

# Turning Digital Divide into Digital Dividend: Anticipating Thailand's Demographic Dividend

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## Introduction

In the near future, Thailand will enter a period in which the working age population will be the highest in proportion compared with other age groups. This situation, where the decline in fertility rate is accompanied by decline in mortality rate, yielding a period where the ratio of the working age group increases, is dubbed the 'demographic dividend'. It has a potential for a very strong economic growth, and what makes it so important is that it happens only once and lasts for a relatively short time. As the ratio of the working age population increases, there is a strong potential for high rate of return, provided that the right policies are in place. However, as this group ages, the benefit resulting from the dividend will enter a period of decline since the later generation will have to take care of them. Moreover, there is no guarantee that the increase in the working age population will invariably yield higher productivity and growth. This can be the case for a simple reason that if the increasing working age group does not have opportunities to turn their strengths into tangible results, then it is hard to imagine how such a boom in population will turn toward growth.

Thus it is imperative that Thailand search for her own ways to take fullest advantage of the coming demographic dividend. Since the working age group will undoubtedly underpin further economic growth as they lay a foundation on which further

development is secured, the need for clear policies on how best to take fullest advantage of this situation is more than doubled. In this paper, we would like to offer another aspect of how to take advantage of the situation. We will show that one of the most important ways to take the advantage is to find out ways to solve the digital divide problem. We will argue that there is a strong converse relation between the demographic dividend and the digital divide, and that the digital dividend that results from solving the digital divide problem will go a long way toward contributing to the demographic dividend. That is, we argue that preparing for the demographic dividend requires that we address the digital divide problem; the digital dividend would then need to be a part of the demographic dividend. This, we further argue, cannot be the case unless attention is paid to how culture and technology are intertwined, and unless attempts to solve the digital divide take into consideration both the 'hardware' problem of providing the physical infrastructure and the 'software' problem of inculcating the mindset, attitudes, skills and know-how that go hand in hand with effective use of computer technology.

The paper will be divided as follows: In the next section we provide a review of empirical studies done on both the demographic dividend and the digital divide. Specific attention will be paid to the debate on whether and how population growth or decline has an impact on economic growth. The current theory of Bloom, Canning and Sevilla (2003), who apparently coined the term 'demographic dividend' will be discussed. Afterwards we discuss the theories and debates on the digital divide. Then we go on to discuss past attempts of the Thai governments to solve the digital divide problem. We shall see there what lessons can be learned from these attempts so that we can formulate the right policies on this matter. And in the last section we provide our detailed argument based on the findings in the previous sections.

## **Key Concepts and Empirical Studies**

## *The Demographic Dividend*

In *The Demographic Dividend: A New Perspective on the Economic Consequences of Population Change* (2003), Bloom, Canning and Sevilla introduces the concept as a way to refer to the phenomenon where the age structure of the entire population is such that it is conducive to a burst of economic growth. According to them, "...if most of a nation's population falls within the working ages, the added productivity of this group can produce a 'demographic dividend' of economic growth, assuming that policies to take advantage of this are in place" (Bloom, Canning and Sevilla 2003: xi). These policies concern the areas of health, family, labor, finance, human capital and education, as well as policies that promote labor-market flexibility, openness to trade and savings (Bloom, Canning and Sevilla 2003: xiii). The authors are clear that the process that leads from the demographic boom in the working age population and economic growth is not automatic. It lies within the power and the capabilities of the relevant policy makers to lay out ways toward maximizing the available dividend.

There have been many debates among economists and demographers over the relationship between population change and economic growth. Three theories are supported by research evidence and widely publicized, including: (a) the Pessimistic Theory; (b) the Optimistic Theory; and (c) the Neutralist Theory. They are well described by Bloom, Canning, and Sevilla (2003: 2-20) and can be summarized as follows:

The Pessimistic Theory—This theory is concerned with the impact on economic-growth restrictions of the rapid population growth after World War II resulting from the gap between declining mortality and continuing high fertility in much of Asia, Latin

America, and the Middle East. In the Late 1940s, the concept of excessive population growth as a threat to food supplies and natural resources was introduced by conservationists; however, this can be traced to Thomas Malthus, whose pessimism about the pressures of a rapidly growing population and insufficient food production is well known. Not only can population numbers affect demand for fixed resources; they can also affect capital intensity, since a large part of investment is used to supply the needs of a growing population, rather than increasing the level of provisions per capita.

The Optimistic Theory—By the early 1980s, economists and demographers started to reject the Pessimist view. Evidence showed that during the time the world's population doubled, per capita income increased by about two thirds. In addition, rather than being constrained by fixed resources, there has been progress in technology, social and institutional innovations, and political participation. The views of a group of “Population Optimists” who promotes the idea that population growth can be an economic asset, have been supported. However, this group is not dogmatic about the positive impact of population growth; instead, they take a broader view, suggesting that a multiplicity of external factors is responsible for the consequences of population growth, and these factors can have either positive or negative economic consequences.

The Neutralist Theory—The statistical correlation between population and economic growth was analyzed, and little significant connection was found. It was found, however, that the portion of economic growth unexplained by factors such as country size, openness to trade, educational attainment of the population, and quality of civil and political institutions have little correlation to population growth rates. This means there is little cross-country evidence that population growth impedes to promote

economic growth. This result seems to justify the Neutralist Theory, which was dominant since mid-1980s.

Bloom, Canning, and Sevilla (2003: 20-21) argue that all of these theories tend to ignore the important dimension of population dynamics: the changing age distribution within population as they grow. These transitions of age structure are as important as population growth. Each age group in a population behaves differently, providing distinct economic consequences. Policymakers must pay attention to these effects of changing age structure into decisions about their countries' future.

In the next decade, the declines of both mortality and fertility will lead to an opportunity for most developing countries to improve their living standards, by capitalizing on the consequent demographic transition, where the number of working-age adults grows large relative to the dependent population. Thailand is one of the developing countries experiencing these transitions. According to Wongboonsin (2003:2), the proportion of Thailand's population aged under 15 will decrease from 24.65 percent in 2000 to 17.95 percent in 2025; while the proportion of population aged 60 and over will increase from 9.43 percent to 19.99 percent in the same period. However, after the increase of the proportion of working-age population (15-59) from 65.92 percent in 2000 to 67.08 percent in 2009, it will continuously decrease and reach 62.05 percent in 2025. These changes of proportions of Thai working-age population indicate that demographic dividend will take place only in the next six years.

### **The Digital Divide**

In general, the term 'digital divide' refers to the inequality of access to and benefiting from the new information and communication technologies. Since these

technologies have played tremendous roles in the development of economies, it has generated a lot of debates and discussion in today's world. According to Toby Arquette, there has been an explosion of talks, conversations, reports, research works, media coverage, and so on about the issue:

A convenience sample of newspapers, journal articles, newswires, and similar mass media sources in the Lexis-Nexis database from January, 1990 to December, 2000, reveals that 14,123 addressing the digital divide appeared. Even more revealing is the explosion in frequency in coverage of the digital divide issue: 1995, 3 stories; 1996, 31 stories, 1997, 43 stories; 1998, 316 stories; 1999, 2054 stories; 2000, 11,676 stories. This represents almost a 3000% increase in issue coverage since 1995. As of July 2001, 4,457 stories are devoted to the digital divide issue (Arquette, 2002: 9).

It is quite clear that stories about the digital divide have a strong appeal to the public imagination. This is perhaps due to the fact that information and communication technologies (ICTs) have pervaded very deeply in the lives of an increasingly greater number of people, especially in the poorer countries.

One rather popular way of characterizing the digital divide is maintain that there is a distinction between the 'information rich' and the 'information poor'. Basically the former are those who enjoy the fruits of the information and communication technologies, while the latter do not. The former is rich in information while the latter are the opposite. However, recent research has shown that simply looking at the phenomenon as a divide between the two is too broad since it presupposes that there is only one criterion that serves to distinguish the two groups whereas in reality there are a

large number of available criteria. One might of course start off with the criterion of whether the population in question are 'wired' to the Internet or not. But this is too broad because there are many complex reasons behind one group's relative disadvantage regarding information use as opposed to another. For example, most Thai Internet users are located in the Bangkok area; however, characterizing them as the information rich does not give much information beyond the fact that they enjoy the advantage of having better access to the technologies. Moreover, residents of the Bangkok area are a very diverse group. Among them, there are significant disparities among genders, age groups, levels of education, economic status, and so on. These factors have to be taken into consideration when one attempts to understand the disparity among the use of computers and the Internet.

In any case, the term 'digital divide' itself is a metaphor evoking the image of a gulf, a chasm, between those who enjoy the technologies and those who do not. Courtright and Robbin (2002) have analyzed the meanings of the term 'digital divide' and found that they vary according to how the phenomenon itself is viewed. If the intended meaning calls for the image of physical prowess and willingness of tackle actual problems, then the metaphors of muscle and motion are used. For example, 'bridging' the digital divide conveys the meaning that the divide can be crossed by constructing bridges. On the other hand, when the emphasis is on deeply held values that bind members of a society together, a different type of metaphors is used, such as to 'level the playing field' or to 'connecting to opportunities'. This shows, *prima facie*, the attitudes toward the digital divide phenomenon that stakeholders, in Courtright's view, do have, but since metaphors usually become frozen with normal use, these attitudes can be imprinted in how words are selected and used. Hence the meaning of 'digital divide' is charged with attitudes and beliefs and refers to some kind of obstacle between two

groups of people that needs to be 'bridged' and 'connected'. Hence the point is that discussion of the digital divide already presupposes, through the use of the term 'divide', a chasm or a separation between two groups. This may be a straightforward way to identify the problem, but one needs to bear in mind that reality is much more complicated, and there is no such simple division in reality, instead one finds a spectrum of different cases where the percentage of information use slides from one end to the other. Nevertheless, talks about the digital divide, as do those about the gap between the rich and the poor, are still a powerful means to illustrate the serious social problem requiring full attention and effort at solving it.

Moreover, the digital divide is very much mired within the complex relations among science, technology and social factors. Toby Arquette (2002) traces the intellectual root of talks or discourses about the digital divide and finds that the talks revolve around the triumvirate of development, globalization and society. Talking about the digital divide has become prevalent in development discourses, where the divide is regarded as yet another hurdle against development. It also figures rather prominently in talks about globalization, as it quite dramatically shows the inequalities among nations and cultures. Lastly, digital divide talks play a role in attempts to delineate the information society, thus putting them in the ongoing stream of scholarship in science, technology and society studies (STS). This shows that the digital divide is a social phenomenon. As an object of attention in discourses on development, globalization and society, talks about the digital divide show that the concept is deeply engaged with social scientific studies, and such talks do not seem to be able to distance themselves from talks in areas such as development, globalization, or society. In either case, it seems to show that talks about the digital divide cannot take place meaningfully outside the contexts of its relation to social and historical contexts. And if this indeed so, then talks

about how to bridge or to solve the digital divide problem as well as concrete action aiming at realizing them cannot take place out of such contexts either.

Some scholars, furthermore, argue that the digital divide is not a unitary concept that can be applied to the same type of phenomenon. On the contrary, one should more accurately talk about the digital divides, as there are many different kinds of the divide. Eszter Hargittai, for example, argues that there is the second-level digital divide, consisting of the gap between the skills people have when they are online (Hargittai, 2002). This is in contrast with the usual interpretation of the digital divide merely as the gap between those who possess or do not possess the technology. One can see that there are many types of the divide simply by looking at the situation in, say, the United States, where there is obviously a kind of divide and compare it to a country such as Thailand, where there is a divide too, but of a different kind. In the US, the divide can be seen quite clearly along racial lines, with a much higher percentage of whites enjoying the technology than blacks do. In Thailand, on the other hand, the divide is located along the urban and rural line, with urban, middle class people on one side and the rural farmers on the other. But even so this is still too crude a description of the actual conditions. It is clear that the difference here stems from, or could be explained by, the different historical paths that Thailand and the US took. But if that is the case, then talks of the digital divide as if it were a single phenomenon appearing all over the world would be too broad, and cannot do justice to the obvious role that cultures and historical paths play in policy deliberations on the digital divide.

### **Digital Divide in Thailand**

While there is a tremendous amount of information on the digital divide in the West, especially the US, information and research on the phenomenon Asia except Japan and the other Third World countries has attracted far less attention. The figures that most dramatically highlight the disparities between the West and the rest of the world can be found, inter alia, in the Information and Communication Technology (ICT) Development Indices (UNCTAD, 2002). Here the ranking of ICT diffusion by countries, according to the statistics in 2001, shows that the first twenty top ranked countries in ICT diffusion are all Western countries, with the US at the top. Only three Asian countries make it to the list: Japan (10), Hong Kong (9) and Singapore (14), whereas among the twenty bottom-ranked countries, six are in Africa, and the rest are all in Asia and the Pacific islands (UNCTAD, 2002, p. 35). Thailand, for example, has only 2.27 million people online, or 5.64 percent of the whole population (Mekhopee, 2002, p. 150); Japan, on the other hand, has according to an estimate by her Ministry of Post and Telecommunications more than 56 million, or around 44 percent of the population (NUA Internet How Many Online, 2003).

As for the disparities within countries, Karsten Giese has documented the digital divide in China (Giese, 2002) and found that use of the Internet is concentrated on the coast and the big cities such as Beijing, Shanghai as well as Hong Kong and vicinities. World wide web users in these areas account for a staggering 60 percent, whereas the inland area has only 10 percent (Giese 2002, p. 50). In Thailand, 16 percent of population in the Bangkok Metropolitan Area have access to the Internet, while only 4 to 5 percent of the people in the rural areas outside of Bangkok do so (Mephokee, 2002, p. 150).

In Thailand the organization that has done the most for policies on information and communication technologies is the National Electronic and Computing Center

(NECTEC). It has published annual surveys of Internet use in Thailand for the past three years, with the latest survey for the year 2002 just coming out earlier this year. However, the data that are freely obtainable over the Internet are those of 2000 (NECTEC 2000). The survey shows that there is a steady increase in the number of servers, both registered under the domestic .th and international domain name. The capacity of the bandwidth expanded into 316.375 Mbps incoming and 215.437 Mbps outgoing in January 2001, compared to only 118.25 Mbps incoming and 66.25 Mbps outgoing in January of the year before. Servers registered under the co.th domain name, which is reserved for business organizations, rose to 4,747 in December 2000 from only 2,927 in December 1999. Even though this showed a marked increase, the survey reported that the majority of Internet traffic is still limited to the Bangkok Metropolitan Area (BMA). It said that more than 70 percent of Internet users in Thailand are residents of the BMA and reported a concern over this situation, which is a clear indication of the digital divide existing in the country.

The key indicators for Thailand's connectivity to the Internet are shown in Table 1:

	<i>Number</i>	<i>Index</i>	<i>Source</i>
Number of Internet users in Thailand (estimate)	Approx. 2.3 million (November 2000)	3.6 users per 100 people	Formula by Vice Adm. Prasart Sripadung
Number of computers in Thailand (estimate)	1,127,550 (mid 2000)	18.19 per 1,000 people	Thai Computer Business Association
Number of Thai domain name (.th)	6,515 (December 2000)		THNIC
Number of computers under the .th domain that are connected to the Internet	71,995 (November 2000)	1.1 computers per 1,000 people	Internet Information Resource Center, NECTEC (www.nectec.or.th/internet)
International bandwidth	316.375 Mbps incoming 215.437 outgoing		Internet Information Resource Center, NECTEC

			(www.nectec.or.th/internet)
Number of schools wired to the Internet	2,184 (January 2001)	5.8 percent of schools nationwide	<a href="http://www.school.net.th">www.school.net.th</a>
Number of universities wired to the Internet	82 (June 2000)		Ministry of University Affairs
Number of government websites	19 ministries and 158 departments		Information Technology Service for Public Sector Office, NECTEC
Number of fixed phone lines	7.66 million lines March 2000	12.3 lines per 100 people	TOT Corporation
Number of leased telephone lines	5.22 million lines March 2000	8.4 lines per 100 people	TOT Corporation
Number of mobile telephone lines	2.56 million lines March 2000 (Operated by TOT and private sector, 1.39 million; CAT and private sector, 1.17 million)	4.1 lines per 100 people	TOT Corporation

*Table 1: Status of Telephone Network and Connectivity to the Internet in Thailand*  
(Source: [http://www.nitc.go.th/document/publications/Internet\\_user2543.pdf](http://www.nitc.go.th/document/publications/Internet_user2543.pdf))

These numbers will be more significant considering that Thailand is lagging far behind her neighbors in many key areas. To illustrate, Thailand has only 8.4 fixed lines per 100 people, whereas the number is 48.41, 44.97 and 21.93 for Singapore, South Korea and Malaysia respectively. Moreover, there is a wide disparity between the ratio of available phone lines in the Bangkok area (54.2 lines per 1,000) and the countryside (5.8 lines per 1,000).

In sum, there are clear indications of the digital divide in many dimensions involving Thailand. Firstly, there is the disparity between Thailand and her neighbors and economic competitors such as Singapore, South Korea and Malaysia. Thailand cannot even start to compete with these countries if these indicators show that in many cases the numbers for Thailand are five times less than those for her neighbors. This disparity between countries or regions in the world is sometimes referred to as the 'global digital divide', pointing out the fact that there is still a wide gap between the so-

called developed and developing world. Secondly, there is another dimension of the digital divide, one that happens within the national border. In the case of Thailand, there is a clear divide between Bangkok Metropolitan Area and everywhere else in the country. The NECTEC report shows that as many as 70 percent of all the users of the Internet live in the Bangkok area, and there is also a wide gap between the educational attainment and economic status of Thais who are connected to the Internet and those who are not. In this paper we would like to focus on the second, domestic aspect of the digital divide, since it lies fully within the power of the policy makers to formulate right policies to take advantage of the demographic dividend and to tackle the digital divide problem, as well as to implement and to see that the policies are carried over to full implementation.

### **Past and Current Attempts to Bridge the Digital Divide in Thailand**

During the Chavalit government (1996-1997), Education Minister Sukhavit Rangsitpol initiated the policy of providing all schools nationwide with computers. The idea was to use the government's budget to buy computers from the dealers and gave them away to the schools, including those in very remote areas. A large number of computers were bought out of public fund and distributed to the schools, each in equal number, as if there were no differences among the schools in the diverse regions of Thailand. There were no prior studies as to the needs of the schools and how the computers would fit into their ways of life. There was no participation from the schools or the village communities as to what kind of computers or how the computers were going to be used and to what purposes.

In this computers-for-school project, the receiving end was powerless. They had

no opportunities at all to participate in the selection and procurement process of the computers that they themselves were going to use. This kind of paternalistic, 'father-know-best' scheme has been typical of the Thai government's dealing with its people for centuries. The stated intention was to bridge the digital divide through sheer physical means of giving away free computers. However, it has been a well known anecdote in Thailand that some schools which got the computers did not even have electricity with which to run them. As one would expect, the computer scheme opened up a wide range of leeways for corruption. The Education Minister was accused of doing just that.

While the intention might be good (if one is optimistic enough), the policy turned a disaster. Many computers sat in the remote schools unused. In many places there was no electricity as previously mentioned; a lot more schools did not have telephone lines, so it was not possible to use the computers to connect to the Internet.

Furthermore, many more schools lacked the personnel capable of running them effectively. The computers in effect became sacred objects symbolizing of the power of the government, and to our knowledge there was no scheme of checking the quality of the computers through independent means. Thus there was no way of ensuring transparency that the public money used to buy these computers was spent in such a way that benefited the public the most.

There have been also other projects aiming at closing the digital divide. In 1995, NECTEC initiated the SchoolNet project aiming to connect schools nationwide to a network that is linked to the Internet. News and information, as well as course material, would be distributed to the schools to facilitate learning. The aim was to enable schools throughout the country to connect to the Internet through phone lines at the same rate of 3 Baht per connection. Schools participating in the program can use their modems to call 1509 to connect to the central server of the project, which contains news and information related to on-line learning and acts as a forum where schoolchildren and teachers can communicate with their peers in the country. At present there are a little

more than 2,000 participating schools, representing 5.8 percent of the total number of schools.

More recently, the Thaksin government, through the newly established Ministry of Information and Communication Technology, has instituted a scheme of selling computers to government workers and the general public at a very low price. The scheme, called in Thai 'Computer *Uea Aathorn*,' or 'Good Wish Computers' aims at selling computers to the population at 10,000 baht (250 US dollars) per computer, a very cheap price since most PCs in the market sell at 25,000 baht (625 US dollars) and up. The aim is the same as the previous policy by Sukhavit, i.e., to help 'enlighten' the Thai population and to bring up-to-date news and information to the population so that they are capable of fending for themselves in today's competitive world. This new policy is another aspect of many 'Good Wish' policies initiated by the Thaksin government to bring goods and services to the poor at a very low cost. The computers were intended not only for the general population, many more were also earmarked for the country's large member of the bureaucracy. And there are many different models of computers to choose from, all running a version of the LINUX operating system developed by NECTEC. According to the country's first Minister of Information and Communication Technology, Dr. Surapong Suebwonglee, the government planned to distribute no fewer than one million such computers to the population, which should incur a considerable impact on the digital divide problem in the country. Other policies that are in place include CAT Telecom – the country's monopoly holder of Internet connection – 'Clean Internet' Project. The connection time is only one baht per hour. Users have to buy a special card and use their modem to call 1222 in order to connect to the project's central server located at <http://www.cat.net.th/cleannet/>. This site collects a number of links to government agencies, schools and other information holding sites, and it is publicized that the site is free from pornographic material. However, the catch is that users cannot connect to any other sites except through this central portal.

In sum, what these schemes of closing the digital divide share in common is that all are ways to bring the hardware and the physical infrastructure to the population, with little consideration given to how the population are knowledgeable enough to operate the machines to their best advantage. What the Sukhavit disaster clearly showed is that simply providing hardware as a way to close the digital divide is never enough, and the main reason is that the computers are pushed to the village communities with no regard to the question of how these computers are to be related to the socio-cultural and historical contexts of the particular communities. And it is very doubtful that the schemes thought up by the Thaksin government would also succeed since they employ roughly the same way of doing things. What differentiates the current policy of selling cheap computers and the previous government's policy of giving them away for free is only that in there is selling and buying the first case, where there is none in the latter. But that is only a superficial difference. The essence remains the same in that both schemes rely on sheer provision of hardware to the population. Many computers in Sukhavit's policy lie there unused, thus the poor remain cut off from the benefits of information and communication technologies. In the same vein it is conceivable that the cheap computers sold by the Ministry of ICT will not be available to the poor either, as most buyers of the cheap computers are the urban dwellers who are already well versed in using computer technology to their advantage. So the digital divide appears nowhere lessened. In the next section we will discuss this point in more detail, focusing on how best to utilize the coming demographic dividend.

### **Anticipating the Demographic Dividend**

The demographic dividend shows that the number of Thais entering workforce will peak in the near future. Thus it is imperative for the government and all concerned to find ways so that this workforce can perform at their maximum capabilities. In

"Growing Science", Soraj Hongladarom (forthcoming) argues that capabilities in science and technology should be 'grown' from the ground up in the respective localities; these capabilities cannot be planted or transferred from one place to another without severe disruption in patterns of living which could prove counterproductive. Since economic development depends in many ways on development of scientific and technological capabilities, the growing workforce needs to become integrated into the attempts to develop these capabilities. Not only do they have to enroll in effective programs of study aiming to hone their skills in science and technology, but, as the Sukhavit case shows, a way needs to be found to integrate technologies, in this case the information and communication technologies, into the lifeworld of the village communities that form the backbone of the Thai economy and way of life. This can be accomplished when the goals, values and aspirations of the local communities are taken as among the top priorities when decisions regarding scientific and technological policies are taken. For example, a village may have perfected the traditional skills of producing rice wine through centuries of experience. Science and technology can certainly help develop them further through research and development. Computer and Internet use enter and contribute to the scene when the villagers use it in relation to their production and marketing. Instead of connecting just to a central server with little useful content, the villagers can then connect to their peers in other villages, sharing information and techniques of rice wine production as well as discuss about the market and other things related to their careers. Hongladarom (2002) has shown how this peer-to-peer networking should be an aim of policy toward effective computer use in the villages, since it will demonstrably strengthen the capabilities of the communities in many ways. This would not be possible if the overall aim of policy in science and technology remains attached to 'catching up' and imitating the path already taken by the industrial West.

We have seen that there are shortcomings in both the Chavalit and Thaksin governments' policies toward alleviating the digital divide. At first there might appear to

be some advantage to Thaksin's and Surapong's policy of providing cheap computers and for selling Internet connection time at only one baht per hour, as opposed to Chavalit's and Sukhavit's action of giving away free computers with no supporting infrastructure. However, the advantage is only minimal. As we have mentioned before, selling computers at cheap price would only widen the gap between the rich and the poor, since it is only the rich who already know how to take full advantage of the available computers. Something has to be there already before a person can start to think about how to use computers to their advantage. The challenge is to find that something and enable it to the population.

So here is the challenge: There is the demographic dividend. The growing workforce obviously needs to be much more effectively educated. A reform in education system is in order. There has been much talk on teaching the students 'how to think', but since there has been no tradition of free and critical thinking in Thailand this is easier said than done. Encouraging free and critical thinking will open up new ideas which could prove tremendously beneficial in the long run. On the other hand, the increase in knowledge and skills enabled by the improved educational system would be of no use whatsoever if the infrastructure within which these skills are put to best use remain underdeveloped. Thailand has more than a fair share of people who possess high academic achievement, but they usually work far below their full potential because there is simply not enough infrastructure to help them develop their potentials to the fullest extent.

Thus there is a two-pronged process. On the one hand, the skills and knowledge of the growing workforce need to be developed - let's call this the 'subjective' side; on the other, concrete opportunities have to be there to absorb these increased skills and knowledge - call this the 'objective' side. One can certainly imagine a virtuous circle where one reinforces the other. More specifically, the 'subjective' includes the much discussed ways of improving the quality of education for the growing workforce in the

country such that the workforce possess required knowledge and skills. On the other hand, what is no less important is that there exist concrete opportunities for these skills and knowledge to be put to good use. What this means at a local, community level is that the knowledge and skills are possessed by the villagers, and what is no less important is that these knowledge and skills find ways to realization into products and services that lead to economic development of their communities. In the case of rice wine production, this includes the knowledge and skills required in producing the best tasting wine possible, the market savvy of finding a niche for their product in the domestic or international market, and the networking that is made possible through Internet technology that enables them to connect with their peers, sharing news and information without interference from the paternalistic central government.

Hence it is here that the digital divide problem has to be addressed, since information and communication technologies are among the most effective tools that can spread ideas and knowledge to the whole population, thus increasing effectiveness of education. The networking is not possible without the computer network, the infrastructure that supports it, and no less importantly the knowledge and skill required to operate them efficiently. What we suggest is that there should be a policy whereby computers are integrated into the lives of the villagers themselves, in the same way as the use of older technologies such as the plowshare or tractors have become integral to the lives of rice farmers. This is clearly a difficult task, but one can start doing it by learning from history to find out how modern, diesel-based tractors have become part and parcel of the farmers' life and search for the pattern. Since the tractors can be demonstrated to be much related to the farmers' work, so can the computers and the network. If it can be shown that operating the computer is no less difficult that operating the tractor, then a good head start can be anticipated.

We contend that this is perhaps the only way to solve the digital divide problem effectively for the country. Addressing the digital divide helps at first sight with the

subjective side of the issue. However, tackling the digital divide problem clearly requires changes in the environment, physical and otherwise; thus ties it with the objective side of the matter also.

More specifically, we recommend the following:

1. There should be more research into how ICTs are best utilized to facilitate development of localities. Active programs that encourage and support field research to find out how ICTs can help the localities should be put in place. The research should identify their needs and look for ways to accommodate them.
2. Another line of research should be to evaluate the past policies and attempts to bridge the digital divide. The research should also measure how much the Internet is actually used and in what form, as well as measure the effects of Internet use in schools and villages that are connected to the Internet through some of the past projects such as the SchoolNet and other projects.
3. Computer skills and literacy should be emphasized in school curriculum. Preparing for the demographic dividend obviously needs productive workforce, and the ability of use IT effectively is necessary. IT use should promote lifelong learning and contribute to development of skills needed for the labor in the future.
4. The 'human' side of IT should be emphasized. The policy should not merely aim at providing hardware and physical infrastructure. More effort should be put toward finding out how the hardware is going to contribute to human resource development through effective and productive use.

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