. Proposed researchable areas (assessment on the use of IT).

TITLE	FIELD OF KNOWLEDGE
The Role of Information Technology in Regional Economy: An Evaluation	• Economics • Public administration, development administration, or development management

Table 2. Continued.

TITLE	FIELD OF KNOWLEDGE
The Business Environment and its Impact on the IT Labor Market	• Economics • Public administration, development administration, or development management
Cost-Effectiveness of the Electronic Procurement System of the DBM	• Economics
Effectiveness of the E-Learning as a Platform of Instruction: An Assessment	• Technology education • Public administration, development administration, or development management
Standards and Policies of Computer Education Programs in Region I	• Policy
Computer Education Programs in Region I: An Assessment of Their Capability to Manage the Challenges and Constraints of IT Education	• Public administration, development administration, or development management
Assessment of the Effectiveness of the CHED's Bridging Program	• Public administration, development administration, or development management
Effectiveness of the 1999 DECS Computerization Program	• Policy
The Information and Communication Technology Policies of the Administration: Its Relevance and Responsiveness to the Needs of the Industry Sector	• Policy
Ethics and Information Technology	• Ethics
Information Technology Law. Its Relevance to Business and Industrial Establishments	• Policy Science
Supply of IT Workers in Region I	• Economics
Challenges in Preparing Post-Secondary Students for the Information Technology Work Force	• Education
Employment Opportunities for Digital Work Force in Region I	• Economics
Profitability of the Cellular Phone Companies	• Economics
The Use of Cellular Phones: Its Social Impact	• Public administration, development administration, or development management

Table 3. Proposed thesis/dissertation equivalent (generation and utilization of IT).

TITLE	FIELD OF KNOWLEDGE
Formulation of the Information Systems Plan of the Institution	• Technology Education
Development of Systems in: • Student Registration • Accounting • Cashiering • Library and Information Services	• Technology Education
Development of the Web Site	• Technology Education

Conclusion

In the knowledge-based economy, information and communications technology is the foundation of the nation's economic productivity. Research plays a vital role in enhancing productivity by helping generate and utilize new IT knowledge and assess the effectiveness of its utilization. Since research is one of the weaknesses of SUCs, greater support must be given thereto.

> *"A Nation is a body of people who have done great things together in the past and hope to do great things together in the future."*
>
> Frank Underhill

> *"DMMMSU is a body of administrators, faculty members, non-teaching personnel and students who have done great things in the past and hope to do much greater things in the future."*

Thank you and Mabuhay kayong lahat dito sa DMMMSU!

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