Enhancing Technological Capabilities for Happiness: Lessons from Thailand

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1. Introduction

People from all walks of life wish to have a happy life. For this reason, many governments, policy makers and politicians advocate a policy of national happiness as one of the most important ultimate goals for the people to which development measures and resources are directed.

Yet , it is not an easy task to achieve such a goal . Happiness or well-being has two faces - subjective and objective (Easterlin,2003).The subjective well-being on the one hand, deals with people's feeling or attitude toward themselves and their environmental conditions. Under this circumstance, the subjective well-being can change overtime although physical conditions remain the same as before. Happiness, in this sense, is not enough (Brittan, 2001). On the other hand, objective well-being tends to be associated positively with such concrete indicators as income, household amenities and wealth. The crux of the matter, however, is that at the level of objective well – being that determined by policy makers, people would feel unhappy still, and vice versa.

Despite the difficulties with happiness at both conceptual and measurement levels as mentioned above, this policy – oriented paper regards happiness as an ultimate goal of a nation and technological capabilities of the nation as an instrumental goal. In other words, the people's well – being or happiness can be attained through the enhancement in technological capabilities of the nation. The proposition that a better theory of well – being has to include technological capability development will be drawn primarily from empirical research in Thailand.

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2. Technology, GDP and Happiness : A Conceptual Framework.

Technology refers to a body of applied scientific knowledge. Technological capabilities are the skills – technical, managerial or organizational – that enable firms to efficiently use equipment and information, and improve technology (Pietrobelli, 2007). Technology can be directly or indirectly related to happiness or well – being as demonstrated in Diagrams (a) and (b) below :

Diagram (a)

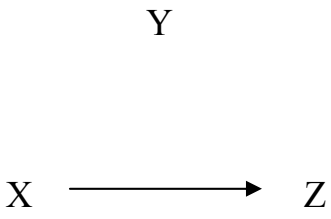
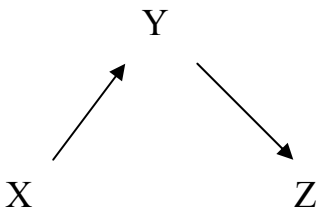


Diagram (b)



where X is technology ,

Y is gross domestic product (GDP).

Z is happiness.

Diagram (a) depicts the direct relationship between technology and happiness. By intuition as well as observable evidence, the relationship exists and the direction of the relationship can be negative or positive. For example, the atomic bombs at Hirochima and Nayazaki, Japan at the eve of the Second World War brought devastating effects to the cities and deep sorrow to the Japanese people. On the other hand, organ transplanting technologies in the field of medical science have brought new lives and happiness to patients across nations in the world.

Diagram (b) represents indirect relationship between technology and happiness, with GDP being the intervening variable (Blalock, 1960:337-341). Economic theories as well as observable evidence suggest that production possibility frontier shifts outward as new and more efficient technology is applied in the production process, resulting in more goods and services being produced at the same amount of available resources. This indicates the significant existence of the relationship between technology and GDP. Additionally, the rise in GDP brings about improved standard of living and happiness. For classical economists, it is

almost tautological to say that the wealthier people are, the happier they are, too.

Paradoxically, the relationship between GDP, particularly GDP per capita, and people's well – being is not straight forward. By most standards, Americans are better off now than they were in the middle of the last century. Oddly, though, surveys of happiness have revealed that the percentage of American people who said they were very happy i.e., subjective well – being , has fallen slightly since the early 1970s – even though income of people born in 1940 has increased, on average, 116 percent over the course of their working lives (Surowiecki, 2005:1) . This phenomenon, however, has taken place in most developed countries and it has become the so – called Easterlin paradox (Graham, 2007:4). An interpretation of the Easterlin paradox is that humans are on a "hedonic treadmill" : aspirations increase along with income and, after basic needs are met, relative rather than absolute levels of income matter to well – being. Another interpretation of the paradox which put forward by psychologists in terms of "set point" theory of happiness is that every individual is presumed to have a happiness level that he or she goes back to over time, even after events such as winning the lottery or getting divorced (Easterlin, 2003)

For about three quarters of the world's population a measure of success will still be real GDP per head, corrected for the worst absurdities and supplement by their feelings (Brittan, 2001).

Within the conceptual framework outlined above, technology plays a central role for human happiness. In other words, the enhancement in technological capabilities of the country can lead directly, or indirectly through an increase in income, to people's happiness. In order to achieve the country's ultimate goal of well – being or happiness for the people, it is, therefore, vital to enhance technological capabilities of the country.

3.Technological Capabilities and Economic Growth in Thailand.

Over the past three decades, Thailand has experienced a significant change in technological capabilities. Khanthachai (1999) conducted a survey on technical change in Thai industries, with special reference to the electronics and machinery industries and found that the majority of firms in the two industries were involved in assembling parts and components in 1984 where as the majority of the firms in the same industries in 2000 were involved in production. The empirical evidence revealed that the

firms in the two industries in 2000 were more capable than their counter parts in 1984 in terms of productive capabilities.

The improvement in technology and skills was a result not only from purchase of machinery and equipment from overseas, particularly form Japan, but also from more involvement of the firms in training of manpower and research and development activities. The majority of the firms were involved in production and concerned with efficiency and product quality improvement. In both industries, skills in research and development, production, management, and marketing of local manpower were impressively enhanced. Linkages with local suppliers were also expanded.

Analyses of production in the electronics and machinery industries in Thailand by means of the Cobb – Douglas production function of the form:

$$Q = A.K^{\alpha}.L^{\beta}$$

where

Q = value of output measured in million baht
K = value of fixed assets measured in million baht
L = labor, number of workers employed or total wage bills in million baht
A = efficiency or technology parameter
α = partial elasticity of output with respect to capital
β = partial elasticity of output with respect to labor.

Taking the natural log, the linear form became:

$$LnQ = LnA + \alpha.LnK + \beta.LnL$$

In quantitative terms, a change in the value of *A* represents change in the level of technology and skills overtime. In other words, it demonstrates the change in TFP - the growth in output without any accompanying amount of inputs.

Production function analyses of firms in electronics industry during 1983 and 2000 demonstrated that for Thai firms, whereby 100 percent of total equity was owned by Thai nationals, the values of the efficiency parameter (A) of the firms in 2000 of 0.42 (number of workers representing labour factor) and 0.48 (total wage payment representing labour input) increased impressively from those in 1983 of -0.62 and -0.47 respectively.

Over the same period of time, the Thai firms in machinery industry exhibited an increase in productive capability in that the values of the efficiency parameter of the firms in 2000 and 1983 were 7.86 and 1.24 compared with those in 1983 of -0.20 and -0.30 respectively.

Over the years and despite the economic crisis in Thailand in 1997, the technological strength that the industries had accumulated made them robust enough for the predicament. Moreover, the industries continued to expand and became a principal force for Thailand's exports(Khanthachai, 2000; Khanthachai, 2002). Under these circumstances, it can be argued with a certain degree of certainty that Thailand's export and economic growth, particularly from 1984 – 2000, as empirical evidence might allow, were a result of an increase in technology and skills which in turn gave rise to higher efficiency. (Khanthachai, 2000 : 32 – 35)

However, the research findings were surprising in that it failed to support the interpretation of economic miracle in Asia put forward by Krugman (1994) that the Asian economic growth was mainly input driven, at least in the case of the machinery and electronics industries in Thailand.

It should also be noted that labour productivity tended to rise over the period of the study whereas capital productivity exhibited a declining trend. The rates of the increase in labour productivity, however, were slower than those of the rise in nominal wage rates.

4.Terms and Conditions in Technology Agreements.

Thai industries relied heavily on technology transfer from overseas (Khanthachai, et al,1989; Santikarn, 1981). Owners of technology generally enjoy a certain degree of market power. Therefore, restrictive terms and conditions affecting marketing, purchasing and pricing strategies as well as those affecting transmission of technology could be attached to the purchase or transfer of technology. It could be argued, however, that in principle they would be relaxed or eliminated as competition increases.

Table 1 compares terms and conditions in technology agreements between recipient firms in Thailand in the machinery and electronics industries and foreign technology suppliers in 1984 and 2000. It was evident that during the period mentioned, the terms and conditions which affected marketing, purchasing and pricing strategies as well as transmission of technology tended to be more restrictive in both industries

in many e.g., respects, e.g., prior approval by suppliers if the recipient firms wanted to enter into third party agreements, termination of production of goods in the agreement upon expiration of contracts, prohibition of duplication of technology or reverse engineering process, prohibition of use of technology upon expiration of contracts, and prohibition of disclosure of technology during the terms of the agreements, prohibiting of export of goods in the agreement, and buying of raw materials and machinery from technology suppliers.

Some terms and conditions were still restrictive to some extent, particularly those concerning export marketing, e.g., prohibiting export of goods in the agreement, export of goods is allowed to some restricted areas, and prior approval of the technology owners before export of goods.

The data in Table 1, however, pointed out that the terms and conditions of technology agreement affecting improvement in technology and skills of local manpower during the same period became more beneficial to the technology recipients. Technology suppliers and recipients adapted technology to local conditions. Additionally, technology recipients were allowed to take over the technology after the expiration of the agreement and to have the right to use the improved technology discovered by themselves. Furthermore, technology suppliers guaranteed certain achievement in product quality. More importantly, more than one fourth of the technology suppliers provided training to the recipients' staff.

The data in Table 1 also revealed that the terms and conditions affecting improvement in technology and skills of local manpower during the same period, became more beneficial to the technology recipients in the machinery and electronics industries in Thailand. In this light, it would result in an enhancement in technological capabilities in the two Thai industries over the years.

Table 1. Percentage of Firms Mentioning Terms and Conditions in Technology Agreements in the Machinery and Electronics Industries , 1984 and 2000.

	1984a			2000		
Terms and Conditions	Machinery (n:46)	Electronics (n:41)	Total (n:87)	Machinery (n:40)	Electronic (n:40)	Total (n:80)
Conditions Affecting Marketing, Purchasing, and Pricing Strategies:						
1)Recipient firms are totally prohibited from exporting of goods in the agreement	15.2	17.1	16.1	10.0	27.5	18.8
2)Recipient firms are allowed to export goods in the agreement to some restricted areas	13.0	26.8	19.5	22.5	42.5	32.5
3)Recipient firms need export approval by the suppliers	21.7	34.1	27.6	20.2	47.5	33.8
4)Suppliers will not export into Thailand	28.3	31.7	29.9	2.5	30.0	16.3
5)Suppliers will appoint local sales agents	8.7	9.8	9.2	5.0	32.5	18.8
6)Prices of agreed products Are fixed by suppliers	4.3	7.3	5.7	22.5	52.5	37.5
7)Recipient firms need approval by supplies to sell intermediate product	15.2	7.3	11.5	12.5	40.0	26.3
8)Recipient firms are prohibited from production of competitive products	23.9	17.1	26.3	47.5	7.5	27.5
9)Recipient firms must buy machinery and equipment from supplier	17.4	7.3	19.3	70.0	75.0	72.5
10)Recipient firms must buy raw materials and intermediates from suppliers	13.0	9.8	11.5	82.5	75.0	78.8
Conditions Affecting Transmission Of Technology						
11)Recipient firms must keep in confidence the technology during the terms of the agreement	32.6	31.7	32.2	82.5	77.5	80.0

Terms and Conditions	1984a Machinery (n:46)	1984a Electronics (n:41)	1984a Total (n:87)	2000 Machinery (n:40)	2000 Electronic (n:40)	2000 Toal (n:80)
Conditions Affecting Transmission of Technology:						
12)Recipient firms must keep in confidence the technology to other firms after the expiration of the agreement	28.3	26.8	27.6	67.5	87.5	77.5
13)Recipient firms must not sub-license or transfer the technology to other firms	23.9	39.0	31.0	82.5	82.5	82.5
14)Recipient firms must not use the technology upon expiration of contracts	15.2	19.5	17.2	82.5	77.5	80.0
15)Recipient firms must not duplicate the technology or reverse engineering process	13.0	24.2	18.4	80.0	82.5	81.3
16)Recipient firms must terminate production of goods in the agreement upon expiration of contracts	17.4	17.1	17.2	82.5	85.0	83.8
17)Recipient firms need approval by suppliers to enter into third party agreements	21.7	22.0	21.8	82.5	90.0	86.3
18)Recipient firms must grant the suppliers the right to use improved technology discovered by recipients	26.1	24.4	25.3	75.0	70.0	72.5
19)Suppliers must grant the recipient firms the right to use improved technology discovered by recipients	32.6	34.1	33.3	75.0	80.0	77.5
20)Both parties must be granted the right to make use of improved technology	30.4	26.8	28.7	72.5	75.0	73.2

	1984a Machinery	1984a Electronics	1984a Total	2000 Machinery	2000 Electronic	2000 Toal

Terms and Conditions	(n:46)	(n:41)	(n:87)	(n:40)	(n:40)	(n:80)
Conditions Affecting Transmission of Technology:						
21)Suppliers must provide training of recipients' staff	39.1	51.2	44.8	75.0	75.0	78.8
22)Suppliers must guarantee the take-over by local staff in specified period	15.2	22.2	18.4	72.5	80.0	76.3
23)Suppliers guarantee certain achievements in quality of products	37.0	43.9	37.9	57.5	82.5	70.0
24)Suppliers will adapt the technology to suit local conditions	17.4	29.3	23.0	72.5	85.0	78.8
25)Others	0.0	2.4	1.9	Na.	Na.	Na.

Note: N.A. = No available data
This is not mutually exclusive for each firm.

a : N. Khanthachai et al (1987:37 – 39).

The lessons from Thailand, particularly those concerning restrictive terms and conditions of technology agreements, are beneficial to developing countries in their negotiation for technology transfer from technology owners. Restrictive terms and conditions on production, marketing, pricing and further development as well as ownership of the technology further developed by the technology recipients should be relaxed and fair to both technology recipients and owners.

The lessons from Thailand also revealed that major problems in technology transfer and development in the electronics and machinery industries in Thailand appeared to be concerned with the subsidiaries or technology recipients, the Thai government, and the parent companies or technology owners. For the recipients of technology and subsidiary firms, language barrier and inadequate number of able personnel for absorption, adaptation, research and development purposes were the major problems. Complicated tax system, inefficient administration system, and confusing and inflexible policies of the Thai government posed important bottle necks for technology transfer and development. As far as the parent companies and technology owners were concerned, their concealment of certain important applied scientific knowledge as well as restrictive terms and conditions of technology agreements which affected marketing, purchasing, and pricing

strategies of the technology recipients created some difficulties in technology transfer and development in the two Thai industries.

5. Policy Priorities

Technology is regarded as one of the important vehicles for sustainable economic growth and national as well as personal happiness. To breed happiness at both the national and personal levels, it is advisable that effort should be made to enhance technological capabilities. To strengthen the technological capabilities of individuals as well as nations. The following is suggested for policy consideration:

1. Increase the supply of manpower in the fields of sciences and technologies. For this purpose, more investment should be directed toward education at the technical and university levels. Since there is generally a surplus of supply of manpower in the fields of arts and social sciences, less attention should be given to the production of manpower in these areas.

2. Additionally, institutes for excellence in technologies should be established. Although an increase in the supply of manpower in the fields of sciences and technology (S&T) is necessary but it is by no means sufficient. They are required not only to absorb the increase in supply of the manpower but also to be involved in research and development activities which are crucial for the absorption and further development of technologies. In other worlds, the institutes for excellence in technologies will create demand for manpower in the fields of S & T.

3. Moreover, the linkages between the industry on the one hand and the institutes for excellence in technologies and the universities on the other should be strengthened. The linkages would provide important channels for practical experiences to flow from industries to the centers for technological excellence and universities in which research and development activities are carried out. Results form these activities then would flow back to the industries for practical purposes.

4. Furthermore, while labour productivity should be continuously enhanced the rates of increase in wages should be closely monitored. In principle, and increase in wage rates is justifiable when it results from an increase in labour skills and productivity.

5. Finally, more efficient administration and less complicated tax system of the government are deemed necessary for the enhancement in technological capabilities, particularly improvement of financing (availability

and accessibility), improvement of incentives for technological development, promotion of R&D in industrially relevant topics in public institutions i.e., the centres for technological excellence and universities (which have most of the R &D resources), promotion of linkage between public institutions and industries, facilitation of access to new technologies and creation of technologies(Kopr Kritayakirana et al: 1988)

6. Concluding Remarks

Having happiness or well-being as a national ultimate goal, nations can achieve such a goal through the development of their technological capabilities which can be regarded as an instrumental goal for happiness. Both subjective and objective well-being should be taken into account as two aspects of the ultimate goal. The direct relationship between technology and happiness or well-being can be positive or negative. The negative effect on happiness of technology such as atomic bombs should be avoided whereas technology in the field of medical sciences such as organ transplanting technology should be promoted. Through an increase in, as well as, equitable distribution of, GDP, particularly GDP per capita, technology can be indirectly related to happiness or well-being. Nations, particularly less and developing nations, with the right policies, can follow Thailand's path of development in technological capabilities as outlined above for breeding well-being or happiness for their people.

Reference

Blalock, Hubert M., 1960
Social Statistics, McGraw-Hill

Brittan, Samuel, 2001
"Happiness" is Not Enough. (online) Available http://www.samuelbrittan.co.uk/spee22_p.html , accessed 10 June 2007

Easterlin, Richard A., 2003
The Economics of Happiness, (online) Available http://www.ref.use.edu/~easterl/Happiness.pd.f , accessed 10 June 2007

Graham, Carol, 2005
The Economics of Happiness (online). Available http://www3.brookings.edu/views/papers/graham/2005graham-dict.pdf , accessed 15 June 2007

Khanthachai, Nathabhol et. al, 1987
Technology and Skills in Thailand, Institute of Southeast Asian Studies, Singapore.

Khanthachai, Nathabhol, 1999
A Change in Technology and Skills in Thai Industries: A Case Study of the Electronics and Machinery Industries. Rangsit University Research Fund, 2003 (Mimeographed)

Khanthachai, Nathabhol 2000
" Creating Business Success through Technology" A proceeding at the Rangsit University International Conference, Chiangrai Province, Thailand

Khanthachai, Nathabhol 2002
"***Promoting Thai Manufactured Exports to the World through Technology"*** A proceeding at the 2002 NASBITE Annual Conference at San Francisco, USA.

Kritayakirana, Kopr et al , 1998
The Development of Thailand's Technological capability in Industry : Capability Development for Biotechnology - Based Industries (online).Available http://www.tdri.or.th/s7_abs.htm, accessed 4 April 2007.

Krugman, Paul, 1994
"The Myth of Asia's Miracle" , Foreign Affairs (November).

Pietrobelli, Carlo (no date)
Fostering Technological Capabilities in Sub – Saharan Africa. (online) Available http://www.scidev.net/dossiers/index/efm , accessed 14 June 2007

Surowiecki, James, 2005
Technology and Happiness (online). Available http://www.technologyreview.com/printer.friendly.article.aspx?id, accessed 11 Jun 2007

Santikarn, Mingsarn, 1981
Technology Transfer: A Case Study. Singapore: University Press.