

# Meaningful Broadband Working Group

Center for Ethics of Science and Technology

Digital Divide Institute

Bangkok, THAILAND



Meaningful Broadband Report 2.0

# BROADBAND

THAILAND 2015

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The photo on the cover page was taken in September 14, 2009 at the Oriental Hotel when members of the Meaningful Broadband Working Group (MBWG) requested that Chulalongkorn University create this Meaningful Broadband 2.0 Report. Is the next step in the formulation of an innovative broadband policy for Thailand. Pictured from left to right are CAT Telecom Executive Vice President Suchin Pungvor-asn, True Corp President and CEO Supachai Chearavanont, Chulalongkorn University's Prof Craig Warren Smith (who directs the Working Group's Secretariat), NTC Commissioner Prof Setaprong Cusripituck, NTC Chairman Prof Prasit Prapinmongkolkarn, TOT Telecom Executive Vice President Montchai Noonsong, and Dtac Senior Vice President Andrew McBean. The document itself reflects the perspectives of Chulalongkorn University Secretariat, and not the views of MBWG members nor their organizations.



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## Meaningful Broadband Report 2.0

# BROADBAND THAILAND 2015

Written at the request of Chulalongkorn University's Meaningful Broadband Working Group, this report aggregates multiple sources of data to forecast two dramatically different scenarios for broadband's impact on Thailand's economy. The first scenario, a continuation of Business as Usual (BAU), would cause Thailand's economy to continue to decline relative to most other Asian nations. Furthermore, economic disparities within Thailand would continue to widen. The other scenario, called Meaningful Broadband, would boost Thailand's competitive advantage in ASEAN well into 21<sup>st</sup> century and produce a growth model that would lessen gaps between rich and poor. A broadband-enabled Thai economy would release pent-up demand for interactive learning and creative entrepreneurship in the majority population. We conclude by posing a question to Thailand's leaders: Which scenario will prevail?

By Craig Smith, Principal Investigator,

Supported by the Secretariat, Meaningful Broadband Working Group,  
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May 1, 2010 DRAFT, NOT FOR CIRCULATION

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# FORWARD

As this report is written, in the wake of horrific riots that pitted one group of Thais against others, the government is struggling to find a new economic model that allows growth to proceed in a way that lessens inequities. Currently nearly 60% of Thai wealth is controlled by the wealthiest 20% of the population.

The Thai government indeed does have a plan to reverse widening gaps between rich and poor, called Stimulus II. Though this report does not take sides in the current political struggle, it shows that Meaningful Broadband could be used to support the success of this plan, and in that way it hopes to help create a more equitable path to economic growth in Thailand. In fact, a meaningful broadband ecosystem, rapidly deployed for the benefit of the mass population of Thailand, may well be the best chance for strengthening the *social contract* upon which Thai democracy depends.

This report asks the government to rethink how to achieve its own economic-reform targets. Even amid the street protests, the opportunity for doing so is now. Broadband has become an overall driver of economic competitiveness in Asia, but the window of time available to catch up with Thailand's more broadband-enabled neighbors is closing.

"Economic stimulus" offers a perfect means for doing so. As in other nations, that term in Thailand no longer means short-term fiscal stimulus but efforts to jump-start *qualitative* macroeconomic reforms realizable in the mid-term (5 years or

*This report asks the government to think again about how to achieve its economic reform targets. Even amid the street protests, the opportunity for doing so is now.*

less.) For those who know Asian politics, stimulus also means something else: a clever way for reformers to circumvent their own slow-moving government bureaucracies to capture the powerful and dynamic new market forces.

Having announced the 1.43 trillion baht Stimulus II Plan (“Strong Thailand”), the Ministry of Finance’s policymakers are now considering options for the plan’s implementation. As they do so, the Chulalongkorn Meaningful Broadband Working Group Secretariat, through this document, asks that they consider two alternatives:

- **BAU (Business-As-Usual Scenario):** They could continue to pursue reforms without aligning with (or altering) the sluggish process by which broadband penetration proceeds in Thailand.
- **MB Scenario (Meaningful Broadband Scenario):** Or they could intervene into the nation’s embrace of broadband with PPPs (e.g., a mix of regulatory innovations, tax concessions, public-private partnerships, new strategic alliances, direct subsidies.) If so, a national “broadband ecosystem” could emerge in alignment with the specific economic reforms called for in Stimulus II. (We call this scenario Meaningful Broadband, or MB.)

Thailand’s team of economics-related ministers needs a way to look into the future to see new ways to avert crisis and grab opportunities. Yet accurately predictions are impossible. “Econometrics,” that science-sounding approach to numbers-crunching, is of little help in predicting the rough-and-tumble decision-making in the telecommunications sector. To create plausible scenarios, many dynamic and uncertain factors must be balanced and weighed.

*“Econometrics,” that science-sounding approach, is of little help in guiding the rough-and-tumble decision-making in the telecommunications sector.*

Luckily, a quarter century of economists have come before us to help us clarify the fog that obscures digital markets. Their methods show us how to peer into an economy that is being remade again and again as technological innovations disrupt old business models and usher in new ones. After tapping their brains, we do our own on-the-ground research. We avoid extremes of utopian and dystopian predictions to portray two *plausible* futures, concluding:

- *Under BAU*, despite the best efforts of the 6,000 development projects funded under the Finance Ministry’s Stimulus II, inequities would grow. Furthermore, the nation will face a 15%-20% loss of competitive advantage *vis a vis* Asian peer nations, which have already incorporated a critical mass of broadband into their economic agendas. As the ASEAN+3 nations remove barriers to an Asian common market in 2015, BAU would cause Thai products and services to be too expensive, too imitative, and too slow to market to compete with the influx of cheap services flowing into Thailand from China and other nations. *In short, the (mostly) borrowed money used to fund Stimulus II would achieve inadequate returns on investment.*
- *Under MB*, on the other hand, Thailand’s economy could be transformed. The ambitious Stimulus II goals for macroeconomic reforms could be achieved, even exceeded. Thailand could reverse its declining comparative advantage in Asia. It could point the way towards a new model of nation-building, one that is more equitable, more ethical, more open, and more environmentally benign than prevailing growth models. It could be Thailand’s gift to the world.

Craig Warren Smith

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## EXECUTIVE SUMMARY

This document was written by the Chulalongkorn University Meaningful Broadband Working Group (MBWG) secretariat at the request of the six MBWG members. They consist of the chairman of Thailand’s telecommunications regulatory agency, Prof Prasit Prapinmongkolkarn and CEOs of the country’s leading commercial telecommunications operators, including AIS Chairman, Mr. Somprasong Boonyachai; CAT Telecom Executive VP, Mr. Charoon Thongma (interim member); DTAC President, Mr. Tore Johnsen; TOT Telecom President, Mr. Varut Suvakorn; and True Corp President and CEO, Mr. Suphachai Chearavanont. Mr. Suphachai is currently Rotating Chairman of the MBWG.

This is the second of a series of five Meaningful Broadband Reports (MBR 1.0 – MBR 5.0)<sup>1</sup> which follow a path that leads a nation step by step from vision to implementation.

Together, the *MBR Report Series* provides a framework for fulfilling the transformational potential of broadband<sup>2</sup> in a specific Asian country. They begin with interviews with the nation’s ICT stakeholders to establish *vision*, stated in broad

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<sup>1</sup>Not confined to Thailand, other nations have been invited to contribute to the Meaningful Broadband process, under the guidance of Digital Divide Institute. The same series of reports are being formulated for Indonesia’s ICT stakeholders by Investor Group Against Digital Divide (IGADD), which has signed a formal agreement to share data with Chulalongkorn researchers. To learn about Digital Divide Institute, see [digitaldivide.org](http://digitaldivide.org). For its Thai affiliate, see [www.meaningfulbroadband.org](http://www.meaningfulbroadband.org). For its Indonesian affiliate, see [igadd.org](http://igadd.org)

<sup>2</sup>“Broadband” is defined as “high-speed” internet, as well as “fat” internet, referring to its capacity to transmit multiple modalities simultaneously. The International Telecommunications Union explains that the speed of broadband depends on its context and is typically faster in countries which have received a critical mass (23% of households) of broadband penetration. <http://www.itu.int/osg/spu/publications/birthofbroadband/faq.html>

principles that define the *zeitgeist* and scope of the “meaningful broadband” approach (MBR 1.0<sup>3</sup>).

The next report (MBR 2.0), represented in Thailand by this document, establishes feasibility by showing how Meaningful Broadband could fulfill the explicit reforms of national governments. It also provides criteria that can be used by governments to consider why and how costs of broadband deployment should and could be shared between public and private sectors.

This report is followed by MBR 3.0, which presents the *roadmap*. Not merely a set of recommendations offered to the government, the roadmap is an economic model which shows how the recommendations could be financed.

Then, in MBR 4.0, we prescribe a series of working groups (composed of empowered leaders from governmental, business, and academic sectors) which will oversee the *implementation* of recommendations.

The final report in this series (MBR 5.0) presents a transnational *Asian model* for Meaningful Broadband. It suggests how continent-wide and “sub-regional” (e.g. ASEAN) structures could be tapped, or new coalitions formed, to bring the Meaningful Broadband Paradigm to the entire continent.

Linking the reforms advocated by the Kingdom of Thailand with broadband deployment, the report herein describes two alternative futures for Thailand, as indicated in the chart below:

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<sup>3</sup> For MBR 1.0 reports see [digitaldivide.org](http://digitaldivide.org), [IGADD.org](http://IGADD.org) (for Indonesia) and [MeaningfulBroadband.org](http://MeaningfulBroadband.org) (for Thailand.)

<b>FACTOR (2015)</b>	<b>BAU (Business As Usual)</b>	<b>MB (Meaningful Broadband)</b>
<b>Penetration Rate (age 13+)</b>	<b>+37% population +17% households</b>	<b>+74% population +54% households</b>
<b>GDP Boost</b>	<b>+0.90%</b>	<b>up to 3.5%</b>
<b>Inequality*</b>	<b>Gini 0.48 High/low 1:65</b>	<b>Gini 0.35 High/low 1:47</b>
<b>Workforce Development</b>	<b>-17% of KEI**</b>	<b>+14% of KEI **</b>
<b>Microfinance Growth</b>	<b>+12%</b>	<b>+320%</b>
<b>Productivity Growth</b>	<b>+7 (in rankings)</b>	<b>+18 (in rankings)</b>
<b>Investments Impacts</b>	<b>+\$3 billion</b>	<b>+\$9 billion</b>
<b>R&amp;D Impacts</b>	<b>0.26% of GDP</b>	<b>1.5% of GDP</b>
<b>Impact of Stimulus II</b>	<b>+0.80% of GDP</b>	<b>+2.3% of GDP</b>

\*Gini Coefficient refers to a quantitative index, ranking nations by their degree of inequality. High/Low refers to the gap between the highest paid 20% of workforce and the lowest paid 20% of workforce.

\*\*KEI = Knowledge Economy Index

Our narrative summary of this forecast is summarized below. A deeper analysis, backed up by documentation and data for each of these nine points, is included in Analysis section of this report. The final section of the report lists Appendices, which provide a more precise summary of data used to formulate these forecasts.

1. **BROADBAND PENETRATION RATE:** In 2010 the best estimate of Thai broadband penetration is 3.4% of households and about 12% of Thai individuals. (Over time, the relevant measure will be individuals, not households, since personal mobile devices will constitute 80% of all Thai users, according to predictions by Gartner Dataquest.) Under the “business as usual” (BAU) scenario, projected for the year 2015, the penetration

rate will rise to 17% of Thai households, significantly less than peer nations in Asia which on average will have more than 30% household penetration. But under the Meaningful Broadband (MB) scenario, the penetration rate jumps to 74% of Thai individuals (54% of households), which would exceed the predicted average rate of Asian peer nations by 22%.

2. **GDP BOOST:** Drawing from recent World Bank economic regression analysis of this topic, we forecast that broadband would contribute just 0.9% to Thailand’s GDP growth rate, all other things being equal. That rate would be 2 % per year lower than the GDP spike received by the average peer nation, where broadband penetration would be higher. Under the MB scenario, the growth rate would achieve a broadband spike that grows incrementally for each year until it accounts for a large share (as much as 3.5%) of GDP.

3. **INEQUALITY:** Meaningful broadband would reverse the growing gap between wealthy and non-wealthy citizens. Currently Thailand has a higher level of inequality, compared to peer nations. The gap between the highest paid 20% of the workforce, and the rest of the population, has been widening steadily for the past decade as wealth became concentrated in the BMA (Bangkok Metropolitan Area.) According to the “Gini coefficient” which ranks nations according their inequality, Thailand has a 0.42 inequality score, compared

*Under the Business as Usual scenario, inequality could worsen by as much as 20% by 2015. Under Meaningful Broadband Scenario, inequality would lessen by 12% by that year.*

to an average of 0.38 for Asian peer nations.<sup>4</sup> Another way of showing inequity in Thailand is the gap between the highest paid worker and lowest paid workers. In Thailand it is 1:65 (the lowest paid workers make 65 times less than the highest paid workers), one of the widest income gaps in Asia. Under BAU, these scores would worsen by about 20% by 2015. In the MB scenario, inequality would decline steadily over five years, reaching a more equitable Gini score of 0.35 (better than the current average for Thailand's peer nations in Asia). We forecast that the gap between the earnings of the highest earning 20% and the lowest 20% would be reduced by about 14%. At last, a reverse emigration from Bangkok to rural villages will exceed those travelling in the opposite direction.

4. **WORKFORCE DEVELOPMENT:** Currently, 2.4% of the Thai workforce is formally "unemployed." But the deeper problem is *underemployment* in the majority (low-to-mid-level) adult population. According to the National Statistical Office, 52% of the workforce currently earns between 3,000 baht and 15,000 baht per month and this group lacks the skills to advance to higher income levels. Many in this category have family members who migrate between Bangkok and rural villages and a majority has part-time, temporary or uncertain employment; large shares of this group are in the informal economy, characterized by barter exchanges. Almost all have cell phones. Therefore, Meaningful Broadband focuses on promoting entrepreneurship in the low-income (i.e.,

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<sup>4</sup> World Bank conducts annual rankings of countries by their degree of inequality.  
<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPOVERTY/EXTPA/0,,contentMDK:20238991~menuPK:492138~pagePK:148956~piPK:216618~theSitePK:430367,00.html>

majority) population, rather than the reduction of formal unemployment *per se*. Under BAU (when broadband would remain concentrated in BMA populations), Stimulus II would only have a marginal impact on boosting entrepreneurship, microcredit and SME growth – major goals of the Thai Ministry of Labor.

Under MB, however, broadband would introduce a game-changing approach to fulfilling the Minister of Labor’s goals. In other words, broadband would add to the purchasing power of the low-income sector by 3% per year. We forecast that MB will reduce costs and increasing incomes of the majority population. New sources of secondary and part-time income would result from mobile data services in which meaningful information not just entertainment would be transmitted. Furthermore, jobs in the broadband ecosystem would stimulate jobs in other sectors, spurring overall SME growth in the domestic economy.

*As broadband penetration reaches a critical mass (23% of households), Thailand can expect \$9 billion in new investments, more than matching broadband investments that will flow to peer nations with a similar population.*

5. **MICROFINANCE GROWTH:** Currently ranked low in international microcredit indexes, microcredit programs in Thailand, such as those of the Bank for Agriculture and Agriculture Cooperatives (BAAC,) would flourish. Under the influence of MB, microcredit levels would rise 320% to 18 million borrowers. More significantly, microcredit programs would be integrated into Thailand’s national systems of finance. Broadband could enable subsidized microcredit programs to operate on a for-profit basis and would enable a large portion of microcredit borrowers to transition into SME status.



6. **PRODUCTIVITY GROWTH:** Ranked near the bottom in Asia productivity indexes, Thailand's low score would actually worsen in BAU, but can be reversed in MB. The trigger would be enhanced efficiency in government bureaus (as well as integration between bureaus at national, provincial, and local levels.) In the private sector, broadband-enabled cloud computing would lower costs and improve productivity of franchise businesses, spurring growth in the domestic economy.
  
7. **INVESTMENT IMPACTS:** Since 1998, foreign investment as a share of total GDP has been declining steadily; the gap in telecommunications investments in Thailand compared to those of peer nations such as Viet Nam has been growing at an alarming rate.<sup>5</sup> According to BAU, only \$3 billions of investment will flow to the Thai telecom sector by 2015, much less than expected for Asian peer nations which are able to assure mobile operators of more predictable returns on investments. According to MB, the decline would be reversed. As broadband penetration reaches a critical mass (23% of households), Thailand can expect \$9 billion in new investments, more than matching broadband investments that flow to peer nations with a similar population.
  
8. **R&D IMPACTS:** Under BAU, Thailand would remain an imitator, not an innovator. With only 0.26% of GDP (22 billion baht) devoted to R&D in 2010, Thailand has among the least developed ICT research infrastructures in any middle-income developing nation. Under MB, the R&D

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<sup>5</sup> According to interview with Dr. Sakarind Bhumiratana, Director of the National Science and Technology Development Agency (NSTDA), March 23, 2010.

goals of the ministry of Science and Technology, which is to boost R&D spending to 1-2% of GDP by 2016, would be met. More significantly, Thailand would establish its distinct niche as an ethical innovator for “killer apps” empowering low-income users of developing nations.

9. **IMPACTS OF STIMULUS II:** Summarizing the effect of all nine factors, we argue that rapid and meaningful deployment of broadband is a necessary condition for fulfilling the goals of Stimulus II as well as for establishing a more equitable, skillful and creative workforce.

Under BAU, Stimulus II would add just 0.80% to Thai GDP, while with MB the rise will be about 2.3% or higher by 2015. This assessment helps define the interest and urgency for Meaningful Broadband in Thailand as well as the risk to the nation, if the problems that impede broadband deployment remain unresolved. We estimate that the cost savings of incorporating MB into Stimulus II will be in the range of 400 trillion baht per year beginning in the year 2015.

This economic analysis of the benefits of Meaningful Broadband is not comprehensive. More studies are needed to go beyond economic benefits to indicate non-economic benefits of meaningful broadband to environmental, cultural, and governance reforms in Thailand. Furthermore, we must go further to indicate the “cost” of BAU in non-economic terms. Such reports would represent an important complement to this one, balancing costs against benefits, to produce the “case” for Meaningful Broadband in quantitative and qualitative terms.

Just as this report relied extensively upon the goal of Stimulus II as a reference point for how broadband can help Thailand, future reports will show how broadband can assist other goals that are embedded into the National Social and Economic Development Board's ten-year plan.

*Though* our findings are incomplete, enough evidence has been gathered to indicate that broadband is a *necessary* (but not sufficient) *condition* for macroeconomic reforms. The next step is to establish a roadmap that prescribes specific policies and practices that can achieve the MB scenario depicted herein. Establishing and communicating this is the aim of the next report in this series, Meaningful Broadband Report 3.0.

# METHODOLOGY

Since the rise of the digital economy in the 1980s, a genre of academic social-science literature emerged to predict the economic impacts of digital technology. At first, the focus was the future of the internet and eventually methodologies were adapted to the spread of mobile telephony, then broadband penetration, and most recently, the impact of mobile broadband in developing countries. Before venturing our own forecasts, the MBWG secretariat reviewed this literature for clues about methodology.

Since broadband is a recent phenomenon in developing economies, researchers do not have access to longitudinal data using control groups. Most assessments are qualitative and inferential; reliable quantitative assessments are rare. Formal empirical studies have focused on developed countries, and small industrialized developing countries, such as Singapore and South Korea which are not forced to contend with the difficulties faced by large, poor countries or the chaos that is typical in non-authoritarian regimes. Most studies have been funded by business-related economic interests that emphasize the benefits, not the costs, of broadband. For example, there are few predictions of the economic impacts on job loss through automation, or predictions about the addictive impact of broadband on the behavior of vulnerable rural youth.

Beyond these concerns is the matter of philosophic bias, noted by William Dutton, Director of Oxford Internet Institute. He argues that much of the new literature on broadband is biased by “technological determinism,” as if technologies have predictable

impacts regardless of how they are shaped by government policy, business decisions, or the creative play of designers, the idiosyncrasies of garage inventors. The approach assumes that the future impact of a technology can be predicted, based on understanding the evolution of the technology itself. Yet, human leadership and ingenuity can intervene to radically alter a technology's impact. Broadband's great potential to contribute to growth and competitiveness depends on whether governments understand the opportunity and ensure that supportive conditions are in place through regulatory and policy reforms as well as strategic investments and public-private partnerships. To realize the benefits of broadband nations must assure development of new content, services, and applications, which become demanded by user.

*Econometric regression is only one of many tools that we used in our forecast. We found the most important tool was on-the-ground interviews with insiders.*

Among economists a lively debate exists over whether the econometric methodology of regression analysis can be used for predicting the impacts of broadband. The Meaningful Broadband Secretariat incorporated regression studies into our forecasts but our forecasts relied more on interviews that captured data as well as best thinking of on-the-ground actors who are familiar with the formal and informal realities that shape broadband deployment in Thailand. We began by considering the economic goals for the nation, and then drew upon international best practices that show how broadband could serve as an enabler of any government's stated goals. In pursuit of that approach, this report is based on the following information gathered from June 1, 2009 to April 30, 2010

- Questionnaires administered to members of Meaningful Broadband Working Group, including TOT Public Company Limited (TOT), CAT Telecom Public Company Limited (CAT), Advanced Info Service Public Company Limited (AIS), Total

Access Communication Public Company Limited (DTAC), True Corporation Public Company Limited (TRUE), and National Telecommunication Commission of Thailand (NTC)

- Demographic data (2007) from National Statistical Office of the Kingdom of Thailand
- Interviews with Thai government officials in the following organizations: Office of the Prime Minister’s office, National Economic and Social Development Board, Ministry of Finance, Ministry of Education, Ministry of ICT, Ministry of Science & Technology (NESDB, NECTEC), Ministry of Commerce and Ministry of Culture
- Key government reports, such as ICT Master Plan from ICT Ministry and Master plan for Frequency Allocation from National Telecommunication Commission of Thailand
- Interviews with and reports by Multinational Corporations that are in the Global “thought leadership” regarding broadband deployment, including Intel, Nokia, Nokia Siemens Network, Oracle, IBM, Acer, Research in Motion (Blackberry), Cisco Systems, Alcatel-Lucent and Microsoft
- Interviews with the principal analysis of key consulting firms covering the Asian ICT sector, e.g. IDC, Gartner, Economist Intelligence Unit, Pyramid Research, McKinsey & Company, The Boston Consulting Group, Forrester Research, Booz Allen Hamilton, KPMG, Accenture, Deloitte, along with follow up interviews with the authors of these reports

- Interviews and review of reports on ICT trends from intergovernmental institutions as follows: ASEAN, UNESCAP, UNCTAD, ITU, IFC, ADB, OECD and World Bank/IFC.
- Interviews with key professors and key Bangkok-based researchers at Chulalongkorn University, King Mongkut University of Technology, Asian Institute of Technology, and Mahidol University
- Interviews with and report of global and regional academic research firms, such as Oxford Internet Institute, Berkman Center for Internet and Society (of Harvard Law School), MIT Media Lab, Oxford Internet Institute, World Internet Institute (University of Southern California, Annenberg School of Communications, National University of Singapore (School of Communications), National Telecommunications University of Singapore.
- Articles in the general and trade press, especially Asian Wall Street Journal, The Nation, and Bangkok Post
- Published company financial reports
- Information and data from web sites relevant to the field of Digital Divide

# INTRODUCTION

In a Bali Hotel in 2008, nine ICT ministers of ASEAN gathered around a table to sign a declaration. “Our highest priority is to build capacity for high-speed Internet...” it said. Then they added a qualifier, “...to close the Digital Divide.”<sup>6</sup> But like most Digital Divide declarations made over 10 years, the Bali declaration was not followed by any concrete plan for how such a goal could be achieved.

Yet, without such a plan, the International Telecommunications Union (ITU) predicts a huge new divide will emerge between nations that are “broadband-enabled” and those that are not.<sup>7</sup> The gap between the two kinds of nation is growing – and some think the gap is already irreversible.

*ITU predicts a huge new divide between nations that are able to shape broadband to meet their needs and those that cannot. This divide may define winners and losers in the “Asian Century.”*

The series of Meaningful Broadband Reports delivered to Asian countries – including this report – hopes to contribute to a model that reverses the broadband divide in emergent economies. Designed for Thailand, this report offers clues relevant for other Asian countries whose leaders are also frustrated that the mass-market embrace of cell phones in their countries is not being followed by a corresponding leapfrog into wireless internet. Though this problem may seem peripheral to most nations’ core concerns, the Meaningful Broadband series hopes to show that “closing the Broadband divide” speaks to the core concerns of prime ministers and parliaments as well as to the general public.

<sup>6</sup> <http://www.aseansec.org/21920.htm>

<sup>7</sup> [www.itu.int/en/broadband/](http://www.itu.int/en/broadband/)



## Why Chula Stepped In?

Alarmed at the slow and uncertain pace of broadband penetration in the nation, the National Telecommunications Commission and the CEOs of the five telecommunications operating companies accepted Chulalongkorn University's invitation to form a coalition, called the Meaningful Broadband Working Group (MBWG.) Rather than seek a policy consensus among themselves, the Working Group asked Chulalongkorn University to formulate an unbiased view of how broadband could be meaningfully deployed in Thailand. Rather than turn to the university's renowned engineering faculty to do the work, the university chairman, Dr. Charas Suwanwela and its President, Dr. Pirom Kamol-Ratanakul, assigned the role of MBWG Secretariat to an obscure program within the university's Faculty of Arts, the Center for Ethics of Science and Technology (CEST.) It addresses technology policy from humanistic and philosophic points of view, including the concept of Sufficiency Economy promulgated by His Majesty the King. The Meaningful Broadband initiative was brought from Indonesia to the university in 2008 by Dr. Charas, who explained that Chulalongkorn has the long-standing role of stepping in to formulate ethical principles that are urgently needed when the government itself is unable or unwilling to act. "This is one of those circumstances," he said.<sup>8</sup>

*The Chulalongkorn secretariat is housed within an obscure program in the Faculty of Arts which safeguards humanistic traditions linked to His Majesty the King.*

The analysis presented here is that of the Chulalongkorn's MBWG Secretariat alone and does not represent viewpoints of members of MBWG, nor its current Rotating Chairman Mr. Suphachai Chearavanont, President and CEO of True Corporation. It has not been influenced by any corporate policies or any governmental interest.

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<sup>8</sup> Public lecture by Dr. Charas Suwanwela, November 23, 2009

## First Thailand, Then the World

The Chulalongkorn secretariat, formed on April 9, 2009, soon found that the matter of bringing Meaningful Broadband to Thailand had international implications. Like the population of Indonesia (where Meaningful Broadband has been formulated by ICT stakeholders since 2004), Thailand's majority population is a perfect demographic match for two billion new cell-phone users who fail to meet the "total cost of ownership" (TCO) criteria of today's smart phone supply chains.<sup>9</sup> If Thailand can reshape "broadband ecosystems" so that majority populations can be helped by it, perhaps other middle-income developing nations might do so as well.

*Thailand's majority population is a perfect demographic match for two billion new cell-phone users who fail to meet the "total cost of ownership" (TCO) criteria of today's smart phone supply chains.*

Currently the greatest opportunity for establishing public-private partnerships for closing digital divide through broadband, lies with the "middle of the pyramid," or MOP. Gartner Dataquest, a leading IT research firm, recently noted that middle-income "transitional economies countries" such as Thailand are the major source of new demand in global telecommunications. Gartner claims they will "define the future of the global telecommunications industry" as mass markets of cell phone users in such countries move step-by-step into "data services," eventually motivating them to upgrade to full-powered broadband devices.<sup>10</sup>

Many of these nations are plagued by an economic malady: "middle-income trap," a clever World Bank term which imitates an older concept called "poverty trap," referring to the vicious circles that create an inability of some nations to lift themselves from poverty. Economists agree that in Thailand, poverty is not the core problem. In the decade of 1996-2006, the rank of truly

<sup>9</sup> www "The Next Four Billion," in <http://www.nextbillion.net>

<sup>10</sup> "ICT in the World Transitional Economies," Gartner Dataquest report, 2009, p. 14

***“Low-income Thais often have time on their hands. They could use their spare time to receive ‘data services’ that come to them through the little windows in upgraded mobile devices.”***

***– Prof Kittti Limsakul***

poor Thai citizens was cut in half to a mere 7%. Yet, according to Chulalongkorn University economics professor Kittti Limsakul, the Thai majority population remains suspended in an economic limbo. Once Thais reach an income level of about \$600 per month, they bump against a glass ceiling and often do not go higher. According to the professor, a “difference between affluent and low-income Thais is that low-income Thais often have time on their hands,” he said. They could use their spare time to receive “data services” that come to them through the little windows in upgraded mobile devices.<sup>11</sup>

These services may help them to save money, gain income, learn new skills, build community, and simply help each other meet basic needs. As incomes rise, these citizens may well be inclined to pay for more services delivered via their phones. For example, Nokia Life Services, charges 60 cents (US) per month to users in India to give low-income cell phone subscribers an SMS-based English language training program.<sup>12</sup> If they pay a bit more and upgrade to a smart phone, video and audio can be added to this same service, creating quicker and cheaper ways to learn English. The effect on poorly educated Thais could be profound. For example, once it is clear to the manager of a restaurant in *Phuket* that a young recruit who is washing dishes knows enough English to interact with *farang* customers, the manager could upgrade the busboy to a status of waiter. The young worker may be on his way to a real career.

<sup>11</sup> Interview with Dr. Kittti Limsakul, Faculty of Economics, Chulalongkorn University, March 13, 2010.

<sup>12</sup> <http://www.nokia.com/corporate-responsibility/society/youth-development/life-skills>

*Mobile data services could do what Thailand's public schools have mostly failed to do: transmit interactive learning and essential skills that could give economic security to low-income users.*

## **A “Wealth Effect”**

Behind the Meaningful Broadband model is a potential alignment between the objectives of business and the objectives of government. According to new data from Intel Corp anthropologists, the lowest income cell-phone users spend money on mobile upgrades even before spending it on health care, education, and even housing. Income spent on ICT products and services rises eight times as incomes rise from \$100 per month to \$600 per month<sup>13</sup>. As local governments introduce subsidies into mobile supply chains, this wealth effect might be enhanced, creating a new mobile-driven way to lead users out of poverty.

## **Broadband as Game-Changer**

“Historically, certain technologies, such as steam power, have served as meta-technologies to bring about quantum leaps in growth with beneficial social impacts with duration of at least fifty years. More than biotechnology and nanotechnology, broadband has caught the imagination of the world’s governments as the technology most likely to serve this role in our own era,” said World Bank’s Valerie D’Costa.<sup>14</sup> In fact, even such an exalted statement may understate broadband’s potential. Unlike other historic inventions, telecommunications in the broadband era can be continually *reshaped* by leaders towards ends that are limited only by human imagination.

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<sup>13</sup> [www.NextBillion.net](http://www.NextBillion.net)

<sup>14</sup> [http://siteresources.worldbank.org/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/282822-1208273252769/Building\\_broadband.pdf](http://siteresources.worldbank.org/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/282822-1208273252769/Building_broadband.pdf)

Already various Asian nations have carved out their niche in this process. For example:

- The Republic of Korea was an early leader in fixed broadband.
- Japan showed how to turn cell phones, and later smart phones into a mass-market commodity.
- Singapore is the world leader in fiber deployment.
- Hong Kong sets the pace with Internet Protocol Television (IPTV).

The Meaningful Broadband approach suggests that, by showing how low-income cell phone users could upgrade meaningfully to broadband, Thailand could set the pace in a new pattern of mobile-enabled growth called “m-development” by the World Bank.<sup>15</sup> Besides serving as a trigger for economic growth as measured by GDP, broadband deployment could also serve other development goals that lie outside the calculations of economists: lightening the earth’s carbon footprint,<sup>16</sup> reducing rural-to-urban congestion<sup>17</sup>, avoiding addictive behavior by users<sup>18</sup>, strengthening traditional cultures, and releasing pent-up human resources in mass populations.

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<sup>15</sup><http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTEDEVELOPMENT/0,,contentMDK:21180737~menuPK:4053926~pagePK:210058~piPK:210062~theSitePK:559460,00.html>

<sup>16</sup> <http://earth2tech.com/2010/03/25/how-broadband-can-be-the-backbone-for-a-green-economy/>

<sup>17</sup> <http://www.dailyyonder.com/rural-internet-connections-u-s-falls-short-other-countries>

<sup>18</sup> A wide body of literature now addresses internet addiction as well as how broadband itself could be used to overcome various forms of addiction, including addiction to broadband itself, and to application domains such as online gaming.

## Why Broadband is Crucial?

Broadband is usually defined in technological terms. Some definitions emphasize the expanding breadth of its technical capacity while others emphasize its boosts in transmission speeds;<sup>19</sup> however, such definitions are frozen in time and miss the essential point: *broadband is better understood as a communications medium for shaping human behavior the impact of which is destined to rise exponentially over time.* Though many efforts are being made to predict the impact of broadband on nations, the fact is that broadband's impact is unknowable.

Though this notion sounds futuristic, broadband is not a new concept. It has always been referred in telecommunications as a wide range or “band” of frequencies which may be divided into channels. The basic rule is that the wider the bandwidth, the greater the information-carriage capacity. Consider radio, a very narrow band will carry Morse code; a broader band will carry speech; a broader band will carry music; and even more bandwidth can enhance the quality of the music, communicating subtle nuances of melody and pitch – music that *moves* us. Thus, high-bandwidth sound can come to us as an *immersive* experience. Compared to radio, broadband internet can be much more impactful. Noting that it is still in its infancy, and that its reach is spreading all throughout the world, broadband may become humanity's most powerful tool for shaping human experience.

***Broadband is just “fast Internet.”  
It is better defined as a medium for transforming human behavior.  
Eventually, broadband ecosystems will produce immersive experiences.  
These experiences can move us emotionally, spiritually.  
How they move us could affect the future of human civilization.***

## For What Purpose?

Broadband's performance/price ratio tends to double every 12-15 months, a trajectory that mimics Moore's Law, which since the late 1960s has effectively predicted the trajectory of semiconductor chips.<sup>20</sup> In other words, in the year 2015, which is a benchmark for this report, the impact of broadband may be five times greater than it is today. We know the experiences that can come to us through a telephone modem operating at 56,000 bits per second. Fiber optic cable can transmit data 2,000 times faster. "Can we even imagine how this technological capacity can be harnessed for human benefit?" asks MIT Media Lab's Alexander Pentland.<sup>21</sup>

Prof Pentland asks us to step back to see the big picture. Like the human body itself, broadband may become a meta-medium, absorbing and integrating other media and mediating our relationship to the outside world, he says. Our mobile devices may become universal, ubiquitous remote control devices, shaping our ties to immediate physical environments. Unlike dial-up internet, Broadband is "always on," not limited by geographic barriers. It multitasks without accumulating stress. It can follow our orders without complaint. "Broadband is a human right of the 21<sup>st</sup> century," says Salman Zafar, Chief Technology Officer for Nokia Siemens Network-Indonesia.<sup>22</sup>

*Like the human body itself, broadband may become a meta-medium, absorbing and integrating other media and mediating our relationship to the outside world.*

<sup>20</sup> [www.infodev.org/en/Document.565.pdf](http://www.infodev.org/en/Document.565.pdf)

<sup>21</sup> Alex Pentland, who directs the "Digital Life" program of MIT Media Lab, presents an astute lecture on the future impact of digital technology on human experience in this site: <http://www.organizationaldynamics.upenn.edu/od.cgi/pentlandmenu.html>

<sup>22</sup> Interview in Jakarta at The Habibie Center with Mr. Salman Zafar, November 24, 2009.

*Few governments have the expertise to re-shape their model of telecommunications so that it absorbs and shapes innovations that may arrive through Next Generation Networks in the future.*

Anthropologists are on full alert. “Broadband will one day match or exceed the persuasive influence of culture itself,” says Intel’s Adrian Forte.<sup>23</sup> Indeed, it may be used to reinforce – or compete with – the values transmitted by family, religion, and community. Spiritual traditions, carefully transmitted for centuries, and imbedded in robust cultures, could be ignored under the pervasive influence of digital convergence – or perhaps the opposite could occur. These same traditions could be strengthened by broadband.<sup>24</sup> Contemplating this potential impact, it is clear that the case for broadband incorporates fundamental concerns about national sovereignty as well as human identity.<sup>25</sup>

Few governments have the expertise to re-shape their model of telecommunications so that it absorbs and shapes innovations that may arrive through Next Generation Networks in the future. Robert Pepper, Vice President of Global Technology Policy of Cisco Systems, makes the point that broadband requires turning upside down the fundamentals that shaped the telecommunications industry each country has inherited from its past:

“In virtually every country around the globe, the telephone industry was organized around five central concepts: the primary service is voice, the minute is the best metric for billing, regulation and measurement; pricing is sensitive to duration of the call, and pricing is sensitive to the distance between callers. None of these conditions apply to broadband use. The only

<sup>23</sup> Interview at Intel Research, Portland, Oregon USA, December 14, 2008

<sup>24</sup> For an analysis of how digital technology is increasingly able to influence one’s sense of “self” and “other,” see the MIT Initiative on Technology and Self (<http://web.mit.edu/sturkle/techself/>) and the research of its founder, Prof Sherry Turkle.

<sup>25</sup> The sovereignty issue is increasingly being used by nations as a rationale for the need for explicit broadband policies. In the new literature on broadband, telecommunications is regarded, not just as a “strategic” industry, but one that controls behavior. This rationale that was used successfully by leaders in South Korea who advocated for an approach to broadband deployment that would enable Republic of Korea to retain sovereignty over its communications vis a vis its rival, Japan. See [http://findarticles.com/p/articles/mi\\_m0FGI/is\\_9\\_16/ai\\_n27869486/](http://findarticles.com/p/articles/mi_m0FGI/is_9_16/ai_n27869486/)



similarity between the telephone and broadband markets is the capital expenditures needed to create the foundational network. Fixed broadband networks still require digging ditches and hanging wires, and the civil engineering costs can be penciled in at a fairly constant rate. But even this similarity is fading as a result of the advent of high-speed wireless technologies, which promise to drastically reduce capital costs for access networks, and expand the range of options available to locations and communities.”<sup>26</sup>

As Pepper’s comment implied, low-income nations must achieve a Big Push to reshape their telecommunications systems to fit the new realities of broadband. To do that *political will* is needed. Government leaders must understand the optimal benefits they can achieve through broadband – and the severe damage to their economies that can occur if they ignore this matter. Noting that “economic stimulus” is currently driving budget priorities in Thailand, the secretariat of Meaningful Broadband Working Group determined that the best way to move broadband high on the national agenda is to show how broadband could enable the government’s own goals for macroeconomic transformation.

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<sup>26</sup> [http://www.broadband.gov/docs/ws\\_int\\_lessons/ws\\_int\\_lessons\\_pepper.pdf](http://www.broadband.gov/docs/ws_int_lessons/ws_int_lessons_pepper.pdf)

# NINE BROADBAND IMPACTS

This section of the report explains and supports the Thai forecasts presented in the chart above. Like the chart, this section has nine parts or dimensions. Each refers to a separate aspect of the Thai economy. In each case we explain how we arrived at the 2015 forecast for the Business-as-Usual (BAU) and Meaningful Broadband (MB) scenarios. Each of the nine sections has two parts: Summary and Analysis. Further back-up data regarding each of the nine factors appears in the Appendices.

## 1. BROADBAND PENETRATION

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### Summary

We estimate that, if Thailand continues to pursue broadband without being guided by a coherent and holistic broadband policy (a scenario we call “Business as Usual” or BAU), the effect will be that 17% of households and 37% of the national population will receive broadband by 2015, combining fixed and wireless. We forecast that the annual increase of smart devices will be 19% per year averaged over five years. (This assumes a broadband speed of a minimum of 256 kilobits per second, which is considered a minimum by OECD standards.) While this increase will contribute marginally to Thailand’s economy, it represents a 50-60% lower broadband penetration rate than what we can expect from most other Asian peer nations by 2015, according to broadband

forecast reports by four major consulting firms.<sup>27</sup> (The most exact predictions supporting this scenario come from Gartner Dataquest.<sup>28</sup>) Thus, the slow pace of Thailand's broadband penetration under BAU may cause Thailand's competitive disadvantage,<sup>29</sup> and it may close the window of opportunity now available to Thailand to leapfrog into *Next Generation Networks*.<sup>30</sup> Already ranking low (11<sup>th</sup>) on the rankings of Asia's 16 broadband penetrated nations,<sup>31</sup> Thailand may drop by three points to 14 under the BAU scenario.<sup>32</sup> Thanks to low broadband penetration, Thailand may continue to have *slower broadband speeds* and *higher internet prices* than peer nations.<sup>33</sup> The combination of slow speeds, high rates and low penetration will prevent Thailand's emergence as a major innovator as Asia moves towards a model of *digital convergence*<sup>34</sup> for the entire continent. These predictions are based on Meaningful Broadband Working Group secretariat's analysis of several reports from proprietary consulting firms, which predict the country's broadband future. Published in 2009 using 2008 data, these predictions were adjusted in 2010 by Chulalongkorn researchers who interviewed the reports' authors.<sup>35</sup>

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<sup>27</sup> Business Monitor International, Thailand Telecommunications Report Q4, 2009, page 88. Our assessment is that, under the MB, scenario, Thailand would leapfrog into the same pattern of broad deployment currently demonstrated by regional leaders: Australia, South Korea, Taiwan, Hong Kong, Japan and China and would reach parity with Malaysia and Viet Nam.

<sup>28</sup> Gartner Dataquest Report, 2008 "Consumer Broadband Growth by Market, 2007-2012.

<sup>29</sup> Business Monitor International, Thailand Telecommunications Report Q4, 2009, page 88. Our assessment is that, under the MB, scenario, Thailand would leapfrog into the same pattern of broad deployment currently demonstrated by regional leaders: Australia, South Korea, Taiwan, Hong Kong, Japan and China and would reach parity with Malaysia and Viet Nam.

<sup>30</sup> An excellent assessment of the dynamics and competitive positioning for Next Generation Networks (NGN) can be found in this OECD report: [www.mobilein.com/NGN\\_Svcs\\_WP.pdf](http://www.mobilein.com/NGN_Svcs_WP.pdf)

<sup>31</sup> Business Monitor International Forecast, 2009

<sup>32</sup> Gartner Dataquest Forecast, 2009

<sup>33</sup> Briggs and Kelly Report demonstrates the links between broadband penetration rates and broadband prices and broadband speed based on a study of international best practices of broadband-enabled nations. Highly penetrated broadband nations such as Singapore experience much faster internet and enjoy lower prices than nations that have little broadband. For the reference to Briggs and Kelly and for a deeper analysis of this issue see

[www.infodev.org/en/Document.565.pdf](http://www.infodev.org/en/Document.565.pdf) (page 13.)

<sup>34</sup> See [www.digitalconvergence.eu](http://www.digitalconvergence.eu)

<sup>35</sup> Include Pyramid <http://www.pyr.com>, ADC <http://www.adc.com>, Gartner <http://www.gartner.com>, Yankee <http://www.yankeegroup.com>, and BMI <http://www.businessmonitor.com>

If Thailand's government and its ICT stakeholders intervene to achieve Meaningful Broadband (MB), this penetration rate will nearly double by 2015, with 80% of this penetration based on wireless when we believe Wimax will contribute to a widespread upcountry embrace of smart devices. This high rate of broadband penetration will allow Thailand to achieve a virtuous circle of economic benefits depicted in subsequent section of the report. Furthermore, the MB scenario will produce a new source of competitive advantage, establishing Thailand's niche alongside today's high-broadband Asian nations (Japan, Singapore, Korea, Taiwan, South Korea, China, and Malaysia).<sup>36</sup> As free-trade barriers fall, Thailand could become a competitive exporter of telecommunications services. This benefit would accrue not just to ICT industries themselves, but to a range of ICT-driven vertical industries<sup>37</sup> whose international success depends on cloud computing and other broadband-induced innovations.

## Analysis

- The combined effects of Gilder's Law,<sup>38</sup> Metcalf's Law,<sup>39</sup> and Moore's Law,<sup>40</sup> which define predictable shifts in performance/price ratios, will cause Thailand and other nations to benefit from technological innovations that spur an annual decrease in bandwidth and internet-related costs during this period.

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<sup>36</sup> Gartner Dataquest Insight, 16 July 2008 "Consumer Broadband Growth by Market, 2007-2012."

<sup>37</sup> Gartner Dataquest Insight, 1 May 2009 "Government Stimulus Packages in Asia/Pacific Target Vertical IT Spending."

<sup>38</sup> [http://en.wikipedia.org/wiki/George\\_Gilder](http://en.wikipedia.org/wiki/George_Gilder)

<sup>39</sup> [http://en.wikipedia.org/wiki/Metcalf's\\_law](http://en.wikipedia.org/wiki/Metcalf's_law)

<sup>40</sup> [http://en.wikipedia.org/wiki/Moore%27s\\_law](http://en.wikipedia.org/wiki/Moore%27s_law)

*If Thailand's government and its ICT stakeholders intervene to achieve Meaningful Broadband, penetration rates could nearly double to 54 % of households and 74% of individuals by 2015, with 80% of this penetration based on wireless.*

- Current Thai markets for mobile phones in upcountry will continue at four times the rate of the Bangkok Metropolitan Area (BMA), causing market forces (i.e., Thai mobile supply chains) to compete in the effort to serve the Thai majority population.
- Mobile supply chains in Thailand, facing steadily declining revenue from voice and SMS services, will intensify their competition for value-added revenue from mobile data services. As this competition heats up outside the BMA market, prices in all parts of mobile supply chains will drop by as much as 30% per year – a factor that will increase further the overall shift from products to services.
- New sources of international bandwidth via undersea cables will enter Thailand to lessen the concentration of bandwidth landing stations now controlled by a state-owned enterprise. This and other factors will cause Thailand's bandwidth costs (currently extremely high, at 5,000 baht per unit vs. 1,000 baht for the same quantity of bandwidth available to advanced nations) to drop steadily over the five year period of this scenario.
- Smart phone handset costs will drop 30% per year in Thailand and in peer nations, as BMA markets become saturated, as marketers become forced to meet TCO requirements of low-income users, and as Asian markets become flooded with cheap massively produced products and services flowing from China.

## 2. GDP GROWTH

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### Summary

By drawing upon econometrics research from World Bank<sup>41</sup> and other sources<sup>42</sup>, we predict that Thailand's GDP will get a "broadband spike" of 0.90% of GDP, solely due to the effect of our predicted (37%) broadband penetration by 2015 under the BAU scenario. However, this boost to the country's GDP will be far less than most of Thailand's peer nations, whose GDP will rise by an average of 2.3% per year due purely to the effect of paced broadband deployments in those nations.<sup>43</sup> Under BAU, the Thai economy would continue to decline in comparison with Malaysia and Vietnam<sup>44</sup> who compete with Thailand for telecommunications investments. The best opportunity for Thailand to match its neighbors in this regard is by leveraging its impressive mobile phone penetration rate – scheduled to reach 133% of all Thais by the year 2015.<sup>45</sup> (This figure accounts for the fact that many will have more than one SIM card and multiple mobile devices.) Surveys indicate that mobile telephony in middle income developing countries, such as Thailand, can receive as much as 3% per year improvements in GDP from mobile telephony, and that this boost to GDP could be further enhanced if cell phone users would upgrade *en masse* to smart devices. Behind this analysis is the view that broadband would boost the purchasing power of the Thai majority population.

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<sup>41</sup> Information and Communications for Development 2009: Extending Reach and Increasing Impact, Chapter 3: Economic Impacts of Broadband  
<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTI C4D/0,,contentMDK:22229759~menuPK:5870649~pagePK:64168445~piPK:64168309~theSitePK:5870636,00.html>

<sup>42</sup> Pyramid Research, 2004

<sup>43</sup> Asian Development Bank report- Growth rate of GDP

<sup>44</sup> Asian Development Bank report- Growth rate of GDP

<sup>45</sup> Gartner Dataquest analysts, result of phone interview, March 12, 1010.

Currently, the share of GDP of Thailand's population earning 3,000 to 15,000 baht is approximately 52%, using IFC data, and the purchasing power is thought to be of similar proportion. Under the MB scenario, this purchasing power could rise by up to 7% per year by 2015, causing a broadening of the domestic economy.

## Analysis

As the low-income population generates demand for “*mobile killer apps*,” they could save costs and develop new sources of income. The “wealth effect” could be substantial, adding as much as 20% to total national purchasing power, based on data drawn from the International Finance Commission’s “Next Four Billion Report.”<sup>46</sup> As their discretionary spending rises, a larger share of their incomes will be spent on ICTs, producing a multiplier effect, which in turn could stimulate domestic spending. The cumulative growth of purchasing power of the Thai “middle of the pyramid” (i.e., those who earn from 3,000 to 14,000 baht per year) could be sizable. The World Bank’s International Finance Commission’s Next Four Billion report in 2005 indicated that – per capita spending on ICTs expands dramatically in middle income countries as wealth rises.<sup>47</sup> It is this data which caused Qualcomm Corporation founder Irving Jacobs to say, “We do not expect to make money on the first cell phone purchased by low-income consumers. But as they use their phones, their income rises and we benefit as a rising share of their income becomes devoted to mobile upgrades.” The same data caused Microsoft’s Executive Vice President Orlando Ayala to explain, “We’re in the nation-building business.”

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<sup>46</sup> [www.NextBillion.net](http://www.NextBillion.net)

<sup>47</sup> [www.nextbillion.net](http://www.nextbillion.net)

*Meaningful Broadband's  
virtuous circle could  
produce a spike in GDP.*

The impact would be to grow the purchasing power of the Thai mass market and boost the domestic economy. Once these data services would be integrated into a national model of digital convergence, broadband would emerge as the new driver of GDP growth in Thailand. We anticipate that under the MB scenario, GDP in Thailand would receive a broadband boost that would rise gradually each year until it reaches 2.4% of GDP in the year 2010.

This virtuous circle, driven by mobile data services, would drive new investments, expand the domestic economy, and bring a rise to GDP of as much as 2.4% per year, all other things being equal.

- **Broadband as meta-driver of growth:** Much of the recent literature on the social and economic benefits of broadband conclude that high-speed internet is now a “meta-driver” overall macroeconomic growth, rather than merely a driver of ICT industries alone. This conclusion results from an analysis of many studies published by academic institutions and industry associations in 2008 and 2009. For example, a three-year data analysis of 12 affluent countries demonstrates that, all other variables being equal, every 1% increase in broadband penetration produces \$2,000 per capita GDP (study took place across several countries).<sup>48</sup> A number of studies conducted by Australia’s National Office for the Information Economy, Australian Government Information Management Office (2004), and Allen Consulting Group (2002)<sup>49</sup> estimate that broadband will add 0.6 percentage point to Australia’s gross domestic product (GDP) growth rate each year.

<sup>48</sup> <http://www.ctia.org/advocacy/research/index.cfm/AID/10538> See also, International Association for Wireless Telecommunications Industry, New York City, 2009.

<sup>49</sup> Allen Consulting Group, Built for Business II: Beyond Basic Connectivity, Oct 2002  
Allen Consulting Group, True Broadband exploring the economic impacts, Sep 2003



- **Developing Country's Broadband Spike:** Low-to-middle income developing countries can get a greater GDP boost from broadband than advanced countries, according to an influential World Bank report.<sup>50</sup>
- **Broadband's GDP Impact is predictable:** Some studies look to the future to predict impacts of broadband in specific nations. By so doing, they provide researchers with a methodology to refine their predictions. According to 2003 estimates by Accenture, next-generation broadband has the potential to contribute \$500 billion to GDP in the United States and from \$300 billion to \$400 billion in Europe, and was likened to water and electricity as the "next great utility."<sup>51</sup>

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<sup>50</sup><http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTIC4D/0,,contentMDK:22229759~menuPK:5870649~pagePK:64168445~piPK:64168309~theSitePK:5870636,00.html>

<sup>51</sup>Accenture, Jan 03, "Igniting the Next Broadband Revolution" (Saksena and Whisler 2003e)  
[http://www.accenture.com/Global/Research\\_and\\_Insights/Outlook/By\\_Alphabet/IgnitingRevolution.htm](http://www.accenture.com/Global/Research_and_Insights/Outlook/By_Alphabet/IgnitingRevolution.htm)

### 3. INEQUALITY

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#### Summary

**A**lready one of the most inequitable societies in Asia,<sup>52</sup> Thailand's income gap between wealthy elites and the mass population would deepen by as much as 12% by 2015 under the business as usual (BAU) broadband scenario – or inequality could lessen by a similar proportion assuming full deployment the Meaningful Broadband (MB) scenario.

*Meaningful Broadband could bring a sense of fairness to Thailand fragile democratic institutions.*

Broadband policy presents a pivot point for the nation. If Thailand's leaders could intervene to shape an optimal broadband ecosystem, their actions could reverse the trend towards ever-widening income gaps and jettison the economy into a fairer, more equitable growth pattern. Doing so would fulfill a goal of the National Economic and Social Development Board (NESDB), which is to strengthen the country's "social compact" and introduce a sense of fairness into the country's fragile democratic institutions.<sup>53</sup> By lessening the costs and increasing their income of those who earn from 3,000 baht to 15,000 baht per month,<sup>54</sup> broadband-enabled services could grow purchasing power in that large target group by 12% by 2015, giving poorly educated masses a chance to catch up with educated and affluent citizens who drive the export-oriented Bangkok Metropolitan Area (BMA.)<sup>55</sup> The following table draws

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<sup>52</sup> Over the years the income distribution in Thailand has become increasingly uneven and income inequality now is at historically high level, according to Medhi Krongkaew (1993, 415), Warr & Isra (2004), World Bank 2005.

<sup>53</sup> "Thailand's Management of Regional and Spatial Development," by Nitaya Kmonwatananisa," NESDB, 2008

<sup>54</sup> Meaningful Broadband proposes an intervention from Thailand's ICT stakeholders that would establish a "broadband ecosystem" that would help establish essential skills and economic security to 53 percent of the Thai population who earned from 3,000 Thai baht to 20,000 Thai baht, using 2007 data provided by the National Statistical Office of Thailand.

<sup>55</sup> Based on IMF data, the current purchasing power of bottom 65% of the Thai population is xx. See "The Next Four Billion," National Resources Council, 2005.

data from the National Statistical Office in Thailand to identify the target population of 53% of the Thai population that could receive the benefits of Meaningful Broadband to a degree that their net incomes would rise. Since this population group corresponds to the mid-section of the global economic pyramid, Thailand could emerge as a global leader in delivering data services to this niche of the global market. The chart below provides the relevant demographic data from 2008 by the National Statistical Office:

Pyramid	Global		Thailand		% of income
	Annual income	% of Thai population	Monthly income	% of Thai population	
<b>BOP</b>	Less than \$3,000	84.2	Less than ฿3,000	38.3	10.83090786
<b>MOP</b>	\$3,000-\$20,000	15.2	฿3,001-฿15,000	53.9	56.13900981
<b>TOP</b>	More than \$20,000	0.6	More than ฿15,001	7.8	33.03008233

Source: National Statistical Office of Thailand

We drew upon predictions of four prominent ICT-related consulting firms<sup>56</sup> and an influential report on low-income purchasing power<sup>57</sup> from the World Bank’s International Finance Commission, to reach the following conclusions:

- 1) The gaps between the highest and lowest wage earners would rise from 1:65 to 1:83 by 2015 under the BAU scenario, but the same gap could be reduced from 1:65 to 1:47 under the MB scenario.<sup>58</sup>

<sup>56</sup> Pyramid Consulting, Business Monitor International, Frost & Sullivan, and Ovum Consulting

<sup>57</sup> “The Next Four Billion,” IFC and National Resources Council, 2005.

<sup>58</sup> <http://www.nationmultimedia.com/home/2009/11/02/columnists/Politics-and-Thailand's-wealth-gap-30115689.html>

***Meaningful Broadband would help Thailand and perhaps other middle-income developing countries overcome what World Bank economists call the “skills mismatch” and the “middle income trap.”***

2) The income gaps between incomes in urban vs. rural sectors would increase by 20% in BAU, and the rural/urban gap would decline by 14% under the MB scenario,

3) Using a quantification tool, called the “Gini Coefficient,”<sup>59</sup> Thailand would shift towards a more (or less) equitable society which could be predicted precisely using a continuum of 0.0 – 1.0. (According to the Gini coefficient, 0.0 represents a score for a perfectly equal society, while 1.0 would indicate an absolutely unequal society.) Using the Gini formula:

- Business-as-Usual (BAU) broadband would accelerate inequities in Thailand, causing the country’s current score (0.42) to worsen. BAU would cause Thailand to fall an additional 10% behind peer nations in Gini rankings.<sup>60</sup>
- Meaningful Broadband (MB), on the other hand, would begin to correct the economic imbalance, bringing the country to a far more equitable 0.35 in Gini rankings. This ranking would put Thailand’s economy on par with the 2009 Gini ranking for South Korea, whose economy has become more equitable in recent years as its broadband penetration has spread to its majority population.<sup>61</sup>

Conceivably, Meaningful Broadband could help Thailand and perhaps other middle-income developing countries overcome what World Bank economists call the “skills mismatch” and the “middle income trap.”<sup>62</sup> Based on the analysis of the Economics Unit of Southeast Asian division of the World Bank, several

<sup>59</sup> See Appendix 3 for a full explanation of the Gini concept and approach to quantification.

<sup>60</sup> See Appendix 3 for the most recent Gini data 2009 shows Thailand to less equal than peer nations. Source: CIA World Fact book 2009, Gini Index 2009 Country Ranks.

<sup>61</sup> CIA World Fact book 2009, Gini index 2009 Country Ranks.

<sup>62</sup> “Skills Inadequacy and Thailand’s Competitiveness,” by Robert Zeufack, World Bank-Thailand, 2006, Seminar on Regional Competitiveness.

“middle-income developing countries” are unable to rise to the ranks of “developed” societies, mostly because their skills are mismatched to the requirements of high paying jobs.

By transmitting those skills, the MB model would add significantly to development theory to show how middle-income developing countries (i.e., those earning between \$976 and \$11,900 per capital per year<sup>63</sup>) could enter the ranks of advanced nations as their economies become optimally transformed through broadband.

## Analysis

In this section we present perspectives from economists regarding the impact of broadband on equality and inequality. In doing so, we hope to suggest how broadband penetration become part of a long-standing macroeconomic debate.

**The Kuznet’s Curve:** Broadband’s economic impact on middle-income developing countries opens a long-standing debate among development theorists regarding the “Kuznets Curve.”<sup>64</sup> This economic theory argues that inequality grows as a country develops, but begins to decline after it reaches a certain point. “So far, Thailand’s economic growth defies Kuznets,” says Prof Kitti Limsakul, Director of the Chulalongkorn University Center on Labor Forecasting, and a former vice minister of Thailand’s Minister of Finance. “It remains to be seen,” he says, “if Thailand can shape broadband penetration so that inequality could decline rather than rise as high-speed internet penetrates the nation.”<sup>65</sup>

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<sup>63</sup> [www.worldbank.org](http://www.worldbank.org)

<sup>64</sup> [http://en.wikipedia.org/wiki/Kuznets\\_curve](http://en.wikipedia.org/wiki/Kuznets_curve)

<sup>65</sup> Based on personal interview with Prof Kitti Limsakul, Chulalongkorn University Faculty of Economics, February 4, 2010.

**Why Broadband May Defy the Kuznets Hypothesis?** Studies from OECD countries suggest that, even in highly educated nations of the West, broadband may be heightening inequalities within nations.<sup>66</sup> Studies in this genre include the following:

- World Bank(2009d) “World Development Indicators”
- Human Development Report 2009<sup>67</sup>
- CIA World Fact book 2009, Gini index 2009 Country Ranks
- The Nation newspaper, “Politics and Thailand's wealth gap”<sup>68</sup>

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<sup>66</sup> JOS DE HAAN, “IT AND SOCIAL INEQUALITY IN THE NETHERLANDS”, 2003

<http://www.stanford.edu/group/siqss/itandsociety/v01i04/v01i04a03.pdf>

<sup>67</sup> <http://hdrstats.undp.org/en/indicators/161.html>

<sup>68</sup> <http://www.nationmultimedia.com/home/2009/11/02/columnists/Politics-and-Thailand's-wealth-gap-30115689.html>, Nov 2009.

## 4. WORKFORCE DEVELOPMENT

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### Summary

*Meaningful Broadband would boast employment. More importantly it would lessen underemployment in the majority population.*

Like other nations, the Thai government bases its efforts on achieving international competitive advantage on its long-standing campaign to transition the national workforce into a “knowledge economy,” where dead-end jobs are replaced by careers benefiting from continual retraining. But Thailand’s rankings on the World Bank’s Knowledge Economy Index (KEI) have fallen steadily over the past decade.<sup>69</sup> Hoping to reverse this decline, The Ministry of Education’s 1.43 trillion baht Stimulus II initiative aims to create 1.7 million new “knowledge workers” by 2015.

But, under BAU, we forecast that Thailand’s KEI rankings will drop by another 17% (to 72 out of 100 nations surveyed in KEI) by that year, due largely to the slow growth of ICTs in Thailand relative to peer countries. In fact, studies show that at least 50% of growth in knowledge economies now depends on broadband.<sup>70</sup> BAU broadband will indeed contribute to the creation of new employment, but most of these new jobs will be located in the high-income Bangkok Metropolitan Area (BMA) market, where ICT workers are already in high demand, causing further urban/rural inequities in salaries.<sup>71</sup> Furthermore, these job gains are offset by lost jobs through broadband-enabled automation in BMA.

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<sup>69</sup> In 1996 Thailand ranked 51<sup>st</sup> out of 100 nations ranked by the World Bank’s Knowledge Economy Index. By 2008, the ranking slipped ten points to 63 of 100. [http://info.worldbank.org/etools/kam2/KAM\\_page5.asp](http://info.worldbank.org/etools/kam2/KAM_page5.asp)

<sup>70</sup> ICT growth accounts for half of the four factors that shape KEI rankings. KEI averages four factors: 1) economic incentives for learning, 2) education and training levels, 3) innovation and technology adoption and 4) ICT infrastructure. <http://go.worldbank.org/SDDP311T40>

<sup>71</sup> The gap between Thailand’s highest paid and lowest paid workers is now 1:65 that this disparity may grow by 20% under BAU.

In MB, the long-sought goals of transitioning the Thai workforce into the knowledge economy may be within reach. Thai KEI rankings may rise to 51 out of 100 nations by 2015 due largely to the transfer of skills through the combined impact of meaningful “digital convergence,” especially mobile data services which will bring financial management skills to the middle-income population, of those earning from 3,000-15,000 baht per month. Within ICT industries themselves, 245,000 new jobs will be created by 2015, and most of these will be “knowledge jobs.” An additional 750,000-1.5 million jobs will be created through “economic multiplier” impacts as broadband ecosystems trigger consumer spending in the domestic economy.

Formal unemployment, now at 2.4 % will decline by 0.2% to 2.2% modestly due to the “broadband bump” in employment statistics. More significantly, the problem of underemployment, disguised by formal employment statistics, will be lessened. As more upcountry Thai families upgrade to mobile data information and education services, they will find secondary sources of income, just as consumers in advanced nations now generate supplementary income sources through buying and selling on eBay and Craigslist. Broadband convergence – combining television, PC, and hand-held devices – will also transmit aptitudes for interactive learning. Consumer interaction with smart devices could produce smart consumers, enabling a proactive entrepreneurial spirit in the Thai workforce. Hand-held devices, loaded with meaningful “killer apps,” could bring lifelong learning to the masses.



## Analysis

*Broadband-enabled jobs have greater “multiplier impact” than jobs created in other industries.*

The employment multiplier impacts are greater in the ICT industries than in other industries. This factor may be particularly true in low-income countries, since mobile telephony can move entire industries into the hinterlands of a nation, such as bringing financial services into the “unbanked” regions of a country. A number of studies show an impressive job impact from ICTs in developing countries. The most dramatic evidence comes from India where two million jobs were created in the ICT sector between 1998 and 2008, boosting the overall level of ICT in GDP from 1.2% of GDP to 5.5% of GDP. In Brazil, job growth in the ICT industry rose six times from 2001 to 2010, according to The Association of Thai ICT Industry.<sup>72</sup>

Some studies from advanced countries suggest that the “cost” for government to stimulate job growth is less in the ICT sector than in other industries. For example, the Obama administration advocated subsidies for broadband infrastructures using the rationale that new jobs in most infrastructure projects, such as building new roads and bridges, would be \$50,000 per job. However, the cost per job of broadband infrastructures would be only a \$5,000, since government subsidies would lower costs in vertical industries, allowing them to extend their reach into low-income or remote parts of the nation.

The boost to SME jobs by broadband was a political factor that caused politicians to approve broadband infrastructure investments which are part of stimulus plans. For example, a timely report by Robert Atkinson<sup>73</sup> indicated that a US government investment of \$9 billion would create 949,000 jobs, half of which would be in small business.

<sup>72</sup> The Association of Thai ICT Industry, [www.atci.or.th/download/ThairealstrongorifICTdevelopment.doc](http://www.atci.or.th/download/ThairealstrongorifICTdevelopment.doc)

<sup>73</sup> The Digital Road to Recovery: A Stimulus Plan to Create Jobs, Boost Productivity and Revitalize America, Robert D. Atkinson, Daniel Castro, Stephen J. Ezell, Information Technology and Innovation Foundation, January 7, 2009

## 5. MICROFINANCE

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### Summary

*Meaningful Broadband would not just multiply the scale of microfinance services; it could dramatically lower interest rate charged to borrowers and convert to for-profit services where they can be tied to national systems for SME growth.*

Microfinance operations could be revolutionized in Thailand through Meaningful Broadband. The Economist Intelligence Unit's (EIU) 2009 ranking<sup>74</sup> of international best practices in microfinance<sup>75</sup> ranks Thailand near the bottom of nations (i.e., 45th<sup>st</sup> out of 55 nations surveyed) in terms of the scale and quality of its microfinance systems.<sup>76</sup> The overall finding: Thailand's microcredit operations cannot be integrated into the country's conventional financial system without deep penetration of broadband. Under BAU, the Thai microfinance ranking would move upward to 46 places by 2015, based mostly on the effect of using cell phone SMS services to low income borrowers. However under MB, Thailand jumps to 21<sup>st</sup> place in the same rankings, while increasing the scale of microcredit operations by 320% during the 2012-2015 time periods.

A Grameen<sup>77</sup> Foundation survey of international best practices indicated that mobile technologies, when fully integrated into all aspects of the "microcredit ecosystems" in various nations, can enhance performance by 70% over a three-year time frame.

These advantages double to 140% when "mobile finance systems" are upgraded to smart devices use by microcredit

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<sup>74</sup> "Global Finance and the Microfinance Business Environment," The Economist Intelligence Unit, 2009.

[http://www.eiu.com/site\\_info.asp?info\\_name=corporate\\_landing\\_united\\_nations&rf=0](http://www.eiu.com/site_info.asp?info_name=corporate_landing_united_nations&rf=0)

<sup>75</sup> Microfinance refers to the provision of financial services to poor or low-income clients including consumers and the self-employed. The term also refers to the practice of sustainability delivering those services. It should not be confused with Microcredit (loans to poor microenterprises) as microfinance addresses a full range of banking needs for poor people including savings, deposits, loans, payments, fund transfers, and insurance products.

<sup>76</sup> Bank for Agriculture and Agricultural Co-operatives (BAAC)

[http://www.baac.or.th/content-product.php?content\\_group\\_sub=6#](http://www.baac.or.th/content-product.php?content_group_sub=6#)

<sup>77</sup> Visit <http://www.grameenfoundation.org/>

clients, intermediaries, and the finance institutions making the loans themselves.

In Thailand, the Finance Ministry's Bank for Agriculture and Agriculture Cooperatives (BAAC) is the largest microcredit institution in the country, serving 3.5 million microcredit borrowers. In an interview conducted for this report with BAAC executives, these officials forecasted the impact of Meaningful Broadband on the bank's operations. Drawing upon these interviews and the international models provided by the Grameen Foundation, along with data provided by Indonesia's Bank Rakyat Indonesia (BRI),<sup>78</sup> we predict the impacts of integrating broadband into BAAC's finance systems by the year 2015, as follows: Meaningful Broadband would...

- Lower BAAC's microcredit transaction costs by 3% per year
- Reduce its interest rate charged to borrowers by 2% per year
- Increase total numbers of borrowers by 10% per year
- Enhance microcredit business and upgrade to SME status by 7% per year
- Lessen by 4% per year the subsidies that currently support microcredit operations
- Decrease "financial education" offered to borrowers by 4% per year
- Increase performance rate of microcredit loans by 5% per year
- Automate banks providing microcredit loans, thereby reducing costs of internal operation by 4% per year
- Increasing scale and performance of rural "sub-branches" that provide the loans 6% per year
- Lessen costs of interaction between banks and farm cooperatives by 4% per year

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<sup>78</sup> <http://www.grameenfoundation.org>

- Enhance interaction between farm cooperatives and farmers by 7% per year
- Total cost savings to all aspects of BAAC's "microcredit ecosystems" would equal US \$570 million per year

## Analysis

- Microfinance refers to the provision of financial services to poor or low-income clients including consumers and the self-employed. The term also refers to the practice of sustainability delivering those services. It should not be confused with Microcredit (i.e., loans of as little as \$25 each to poor microenterprises) as microfinance addresses a full range of banking needs for poor people including savings, deposits, loans, payments, fund transfers, and insurance products.
- The greatest opportunity for enhancing microcredit as a factor in national financial systems depends on new technologies, and in particular, the ability of banks to use mobile finance systems to lower transaction costs associated with making tiny loans in remote locations.<sup>79</sup>
- Microcredit will continue to gain favor with the Thai Royal Family and be integrated into NGOs associated with the Monarchy, with the active assistance of the Science and Technology Ministry.
- Globally, Thailand will be affected by a global trend in which microcredit operations shift from nonprofit to for-profit and become incorporated into the conventional SME lending operations of many Thai banks.
- Digital Divide Institute proposes a partnership between BAAC and Indonesia's Bank Rakyat Indonesia (BRI), to facilitate best practices as broadband becomes integrated into microfinance operations of both financial institutions.

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<sup>79</sup> <http://www.grameenfoundation.org>

## 6. PRODUCTIVITY

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### Summary

Ranked 50 out of 57 nations in the 2009 World Competitive Report of International Institute for Management Development,<sup>80</sup> Thailand scores near the bottom of the productivity scale of Asian nations. According to the Reports analysts, Thailand low score reflects poor efficiency of the Thai government as well as the country's business sector. Comparative studies use the methodology associated with the Malmquist Index<sup>81</sup> shows that ICTs function as prime-movers of change in productivity rankings.<sup>82</sup> Some studies, showing the ICT impact on Malmquist in developing countries, indicate that, by boosting broadband and "network readiness," development countries can get a "catch-up effect" that can boost their productivity.<sup>83</sup>

A similar investment in ICTs by low income countries will yield a greater productivity boost than an equivalent investment by high-income countries.<sup>84</sup> A number of World Bank reports argue that productivity rankings are driving down GDP rankings and lessening the country's overall competitiveness in relationship to

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<sup>80</sup> International Institute for Management Development (IMD), World Competitiveness Yearbook 2009.

<sup>81</sup> Malmquist Productivity Index, developed in 1982, is the most widely used international indicator of national productivity. See appendix 6 for more information.

The Malmquist Index was introduced in the 1982 paper, "Multilateral Comparisons of Output, Input and Productivity Using Superlative Index Numbers", by Douglas W. Caves, Laurits R. Christensen and W. Erwin Diewert.

<sup>82</sup> Susan Tetschler, Chief ICT and Policy Analysis Group, UNCTAD "Measuring ICT Impact at the Firm Level," 2007

<sup>83</sup> Somesh Malthur, "ICT Sector Across Countries: Productivity Analysis Using DEA and Malmquist Index," 2008 <http://www.apeaweb.org/confer/bei08/papers/mathur.pdf>

<sup>84</sup> Somesh Malthur, "ICT Sector Across Countries: Productivity Analysis Using DEA and Malmquist Index," 2008 <http://www.apeaweb.org/confer/bei08/papers/mathur.pdf>

peer nations.<sup>85</sup> Recognizing this factor, Thailand's ICT Ministry has created an ICT Master Plan (*Smart Thailand*) that aims to boost the country's ICT indicators and, in turn, upgrade the country's rankings on Malmquist and IMD Indexes by 2015. However, the Master Plan's success requires a radical acceleration of broadband penetration. Thus, we forecast that, under BAU, Thailand's productivity rankings will decline further by that year relative to the rankings of peer nations which have coherent broadband policies. However, under MB, Thai productivity would rise steadily in the international productivity rankings, perhaps by as much as 10% relative to peer nations.

## Analysis

1. **Relevance of South Korea:** Drawing upon analysis from South Korea,<sup>86</sup> we envision the following virtuous circle of activities that would add up to boost Thailand's rankings:

### **Public Sector:**

- Integrating the government bureaus
- Enhancing interaction between government and citizens
- Intergovernmental aligning among national, provincial, and local units
- Bridging perspectives between public, private, and academic sectors.

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<sup>85</sup> Thailand Investment Climate Assessment Update, the World Bank, June 08.

<sup>86</sup> The Korean Approach to Innovation Policy with a Focus on HRD and R&D, Gwang-Jo Kim, Knowledge Economy Forum VIII, 2009: [www.unescobkk.org/fileadmin/user.../090500GJ\\_Kim\\_presentation.pdf](http://www.unescobkk.org/fileadmin/user.../090500GJ_Kim_presentation.pdf)

**Private sector:**

- Enhancing the productivity of business ecosystems
- Enabling convergence between ICT and other industries
- Aligning between domestic and international business

The relationship between information technology and productivity is a longstanding subject in advanced nations, and the topic of a genre of respected academic studies using various methodologies. In that last decade this genre has incorporated mobile telephony and broadband as factors in their analysis.

2. **UNCTAD's innovation:** UNCTAD is adapting a methodology developed for ICT's role in productivity increases to developing countries, with Thailand one of their BETA tests. Linking three variables: ICT indicators, labor productivity indicators, with complementary control variables such as Cobbs-Douglas Factors, in term of cost of materials, cost of labor, and capital stock.

UNCTAD sees evolution of graduating productivity impacts from use of telephone, to use of internet, to use of mobile phones, to the full impact of broadband, in which cloud computing and other methods of re-engineering business processes become integrated into formulas for "digital convergence" which become conceivable when a certain level of broadband penetration is reached in a specific country.

For a full review on Measuring Economic Impact of ICT see *Information Economy Report, 2009, UNCTAD*.<sup>87</sup>

UNCTAD literature review shows that a 10% increase in the share of employees using computers results in the following labor productivity increases:

- 1.8% higher labor productivity in manufacturing and 2.8% increase in services in Finland. (Maliranta & Rouvinen, 2003)
- 1.3 % higher labor productivity in the entire business sector in Sweden (Hagén & Zeed, 2005)
- 2.1% higher labor productivity in manufacturing and 1.5% in services in the UK (Farooqui, 2005)

**3. Productivity Data from Advanced Countries:** The following further data points are drawn from this genre of literature in the advanced countries.

- A national carrier grade network that is spread to 90% of the population in Australia constructed from 2009 to 2016 would generate revenues to Australia of \$9.5 billion, based on productivity gains.<sup>88</sup>

Some studies from advanced countries specifically address productivity gains from wireless broadband, including consumer use of smart phones, such as these 2009 conclusions by Ovum Consulting<sup>89</sup>:

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<sup>87</sup> Information Economy Report, 2009, UNCTAD.

<sup>88</sup> "Impacts of a National High-Speed Broadband Network," Joshua Gans, Access Economics, 2009. See <http://cite.org.au/store/catalog/ideaCHECKGansMarch.pdf>

<sup>89</sup> Ovum Report, "The Increasingly Important Impact of Wireless Broadband Technology and Services on the U.S. Economy." Roger Entner, 2008 <http://www.ctia.org/media/press/body.cfm/prid/1755>



- In 2005 mobile broadband wireless services generated productivity gains to the US economy worth \$28 billion per year.
- Productivity value of all mobile wireless services in the U.S. in that year was \$185 billion.
- By 2016, the value of the combined mobile wireless voice and other broadband productivity gains to the U.S. economy will be \$427 billion per year.

4. **Broadband Productivity in Specific Sectors:** Studies of broadband’s impact on productivity in advanced countries have also focused on specific sectors such as health care, education, SMEs, including the following:

- In 2005, productivity as a result of mobile broadband solutions created Health care gains of \$6.9 billion. It is predicted gains will reach \$27 billion in 2017.<sup>90</sup>
- A US government investment of \$30 billion would create 949,000 jobs, half of which would be in small businesses.<sup>91</sup>

5. **Broadband Productivity in Enterprises:** The best productivity studies which focus on impact of broadband on the efficiency of individual private enterprises are as follows:

- Internet business solutions have enabled private companies to cut costs (by \$155 billion in the United States and a collective \$8.3 billion in France, Germany, and the United Kingdom) and increase revenues (by a collective \$79 billion in France, Germany, and the United

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<sup>90</sup> “The Increasingly Important Impact of Wireless Broadband Technology and Services on the U.S. Economy.” Roger Entner, Ovum Report, 2008 <http://www.ctia.org/media/press/body.cfm/prid/1755>

<sup>91</sup> “The Digital Road to Recovery: A Stimulus Plan to Create Jobs, Boost Productivity and Revitalize America.” Robert D. Atkinson, Daniel Castro, Stephen J. Ezell, January 7, 2009

Kingdom)—suggesting that the companies focused their Internet solutions on growth rather than just on cost savings (Varian et al, 2002).

- Forman, Goldfarb, and Greenstein (2005) distinguish between “IT (information technology) using” and “IT enhancing” firms, and find that the changes broadband delivers to firm behavior generally lie on a spectrum—with the highest productivity increases appearing in firms that commit most intensively to integrating broadband, or IT in general, with new business processes.
- Clarke and Wallsten (2006), in a study of 27 developed and 66 developing countries, found that a 1% point increase in the number of Internet users is correlated with a boost in exports of 4.3% points and an increase in exports from low-income to high-income countries of 3.8% points. Although this study was not broadband-specific, it is safe to infer that broadband would have an even bigger positive impact.

## 7. INVESTMENT IMPACTS

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### Summary

Thailand's business environment is near the bottom of Southeast Asian rankings, according to Business Monitor International (BMI)<sup>92</sup>. According to World Bank (Thailand), foreign direct investment (FDI) has been steadily declining since 1998 as a share of GDP, and that this decline has lessened the competitiveness in the Thai economy relative to other Asian countries.<sup>93</sup>

Much of the problem lies with the ICT sector. Goldman Sachs's BRIC Report identified investments in IT and telecommunications as the overall drivers of the sustained economic growth in Asia for the past two decades, including the long growth surge in China.<sup>94</sup> Thailand participated in this trend till 2001, but, in light of continued delays in 3G licensing, investors in the broadband sector have avoided Thailand in favor of more predictable returns on investments promised by Viet Nam, Malaysia, China and Indonesia, where telecommunications investments recently surged.<sup>95</sup>

According to BAU, we forecast that only \$3 billion in new investments will flow to the Thai telecom sector through 2015.<sup>96</sup>

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<sup>92</sup> Refer to "Asia Telecom Business Environment Rankings" in "Thailand Telecommunications Report Q4 2009", Business Monitor International. See appendix 7.

<sup>93</sup> World Bank (Thailand) has a yearly assessment of the economic climate/problems in Thailand. One of them is lack of FDI investments. Please go to [http://siteresources.worldbank.org/THAILANDEXTN/Resources/333295-1249970320257/TH\\_ICA\\_Update08\\_fullreport.pdf](http://siteresources.worldbank.org/THAILANDEXTN/Resources/333295-1249970320257/TH_ICA_Update08_fullreport.pdf)

<sup>94</sup> The famous study of Goldman Sachs predicting the economic surge of Brazil, Russia, India and China (BRIC) emphasized that their growth surge has been and will continue to be driven by ICT investments. <http://www2.goldmansachs.com/ideas/brics/index.html>

<sup>95</sup> Thai Chamber of Commerce and Industry report. See [www.thaichamber.com/](http://www.thaichamber.com/)

<sup>96</sup> This forecast is based on interviews with Booz, Allen consulting firm.

Assuming investors become convinced that a minimum of 54% of households and 74% of individuals (age 13+) will receive broadband in the MB scenario, investments in all parts of broadband ecosystem could rise by a cumulative total of \$9 billion, by 2015.<sup>97</sup> This investment, combined with policy and regulatory reforms, would help Thailand reach parity with China and India, in terms of its business-friendly ICT sector.<sup>98</sup>

## Analysis

In Thailand, as in other nations, the major advocates for encouraging government to investment climate for ICT come from chambers of commerce, including Thai Chamber of Commerce, American Chamber of Commerce (ICT Committee) and Foreign Joint Chambers of Commerce (ICT Committee). These associations have collaborated to produce a number of useful reports that show the link between telecommunications benefit and economic benefit to Thailand. A 2009 Study conducted by Thai Chamber of Commerce and Thailand Board of Trade, using Thai Statistical Office data and interviews with business leaders, concluded that acceleration of spectrum for 3G and Wimax licenses for 3G investments will generate 380 billion baht of new investments.

The World Bank-Thailand's "Thailand Investment Climate Update," June 2008, argues that the decline in FDI in the telecom sector is a risk factor for its competitiveness.<sup>99</sup>

The World Economic Forum also ranks Asian nations regarding their competitiveness in Business Environment Rankings, The Global Competitiveness Report 2009 -2010.<sup>100</sup>

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<sup>97</sup> This forecast relies on the following assumptions.

<sup>98</sup> Refer to chart comparing China, India and Thailand. See appendix 7.

<sup>99</sup> [http://siteresources.worldbank.org/THAILANDEXTN/Resources/333295-1249970320257/TH\\_ICA\\_Update08\\_fullreport.pdf](http://siteresources.worldbank.org/THAILANDEXTN/Resources/333295-1249970320257/TH_ICA_Update08_fullreport.pdf)

## 8. RESEARCH & DEVELOPMENT IMPACT

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### Summary

As measured in international rankings, Thailand has a low level of research and development spending by private and public sectors, representing only 0.26% of GDP.<sup>101</sup> This level has been declining since 2006.<sup>102</sup> Asian peer countries, such as Viet Nam and Malaysia, with strong broadband policies, broadband have risen in R&D rankings.

*Meaningful broadband would stimulate an overall rise in Thai R&D levels to as much as 1.5% of GDP by 2015, more than fulfilling the targets of the Ministry of Science and Technology.*

Under BAU, Thailand would continue to fall below peer nations as an innovator. Under MB however, this circumstance would be dramatically reversed. Meaningful broadband would stimulate an overall rise in Thai R&D levels to as much as 1.5% of GDP by 2015, more than fulfilling the targets created by the Ministry of Science and Technology.<sup>103</sup> Looking further ahead to 2020, Thailand could match the impressive 10.6% of GDP currently devoted to R&D in the Republic of Korea.<sup>104</sup> At that point, broadband would serve as the centerpiece of a Thai “innovation economy,” just as it now does in South Korea.<sup>105</sup>

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<sup>100</sup> <http://www.weforum.org/en/initiatives/gcp/Global%20Competitiveness%20Report/index.htm>

<sup>101</sup> This figure is from the Ministry of Science and Technology, as reported in The Nation.

<http://www.nationmultimedia.com/worldhotnews/30063697/Skills-development-a-major-TRIDI-focus>

<sup>102</sup> Thai R&D expenditure 2007 = 18,225 mil baht (0.21 % of GDP) and more recent figures put the level in the 0.2 to .3% of GDP range. (2009 National survey on R&D expenditure and personnel of Thailand.) <https://sites.google.com/site/site2552/>

<sup>103</sup> The Ministry of Science & Technology’s National Science and Technology Development Agency (NSTDA) President Dr Sakarindr Bhumiratana announced in 2009 that he hopes to see Thailand’s research and development budget rise to 1% of gross domestic product in 2011 and 1.5% of GDP by 2015, according to an NSTDA internal news report. <http://www.thaiscience.info/News/ThaiScienceNews/64000873.htm>

<sup>104</sup> See appendix 8 for data supporting South Korea’s R&D and the role of broadband in its innovation economy.

<sup>105</sup> See appendix 8 for a PowerPoint slide of a 2009 presentation depicting the dynamics of the current South Korean “innovation economy.” The South Korean interpretation of an ICT-driven “innovation economy” is now widely accepted as the best-practice benchmark in Asian nations.

Thailand would emphasize its role as an inventor of broadband-enabled “killer apps” that serve the “middle of the pyramid” (“next two billion” smart phone users in world markets). This niche would qualify Thai universities, government agencies, and corporations to enter into research partnerships with leading academic and corporate ICT labs on a worldwide basis. Investors would support “deep localization” of the standard menu of Thai broadband apps, so that these become adapted to the distinct needs of majority populations of ASEAN and users in mid-level developing countries.

## **Analysis**

### **The big picture**

Global R&D in the ICT sector, once concentrated in advanced markets, has diversified to Asia, and their global research agenda’s are increasingly focused on serving lower tiers of enterprise and consumer markets. In the past decade, the world’s most significant corporate labs have created satellite labs in India and China. Originally designed to conduct low-end outsourcing servicing Western markets, these Asia-based labs now play a starring role in mapping future strategies for the U.S. and the EU-based companies. These Asian labs now create end-to-end solutions for Asian enterprises. As mobile consumer markets expand, the labs also focus their attention on mobile data applications designed to serve low-income customers.

Governments in Asia are joining this trend and establishing R&D partnerships with multinational corporations. Though Singapore government has several new R&D initiatives, most of the multinationals have not established satellite labs in Southeast Asia and it is still unclear how their labs in China and India can be adapted to serve ASEAN markets as well. Thus an opportunity

exists for Thai institutions to help the China - and India-based labs extend their reach into Southeast Asia.

Thailand has two main structures for technology research: The science and technology ministry's National Electronics and Computer Technology Center (NECTEC) and Telecommunications Research and Industrial Development Institute (TRIDI). TRIDI is not a research institution per se, but boosts telecommunications research capacity in eight research universities in Thailand. TRIDI's structure has identified four themes.

- Wire-line and wireless broadband access technology
- Short-range communication technology
- Optical communication technology such as fiber-to-home
- Next-generation network technology

Each of these themes is relevant to meaningful broadband. Under MB, Thai universities in the TRIDI network, as well as research units of NECTEC, would establish research partnerships with Chinese, Indian, Singaporean and Western-based laboratories to conduct research and develop applications for the “next two billion” consumers. In so doing, TRIDI wants to help these universities serve as trigger for innovation that will help Thai industry. “In all parts of the telecom value chain—network equipment, network operation, network middleware, applications, content, terminal equipment and service providers, there are many business opportunities for Thai telecommunications companies,” Supot Tiarawut said. Initially, the institute has rolled out a plan to develop a researcher database and a telecom manufacturing database, to encourage the establishment of a centre of excellence in telecoms and related technologies, and to promote local applications. The institute works with Chulalongkorn University, Kasetsart

University, Chiang Mai University, Khon Kaen University, Prince of Songkla University, King Mongkut's Institute of Technology Lat Krabang, King Mongkut's University of Technology Thon Buri, and Sirindhorn International Institute of Technology.<sup>106</sup>

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<sup>106</sup> "Skills development a major TRIDI focus", The Nation, January 29, 2008  
<http://www.nationmultimedia.com/worldhotnews/30063697/Skills-development-a-major-TRIDI-focus>



## 9. ECONOMIC STIMULUS IMPACTS

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### Summary

Unlike other peer Asian nations, the Kingdom of Thailand ignored broadband as a factor in the country's economic stimulus plans announced in 2009 and 2010. Nonetheless, our assessment is that, it is not too late for the Prime Minister and Cabinet to incorporate meaningful broadband into their Fiscal Year 2012 budget requests, so that the previously announced goals of economic stimulus could be achieved with the help of vigorous broadband deployment.

Though it aimed to boost GDP by 1.5% per year,<sup>107</sup> the 1.43 trillion baht Economic Stimulus II plan, "Strong Thailand" will provide a mere 0.7% boost to Thai GDP per year without a forceful intervention by the Kingdom of Thailand to reinforce the impact of the spending plan. Under the MB scenario, the plan's 6,000 development projects, to be funded by the Ministry of Finance through 2012 would tap mobile data services and media convergence to trigger economic multiplier impacts, creating a 2.4% boost to GDP growth by 2015.<sup>108</sup> More importantly, Stimulus II could also achieve the underlying *qualitative* changes to the Thai economy, supporting the social and economic goals of NESDB<sup>109</sup> which are imbedded into Stimulus II. The combined Stimulus/broadband impact would be particularly evident

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<sup>107</sup> Fiscal Stimulus Package, Ministry of Finance, Kingdom of Thailand

<sup>108</sup> Under the MB scenario for Thailand, economic impacts would follow the pattern demonstrated for South Korea in the 2002-2006 period, producing a GDP bump for the nation that we estimate as follows: + 0.3% GDP in 2011, +0.6% GDP in 2012, +1.4% GDP in 2013, 2% GDP in 2014 and +2.4% GDP in 2015.

[http://siteresources.worldbank.org/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/282822-1208273252769/Building\\_broadband.pdf](http://siteresources.worldbank.org/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/282822-1208273252769/Building_broadband.pdf)

<sup>109</sup> Summary the tenth national economic and social development plan (2007 - 2011)

<http://www.nesdb.go.th/Default.aspx?tabid=139>

regarding the 128 billion baht effort to boost “creative industries,” which hopes to establish Thailand’s niche as the creative force in the formulation of Next Generation Networks<sup>110</sup> in Asia. This goal is inconceivable if Thailand remains a broadband laggard in Asia. The plan of The Software Industry Promotion Agency<sup>111</sup> (SIPA) to increase “creative industries’ ” role in the national economy from 12%<sup>112</sup> of GDP to a 20% portion of GDP<sup>113</sup> by 2015 may depend upon alignment of Meaningful Broadband with the goals of Stimulus II.<sup>114</sup> As regards the Thai software industry itself, the MB scenario could establish its niche as providing “killer apps” data services for smart phone users of the world’s low income population. We predict the following shifts in the Thai software industry, enabled in part by Meaningful Broadband:

- 10% annual expansion of international joint ventures between Thai and multinational software companies,
- Increase of total revenue in Thai software industry from 63 billion in 2009 to 107 billion baht in 2015,
- Increase in FDI in the Thai software industry by 7% per year.

## Analysis

Thailand will fit into the global trend in which the *stimulus* will continue to evolve beyond short-term finance stimulus to a broader concept in which finance ministers look beyond their normal budgetary process to stimulate qualitative changes in their macroeconomics.

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<sup>110</sup> “Next Generation Networks” [http://en.wikipedia.org/wiki/Next\\_generation\\_networking](http://en.wikipedia.org/wiki/Next_generation_networking)

<sup>111</sup> Software Industry Promotion Agency (Public Organization) [www.sipa.or.th/](http://www.sipa.or.th/)

<sup>112</sup> Ministry of Commerce [www.moc.go.th/](http://www.moc.go.th/)

<sup>113</sup> Software Industry Promotion Agency (Public Organization) [www.sipa.or.th/](http://www.sipa.or.th/)

<sup>114</sup> The role of broadband in fulfilling the goals of creative economy is now well established by the United Nations Conference and Trade and Development, which promotes and tracks the creative economy concept on an international basis. See [www.unctad.org/en/docs/ditc20082cer\\_en.pdf](http://www.unctad.org/en/docs/ditc20082cer_en.pdf)

- With broadband infrastructure rollouts planned international over the next few years, it is likely to be 3-5 years before any significant economic benefits can be accurately quantified.
- No mature model exists for defining the best practice approach – for example, public sector, private sector, or joint investment. Telecommunications regulators in Asia currently lack a framework for determining how costs and risks can and should be shared between public and private sectors.
- Broadband infrastructure investment is a major expense that few private sector organizations can afford to do alone, unless regulatory policies protect their investment through closed-access and pricing guarantees. So far, the Kingdom of Thailand Finance Ministry or its national planning agency, NESDB, has not yet determined the role of Stimulus to stimulate and activate the private sector to establish broadband ecosystems that serve the nation’s needs.
- Broadband stimulus plans should not be seen as a one-off investment program; in situations where the infrastructure is publicly owned there will be on-going operational costs as well as capital expenditure to upgrade and replace equipment.
- Investing public money should be assessed particularly carefully in scenarios where there is existing/parallel private sector investment, as there is a high risk that the private sector will target areas of high profitability, leaving the public sector to provide access to unserved/underserved regions; this is a significant factor in the business case affecting the returns on investment.

- Finally, the question of whether a “build it and they will come” approach will be successful is also unclear – many citizens do not see the relevance of broadband or the internet to their lives. As part of any stimulus plan it is therefore important to consider appropriate media publicity to educate people on the benefits, such as e-Government, e-Health and e-Learning, which needs to be backed-up by development in local content and applications and also training and support for end users.

# CONCLUSIONS

*Using the quantitative forecasting approaches contained in this report, it was not difficult to argue that broadband could bring a “FBC” (faster, better, cheaper) factor to the government's economic formulas.*

The rationale for Meaningful Broadband presented in this report may seem comprehensive. It is not.

This report did not focus on non-economic benefits of broadband. We did not present studies that suggest that broadband (if meaningfully deployed) may be the best hope for reducing the world's carbon footprint, for lessening the threat of terrorism, for stopping the spread of viruses before they turn into pandemics, for preserving the world's richest and most spiritually profound cultural traditions...and, last but not least, for lessening traffic jams in urban cities! Each of those arguments is counter-intuitive and requires careful explication and data-back up. These claims should be carefully analyzed in future academic studies. But not here.

In their wisdom, members of the Meaningful Broadband Working Group, instructed the Chulalongkorn Secretariat to focus on one matter alone: the economy. Aware that Prime Minister Abhisit's Cabinet, the Parliament and the National Economic and Social Development Board have established ambitious economic reform objectives, MWBG members knew that they could not bring political traction for broadband unless show how broadband could fit into the government's own aims.

Using the quantitative forecasting approaches contained in this report, it was not difficult to argue that broadband could bring a “FBC” (faster, better, cheaper) factor to the government's economic formulas. In the pages of this report, we suggest how economic reforms might be achieved more successfully with the help of broadband – and we cast serious doubt about whether

the government plans for such concepts as "creative economy" could have great impact, unless they were back up by broadband deployment. We forecast that the stated goals of this initiative, which is to boost GDP by 1.5% per year by 2013 would be only half met (at 0.8% of GDP) if Thailand continues its slow and sluggish march into broadband. However, the GDP spike could double by that same year (to almost 3% of GDP per year) if meaningful broadband deployments would proceed.

The next step, now, is to move towards present the Roadmap, what we called Meaningful Broadband Report-Thailand (MBR-T), 3.0. Now that we know that Meaningful Broadband is a necessary condition for Thailand's economic transformation, the Secretariat must consider specific actions might be taken if broadband is to be *usable, affordable and empowering* to its mass population. Once we get the attention of economic policymakers, we may force them to make difficult choices about Thailand's broadband future – even if it means they must disrupt entrenched interests in so doing. It is time to present in bold details the changes that are needed for Thailand's telecommunications policies and practices. And we must quickly follow that prescription for implementing a financial model that would allow costs and risks to be shared between public and private sectors

# APPENDICES

## Appendix 1

Data and charts which support predictions for how broadband penetration will change under the Business-as-Usual (BAU) scenario, as well as Meaningful-Broadband (MB) scenario, can be found below:

### Regional Broadband Penetration Overview

Table: Regional Broadband Penetration Overview		
Country	Broadband Penetration 2008e (%)	Regional Rank 2008 (2007)
Australia	35.7	1 (2)
South Korea	32.5	2 (1)
Singapore	31.5	3 (4)
Taiwan	30.8	4 (5)
Hong Kong	29.7	5 (3)
Japan	24.9	6 (6)
Malaysia	7.8	7 (7)
China	7.0	8 (8)
Vietnam	2.9	9 (9)
Philippines	1.7	10 (15)
<b>Thailand</b>	<b>1.6</b>	<b>11 (10)</b>
Sri Lanka	0.9	12 (=13)
Bangladesh	0.7	13 (11)
Indonesia	0.6	14 (12)
India	0.5	15 (=13)
Pakistan	0.4	16 (16)

*e = estimate. Source: BMI forecasts*

Source: Business Monitor International, Thailand Telecommunications Report Q4, 2009, page 88.

## Consumer Broadband Connection Growth by Market, 2007-2012

Table 1. Consumer Broadband Connection Growth by Market, 2007-2012

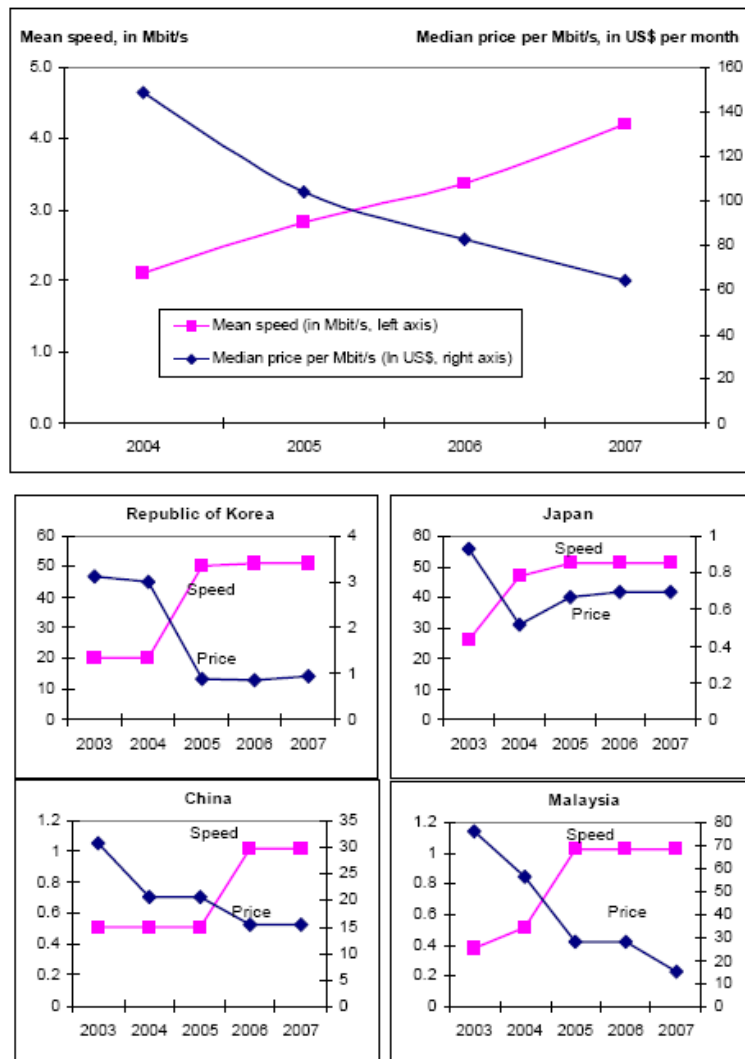
Rank	Market	Connections, 2007 (M)	Connections, 2012 (M)	Increase (%)
1	China	65.9	111.4	45.5
2	United States	64.1	96.5	32.4
3	Japan	27.1	39.0	11.8
4	India	2.7	12.1	9.4
5	Germany	19.2	27.0	7.8
6	United Kingdom	14.8	19.7	4.9
7	France	14.8	19.1	4.2
8	Italy	9.9	13.7	3.8
9	Canada	8.5	10.9	2.4
10	Spain	7.7	10.0	2.3
11	Poland	2.9	5.0	2.2
12	Australia	4.2	6.2	2.1
13	South Korea	14.3	15.9	1.6
14	Taiwan	4.3	5.8	1.5
15	Malaysia	1.0	2.4	1.3
16	Thailand	1.0	2.3	1.3
17	Philippines	0.7	1.8	1.1
18	Czech Republic	1.1	2.0	0.9
19	Netherlands	5.3	6.0	0.7
20	Hungary	1.1	1.8	0.7
21	Sweden	2.6	3.2	0.6
22	Belgium	2.4	3.0	0.5
23	Austria	1.5	2.1	0.5
24	New Zealand	0.6	1.0	0.4
25	Singapore	0.8	1.1	0.3
Rank	Market	Connections, 2007 (M)	Connections, 2012 (M)	Increase (%)
	Middle East and Africa	7.9	16.8	8.9
	Rest of Western Europe	8.2	10.6	2.4
	Rest of Emerging Asia/Pacific	0.7	0.8	0.1
	<b>Worldwide</b>	<b>322.6</b>	<b>498.8</b>	<b>176.2</b>

Source: Gartner (July 2008)



## Trends in Broadband Speeds and Pricing, Globally 2004-2007, and in Selected Asian Economies, 2003-2007<sup>115</sup>

Figure 8: Trends in broadband speeds and pricing, globally 2004-2007, and in selected Asian economies, 2003-07



Source: Biggs and Kelly (forthcoming, 2009).<sup>11</sup>

<sup>115</sup> Source: Briggs and Kelly Report [www.infodev.org/en/Document.565.pdf](http://www.infodev.org/en/Document.565.pdf) (page 13.)

## Appendix 2

Data sources and charts that were used to support the predictions and conclusions made in this section can be found below:

### Balance Sheet of GDP and Expenditure at Current Market Price

	2008p	2009p1	2008p				2009p1			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Private Consumption Expenditure	4,997,728	4,973,037	1,219,273	1,274,120	1,250,636	1,253,699	1,200,256	1,243,761	1,233,639	1,295,381
General Government Consumption Expenditure	1,128,229	1,202,702	263,141	271,700	318,737	274,651	281,186	290,563	336,276	294,677
Gross Fixed Capital Formation	2,488,944	2,208,398	619,937	630,840	641,310	596,857	516,442	542,148	574,664	575,144
Change in Inventories	131,412	-230,877	35,188	-11,486	41,632	66,078	-154,143	-32,083	-93,198	48,547
Net Exports of Goods and Services	248,609	955,492	127,385	88,059	38,585	-5,420	366,371	158,783	231,465	198,873
- Goods	1,597	672,658	22,836	36,959	-9,123	-49,075	275,434	134,684	173,500	89,040
- Services	247,012	282,834	104,549	51,100	47,708	43,655	90,937	24,099	57,965	109,833
Exports of Goods and Services	6,941,526	6,194,281	1,662,721	1,739,789	1,934,054	1,604,962	1,457,372	1,389,127	1,621,077	1,726,705
- Goods	5,831,086	5,162,577	1,348,501	1,485,037	1,669,292	1,328,256	1,178,921	1,177,249	1,380,565	1,425,842
- Services	1,110,440	1,031,704	314,220	254,752	264,762	276,706	278,451	211,878	240,512	300,863
Imports of Goods and Services	6,692,917	5,238,789	1,535,336	1,651,730	1,895,469	1,610,382	1,091,001	1,230,344	1,389,612	1,527,832
- Goods	5,829,489	4,489,919	1,325,665	1,448,078	1,678,415	1,377,331	903,487	1,042,565	1,207,065	1,336,802
- Services	863,428	748,870	209,671	203,652	217,054	233,051	187,514	187,779	182,547	191,030
<b>Expenditure on Gross Domestic Product</b>	<b>8,994,922</b>	<b>9,108,752</b>	<b>2,264,924</b>	<b>2,253,233</b>	<b>2,290,900</b>	<b>2,185,865</b>	<b>2,210,112</b>	<b>2,203,172</b>	<b>2,282,846</b>	<b>2,412,622</b>
Statistical Discrepancy	80,571	-61,121	17,998	24,915	7,280	30,378	-18,948	704	-46,887	4,010
<b>Gross Domestic Product, (GDP)</b>	<b>9,075,493</b>	<b>9,047,631</b>	<b>2,282,922</b>	<b>2,278,148</b>	<b>2,298,180</b>	<b>2,216,243</b>	<b>2,191,164</b>	<b>2,203,876</b>	<b>2,235,959</b>	<b>2,416,632</b>

	2008p				2009p1			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
<b>Gross Domestic Expenditure</b>								
Private Consumption Expenditure	4.7	2.0	1.8	-1.2	-4.4	1.8	2.7	3.5
<i>Exclude Oversea Visitors</i>	5.1	2.1	1.9	-1.2	-4.5	2.4	2.4	3.5
Government Consumption Expenditure	3.5	1.1	3.2	5.0	-2.6	1.4	1.9	6.8
Gross Fixed Capital Formation	6.8	-0.1	0.7	-3.1	-13.6	2.1	3.7	4.6
Exports of Goods and Services	1.0	5.3	2.4	-15.4	-3.9	-4.0	7.5	8.3
Imports of Goods and Services	11.2	0.7	12.1	-14.6	-25.9	5.2	10.0	10.4
<b>Gross Domestic Product</b>								
Agriculture	5.0	9.7	-3.3	-5.6	3.8	5.3	-14.2	10.6
Manufacturing	0.3	1.6	2.0	-12.0	-3.4	6.5	5.3	6.0
Construction	0.9	0.8	-2.0	-6.4	-5.5	6.8	-0.5	1.2
Services	1.5	1.7	0.9	-3.3	1.1	0.5	2.3	3.2
<b>GDP</b>	<b>1.4</b>	<b>2.5</b>	<b>0.7</b>	<b>-6.7</b>	<b>-0.3</b>	<b>3.2</b>	<b>1.2</b>	<b>4.9</b>

Source: NESDB, Gross Domestic Product: Q4/2009

## Growth Rate of GDP

8-Oct-09

(% per year)

	2006	2007	2008	2009 ADO 2009	2009 Update	2010 ADO 2009	2010 Update
Central Asia	13.3	12.0	5.7	3.9	0.5	4.8	3.6
Armenia	13.2	13.8	6.8	0.5	-9.9	3.0	0.9
Azerbaijan	34.5	25.4	10.8	8.0	3.0	6.7	4.5
Georgia	9.4	12.3	2.1	2.5	-4.0	6.0	2.5
Kazakhstan	10.7	8.9	3.3	2.0	-1.0	3.3	2.5
Kyrgyz Republic	3.1	8.5	7.6	4.0	1.0	6.0	2.0
Tajikistan	7.0	7.8	7.9	3.0	0.5	4.0	2.0
Turkmenistan	11.4	11.6	9.8	10.0	8.0	10.0	10.0
Uzbekistan	7.2	9.5	9.0	7.0	7.0	6.5	6.5
East Asia	9.4	10.5	6.5	3.6	4.4	6.5	7.1
China, People's Rep. of	11.6	13.0	9.0	7.0	8.2	8.0	8.9
Hong Kong, China	7.0	6.4	2.4	-2.0	-4.0	3.0	3.0
Korea, Rep. of	5.2	5.1	2.2	-3.0	-2.0	4.0	4.0
Mongolia	8.6	10.2	8.9	3.0	2.8	4.5	4.3
Taipei,China	4.8	5.7	0.1	-4.0	-4.9	2.4	2.4
South Asia	9.0	8.6	6.3	4.8	5.6	6.1	6.4
Afghanistan	8.2	12.1	3.4	9.0	15.7	7.5	8.5
Bangladesh	6.6	6.4	6.2	5.6	5.9	5.2	5.2
Bhutan	6.4	14.1	11.5	5.5	6.0	6.5	6.5
India	9.7	9.0	6.7	5.0	6.0	6.5	7.0
Maldives	18.0	7.2	5.8	1.0	-3.5	1.5	3.5
Nepal	4.1	2.7	5.3	3.0	3.8	3.5	4.0
Pakistan	5.8	6.8	4.1	2.8	2.0	4.0	3.0
Sri Lanka	7.7	6.8	6.0	4.5	4.0	6.0	6.0
Southeast Asia	6.1	6.4	4.1	0.7	0.1	4.2	4.3
Brunei Darussalam	4.4	0.6	-1.9	-0.4	-1.2	2.3	2.3
Cambodia	10.8	10.2	6.7	2.5	-1.5	4.0	3.5
Indonesia	5.5	6.3	6.1	3.6	4.3	5.0	5.4
Lao People's Dem. Rep.	8.7	7.8	7.2	5.5	5.5	5.7	5.7
Malaysia	5.8	6.2	4.6	-0.2	-3.1	4.4	4.2
Myanmar	13.1	11.9	-	-	-	-	-
Philippines	5.3	7.1	3.8	2.5	1.6	3.5	3.3
Singapore	8.4	7.8	1.1	-5.0	-5.0	3.5	3.5

Thailand	5.2	4.9	2.2	-2.0	-3.2	3.0	3.0
Viet Nam	8.2	8.5	6.2	4.5	4.7	6.5	6.5
The Pacific	2.4	3.0	5.2	3.0	2.8	2.7	3.1
Cook Islands	0.7	1.3	-1.2	1.0	-0.1	0.8	0.8
Fiji Islands	3.4	-6.6	1.2	-0.5	-1.0	0.2	0.5
Kiribati	3.2	-0.5	3.4	1.0	1.0	0.9	0.9
Marshall Islands, Rep. of	2.4	3.3	-2.0	0.5	0.5	0.8	0.8
Micronesia, Fed. States of	-0.4	-0.1	-2.9	-0.1	0.5	0.8	0.5
Nauru	6.3	-27.3	1.0	1.5	1.0	1.5	0.0
Palau, Rep. of	4.8	2.1	-1.0	-2.0	-3.0	-0.2	-1.0
Papua New Guinea	2.6	6.5	7.2	4.0	4.5	3.5	3.9
Samoa	6.2	6.4	-3.4	-1.0	-0.8	-0.1	-0.6
Solomon Islands	6.1	10.3	6.4	2.2	0.0	1.7	2.6
Timor-Leste, Dem. Rep. of	-5.8	8.0	13.0	10.0	8.0	8.0	9.0
Tonga	3.7	0.5	0.8	-2.0	-0.5	-0.6	0.5
Tuvalu	1.0	2.0	1.5	1.0	1.0	0.9	1.0
Vanuatu	7.4	6.8	6.3	3.5	4.0	0.8	3.5
Average	8.9	9.5	6.1	3.4	3.9	6.0	6.4

Source: Asian Development Bank

## Definition of Purchasing Power<sup>116</sup>

The purchasing power in today's money of an amount  $C$  of money,  $t$  years into the future, can be computed with the formula for the present value:

$$C_t = C(1 + i)^{-t} = \frac{C}{(1 + i)^t}$$

where in this case  $i$  is an assumed future annual inflation rate.

## Definition of Gross Domestic Product (GDP)<sup>117</sup>

The gross domestic product (GDP) or gross domestic income (GDI) is a basic measure of a country's overall economic output. It is the market value of all final goods and services made within the borders of a country in a year. It is often positively correlated with the standard of living, though its use as a stand-in for measuring the standard of living has come under increasing criticism and many countries are actively exploring alternative measures to GDP for that purpose. GDP can be determined in three ways, all of which should in principle give the same result. They are the product (or output) approach, the income approach, and the expenditure approach. The most direct of the three is the product approach, which sums the outputs of every class of enterprise to arrive at the total. The expenditure approach works on the principle that all of the product must be bought by somebody, therefore the value of the total product must be equal to people's total expenditures in buying things. The income approach works on the principle that the incomes of the productive factors ("producers," colloquially) must be equal to the value of their product, and determines GDP by finding the sum of all producers' incomes.

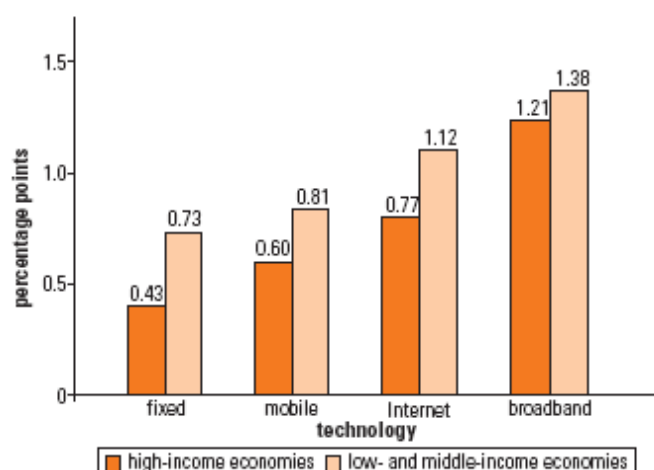
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<sup>116</sup> Source: [http://en.wikipedia.org/wiki/Purchasing\\_power](http://en.wikipedia.org/wiki/Purchasing_power)

<sup>117</sup> Source: [http://en.wikipedia.org/wiki/Gross\\_domestic\\_product](http://en.wikipedia.org/wiki/Gross_domestic_product)

**The World Bank, “Information and Communications for Development 2009: Extending Reach and Increasing Impact,” Chapter 3 Economic Impacts of Broadband**  
**Christine Zhen-Wei Qiang and Carlo M. Rossotto with Kaoru Kimura**

To show convincingly how cell phone penetration, narrowband internet and broadband can disproportionately boost low income countries, the breakthrough came in 2009 in the World Bank’s Information and Communications for Development 2009: Extending Reach and Increasing Impact, in a study led by Qiang, et al. The report uses econometric analysis to show that in all three of these categories, low-to-middle income countries such as Thailand can get a greater GDP boost than highly developed countries. The study’s results are presented in the following diagram<sup>118</sup>:



**Source:** Qiang 2009.

**Note:** The y axis represents the percentage-point increase in economic growth per 10-percentage-point increase in telecommunications penetration. All results are statistically significant at the 1 percent level except for that of broadband in developing countries, which is at the 10 percent level.

<sup>118</sup>Source:

<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/EXTI C4D/0,,contentMDK:22229759~menuPK:5870649~pagePK:64168445~piPK:64168309~theSitePK:5870636,00.html>

Quiang's study drew from an oft-quoted 1991 "endogenous growth model" of Barro,<sup>119</sup> to test the impact of broadband penetration on the average growth rate of per capita GDP between 1980 and 2006. Such a macro-level econometric analysis makes it possible to control for other factors that may have similar impacts on growth, and thus explores the effects of broadband access specifically.<sup>120</sup> In addition, a cross-country analysis sheds light on developing countries where empirical evidence is lacking. The average growth rate of per capita GHDEP between 1980 and 2006 was used as the dependent variable and regressed into a number of other variables in the growth literature, e.g. primary school enrollment, average rate of investment and other factors that might explain increases in GDP growth.

Data from all ICT-specific variables are from ITU (2007) and World Bank (2008). The sample consisted of 120 countries, the majority of which are developing countries. The chart above, summarizing the results of this study, is consistent with the literature on endogenous growth: the average growth rate of per capita GDP was negatively correlated with initial GDP per capita and positively correlated with average share of investment. "The results show a robust and noticeable growth dividend from broadband access in all developed countries, all else equal, a high-income economy with an average of ten broadband subscribers per 100 persons would have enjoyed a 1.21 percent point increase in per capital GDP growth. The potential growth increase is substantial given that the average growth rate of developed countries was just 1.21 percent between 1980 and 2006.

This section uses an endogenous growth model (Barro, 1991) to test the impact of broadband penetration on the average growth rate of per capita GDP between 1980 and 2006. Such a macro-level econometric analysis makes it possible to control for other factors that may have similar impacts on growth, and thus explores the effects of broadband access specifically. In addition, a cross-country analysis sheds light on developing countries where empirical evidence is lacking. Annex 3A provides more details on the definition of variables, methodology, results, and limitations of the analysis. The average growth rate of per capita GDP between 1980 and 2006 was used as the dependent variable and regressed onto the following variables, selected as representative of conditioning variables in the growth literature:

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<sup>119</sup> Refer to Barro reference in appendix as page no here.

<sup>120</sup> Quiang, p. 43, World Bank report.

- Per capita GDP in 1980 (GDP80)<sup>5</sup>
- Average ratio of investment to GDP between 1980 and 2006 (I/Y8006)
- Primary school enrollment rate in 1980 (PRIM80) (a proxy for human capital stock)<sup>6</sup>
- Average penetration of broadband and other telecommunications services between 1980 and 2006 for developed (BBNDH) and developing (BBNDL) countries (a proxy for technological progress and the focus of this analysis)
- Dummy variables for countries in the Sub-Saharan Africa (SSA) and Latin America and Caribbean (LAC) Regions.

Data for all the ICT-specific variables are from the ITU (2007) and World Bank (2008b). The sample consisted of 120 countries, the majority of which are developing countries.

Table summarizes the results from the growth regression, which are consistent with the literature on endogenous growth: the average growth rate of per capita GDP between 1980 and 2006 was negatively correlated with initial GDP per capita (GDP80) and positively correlated with the average share of investment in GDP (I/Y8006). Consistent with the convergence implication of the neoclassical growth model, the coefficients on these variables were significant.

The coefficient on average broadband penetration for high-income countries (BBNDH) was positive and significant. This result suggests a robust and noticeable growth dividend from broadband access in developed countries: all else equal, a high-income economy with an average of 10 broadband subscribers per 100 people would have enjoyed a 1.21 percentage point increase in per capita GDP growth. This potential growth increase is substantial given that the average growth rate of developed economies was just 2.1 percent between 1980 and 2006.



## Broadband-Enhanced Trade Facilities in Ghana and Singapore

**Ghana.** In 2003, Ghana introduced the GCNet customs system as an ICT-based solution to foster trade development and facilitation and ensure effective mobilization of customs revenues. The electronic data interchange system links all the main players in the clearing process, enabling quick online processing of customs clearance documentation and facilitating clearance of goods through ports. Among other features, the system allows around-the-clock submission of customs documents, provides a one-stop platform for processing and verifying trade documents, and enables systematic monitoring of consignment movements. Within its first 18 months, GCNet increased customs revenues by 49 percent and substantially reduced clearance times.

The system's backbone is a private broadband communication network that consists of a fiber-optic broadband link between the GCNet office and the Customs, Excise, and Preventive Services Department, and is complemented by radio links and leased lines to the department's offices throughout Ghana. By increasing the speed, reliability, and transparency of the clearing process and revenue accrual, broadband contributes directly to the country's competitiveness and economy.

**Singapore.** SingaporeONE was launched in 1998 to connect citizens, firms, and the government in a single broadband network. A public-private consortium, I-Net Singapore, was formed to run SingaporeONE's backbone. Infocomm@SeaPort is one of the programs that uses SingaporeONE's broadband capacities. It was launched in 2007 to enhance the capabilities and efficiencies of Singapore's ports and improve the port community's infrastructure. One of its first projects is WISEPORT, a mobile wireless broadband network providing low-cost, high-bandwidth, secure access within 15 kilometers of Singapore's southern coastline. By the end of 2008, all ships in Singapore will have access to mobile wireless broadband, allowing real-time and data-intensive communications between the ships and their customers and business partners. The parties involved will be able to perform multiple tasks remotely, including regulatory filings and real-time access to navigational data. This network is aimed at maintaining Singapore's competitiveness relative to other growing ports in the region.

Sources: de Wulf and Sokol 2004; Ghana Shippers' Council 2008; Kang and others 2008.

## Growth Regression Separating Effects of Broadband Penetration

Variable	Coefficient	t-Statistic
GDP <sub>90</sub>	-0.100	3.86
IY <sub>90-05</sub>	0.164	5.46
PRIM <sub>90</sub>	0.001	-0.19
BBNDH	0.121	2.87
BBNDL	0.138	-1.96
SSA dummy	-1.018	2.19
LAC dummy	-0.655	-1.55
Constant	-1.726	-1.83

Source: Authors' analysis.

Note: BBNDH = average broadband penetration for high-income countries between 1980 and 2006; BBNDL = average broadband penetration for middle- and low-income countries between 1980 and 2006; GDP<sub>90</sub> = per capita gross domestic product (GDP) in 1980; IY<sub>90-05</sub> = average ratio of investment to GDP between 1990 and 2006; LAC = Latin America and the Caribbean Region; PRIM<sub>90</sub> = primary school enrollment rate in 1980; SSA = Sub-Saharan Africa Region.

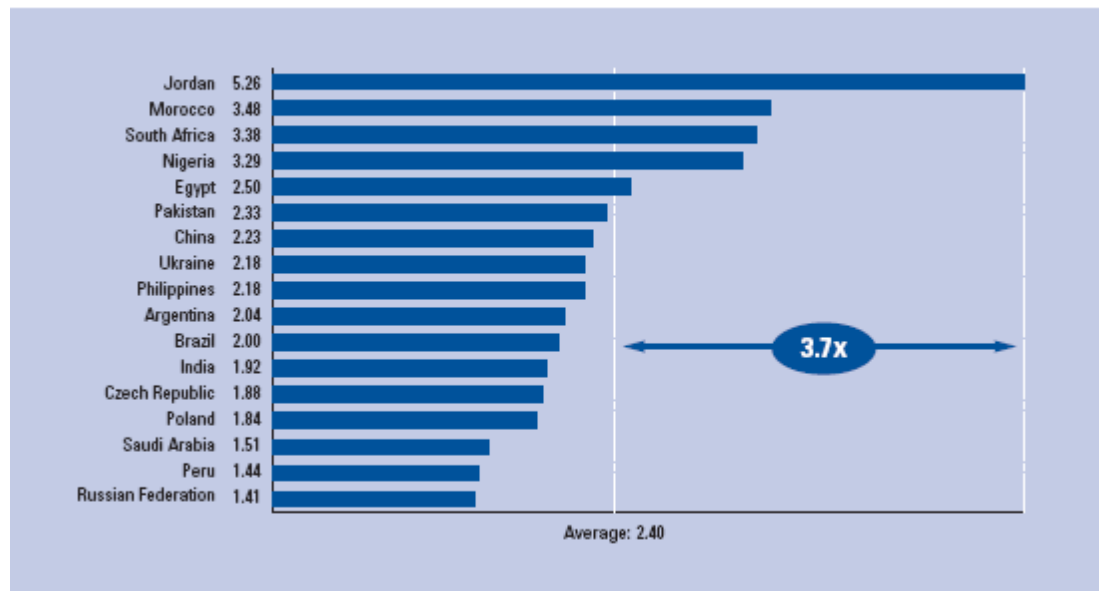
The growth benefit that broadband provides for developing countries was of similar magnitude as that for developed economies—about a 1.38 percentage point increase for each 10 percent increase in penetration. But the coefficient on average broadband penetration for middle- and low-income countries (BBNDL) was statistically significant at 10 percent but not at 5 percent, perhaps reflecting that broadband is a recent phenomenon in developing countries and penetration has not yet reached a critical mass to generate aggregate effects as robust as in developed countries.

In 2006, 3.4 percent of the population in low-income countries and 3.8 percent in middle income countries had broadband, compared with 18.6 percent in developed economies.

Despite its shorter history, broadband seems to have a higher growth impact relative to communications technologies such as fixed and mobile telephony and the Internet. Thus, current differences in broadband penetration among countries may generate significant long-run growth benefits for early adapters. Moreover, the significant and stronger growth effects of other technologies in developing countries than in developed countries suggest that the growth benefit of broadband in developing countries could be on a similar path.

## Contribution of Mobile Telecommunications Services to GDP, 2008 (percent)

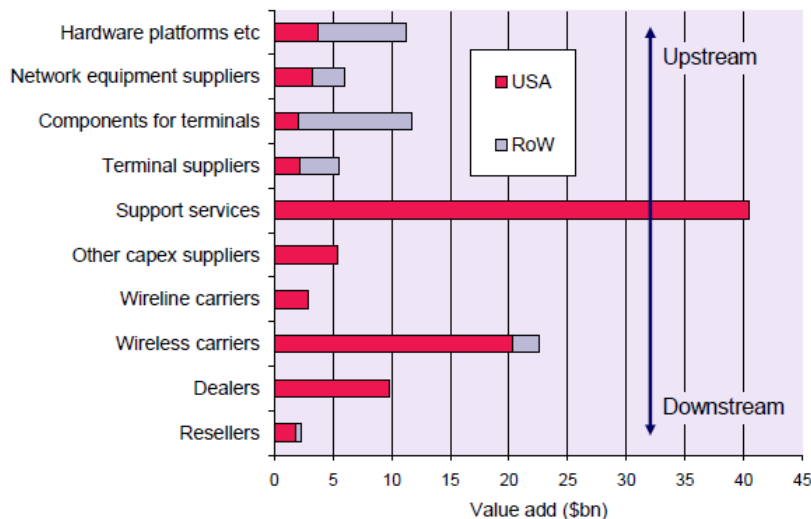
Figure 2: Contribution of mobile telecommunications services to GDP, 2008 (percent)



Source: Pyramid Research, 2008d.

## The GDP Impact of the U.S. Wireless Services Industry<sup>121</sup>

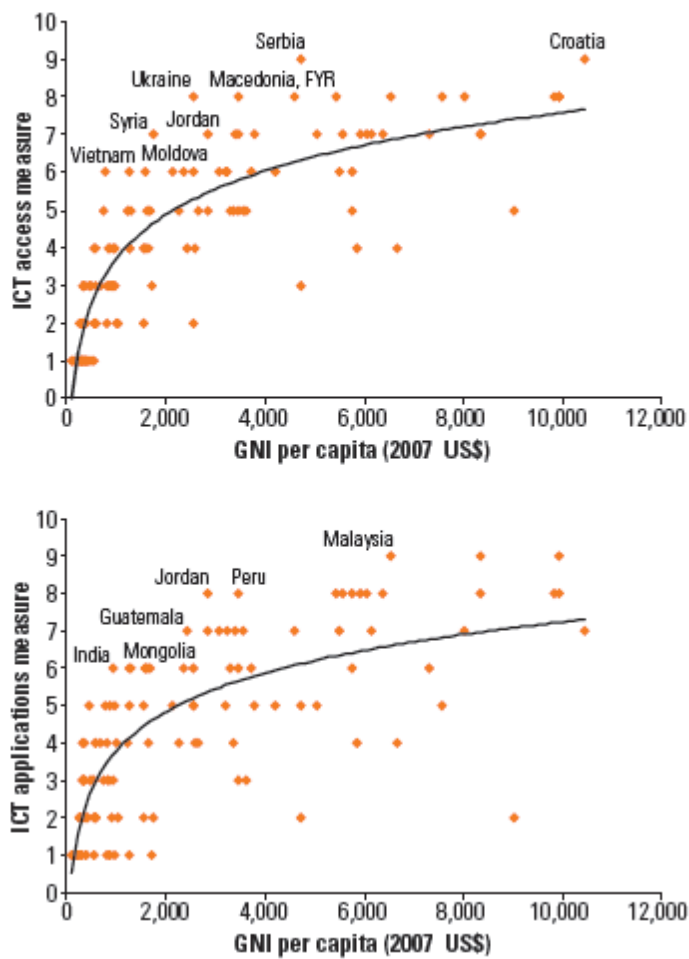
Figure 1.3 The GDP impact of the US wireless services industry



<sup>121</sup> Source : Ovum Research, The Impact of the U.S. Wireless Telecom Industry on the U.S. Economy – A Study for CTIA-The Wireless Association, Sep 05

## Relation between the Country ICT Performance Measures (for Access and Applications) and Income per Capita, Developing Countries

**Figure 1.5** Relation between the Country ICT Performance Measures (for Access and Applications) and Income per Capita, Developing Countries



Source: World Bank staff.

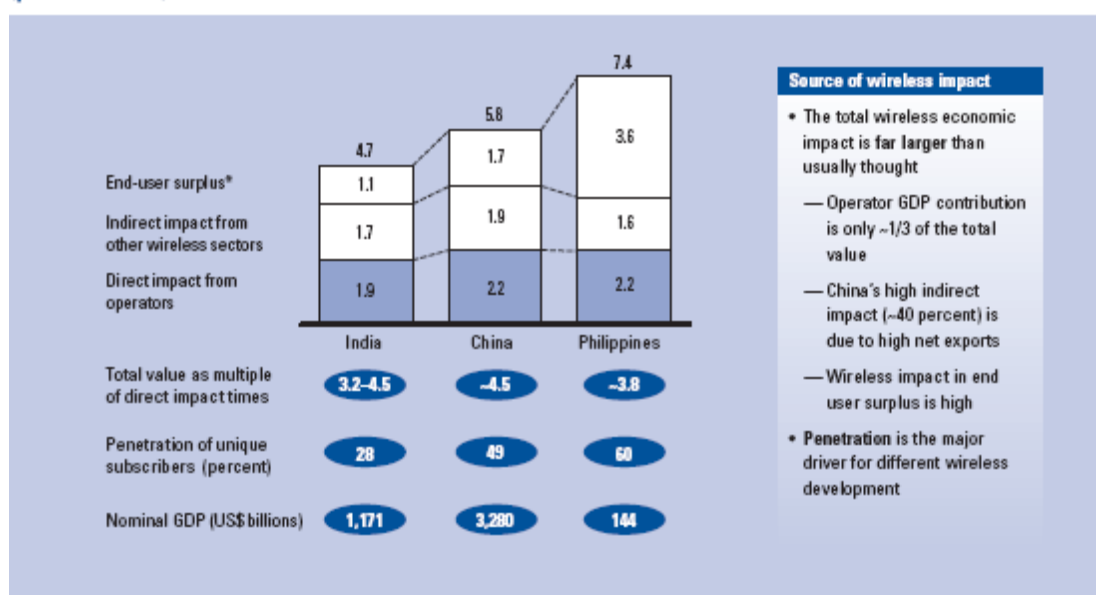
## Notes from McKinsey taken from Pyramid Research

Enhance impacts of mobile communications on emerging markets

The mobile industry often accounts for 2 percent to 3 percent of an emerging market's GDP, with a range that extends from 1.4 percent in Russia to 5.3 percent in Jordan (Figure 2). However, the indirect contribution of the mobile industry to the economy can range several times higher than this observable GDP effect, because it includes GDP contributions from other companies in the wireless sector, such as handset manufacturers and retailers, content providers, and equipment manufacturers, as well as what we call the "end-user surplus." This sur-

From McKinsey:

**Figure 4: Economic impact of mobile telecommunications industry in India, China, and the Philippines, 2007 (percent of GDP)**



Source: ITU, 2008; EIU, 2008; IHS Global Insight, 2008; Yankee Group Global Forecast 2007; IDC, 2007; McKinsey analysis.  
 \* Rough low-bound estimation using historical ARPU, inflation adjusted.

## APPENDIX 3

The following chart indicates the substantial share of total national income received by various low-income groups, as measured by the National Statistical Office through the year 2007:

### Share of Household Current Income and Gini Coefficient of Household and Person: 2002-2007

TABLE 32 SHARE OF HOUSEHOLD CURRENT INCOME BY 5 QUINTILE GROUPS AND GINI COEFFICIENT OF HOUSEHOLD AND PERSON : 2002 – 2007

กลุ่มครัวเรือนไทย	2545 / 2002	2547 / 2004	2549 / 2006	2550 / 2007	Quintile Group
กลุ่มที่ 1 (รายได้ต่ำสุด)	5.7	6.1	5.1	5.7	Group 1 (Lowest Income)
กลุ่มที่ 2	9.3	9.8	9.1	9.6	Group 2
กลุ่มที่ 3	13.7	14.2	13.9	14.2	Group 3
กลุ่มที่ 4	21.2	21.1	21.0	21.3	Group 4
กลุ่มที่ 5 (รายได้สูงสุด)	50.1	48.8	50.9	49.2	Group 5 (Highest Income)
สัมประสิทธิ์ของความไม่เสมอภาค (ครัวเรือน)	0.428	0.411	0.439	0.418	Gini Coefficient (Household)
สัมประสิทธิ์ของความไม่เสมอภาค (บุคคล)	0.418	0.425	0.418	...	Gini Coefficient (Person)

ที่มา : สำนักงานสถิติแห่งชาติ และสำนักงานคณะกรรมการพัฒนาการเศรษฐกิจและสังคมแห่งชาติ สำนักนายกรัฐมนตรี

Source : National Statistical Office and Office of the National Economic and Social Development Board, Office of the Prime Minister

## Use of Information and Communication Technology in Household: 2005-2007

TABLE 41 USE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN HOUSEHOLD : 2005 - 2007

รายการ	2548 / 2005	2549 / 2006	2550 / 2007	Items
สัดส่วนของประชากรอายุ 6 ปีขึ้นไป ที่ใช้เครื่องคอมพิวเตอร์ (%)	24.5	26.9	26.8	Proportion of Population 6 Years and Over Using Computer (%)
สัดส่วนของประชากรอายุ 6 ปีขึ้นไป ที่ใช้อินเทอร์เน็ต (%)	12.0	14.2	15.5	Proportion of Population 6 Years and Over Using Internet (%)
สัดส่วนของประชากรอายุ 6 ปีขึ้นไป ที่ใช้โทรศัพท์มือถือ (%)	36.7	41.6	47.2	Proportion of Population 6 Years and Over Using Mobile Phone (%)
จำนวนเครื่องคอมพิวเตอร์ต่อ 100 ครัวเรือน	15.5	18.5	20.4	No. of Computers per 100 Households
การใช้อินเทอร์เน็ตต่อ 100 ครัวเรือน	6.2	7.2	7.6	Use of Internet per 100 Households
จำนวนเครื่องโทรสารต่อ 100 ครัวเรือน	1.5	1.5	1.5	No. of Facsimiles per 100 Households
จำนวนโทรศัพท์ต่อ 100 ครัวเรือน	26.8	24.8	24.3	No. of Telephones per 100 Households
เครื่องคอมพิวเตอร์ต่อประชากร 100 คน	4.0	5.1	6.2	No. of Computers per 100 Population

ที่มา : สำนักงานสถิติแห่งชาติ ศูนย์เทคโนโลยีอิเล็กทรอนิกส์และคอมพิวเตอร์แห่งชาติ และกรมศุลกากร กระทรวงการคลัง  
Source : National Statistical Office, NECTEC and the Customs Department, Ministry of Finance

## Distribution of Family Income - Gini Index 2009 Country Ranks

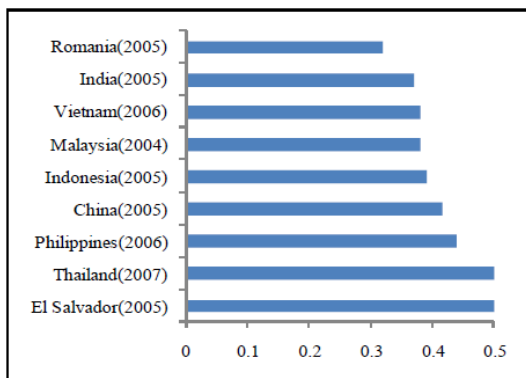
Country	Gini index 2009
Indonesia	0.39
India	0.36
Malaysia	0.46
Vietnam	0.37
China	0.47
South Korea	0.31
Thailand	0.42

Sources: CIA World Fact book 2009, Gini index 2009 Country Ranks. Also see World Bank(2009d) "World Development Indicators." <http://hdrstats.undp.org/en/indicators/161.html>

## Thailand Economic Monitor

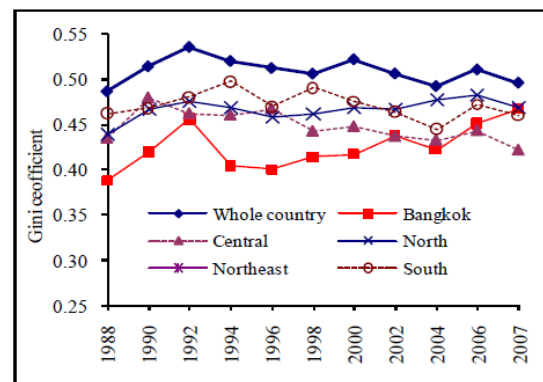
The World Bank has documents the pattern of inequality in Thailand though using the following data points<sup>122</sup>:

**Figure 91. Thailand has higher level of income inequality than its East Asian neighbors and other middle-income countries**



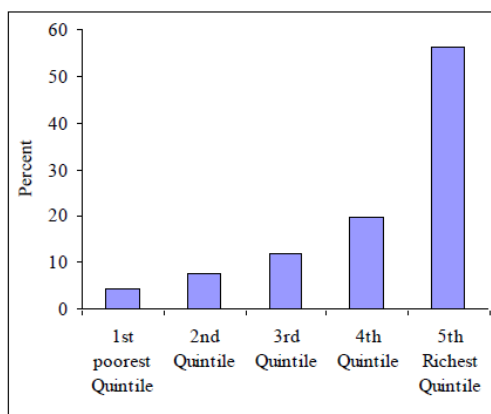
Source: World Bank and NESDB  
Numbers in ( ) are years data is reported

**Figure 92. Lower levels of inequality within regions suggest that inequality between regions contributes to high inequality at the national level**



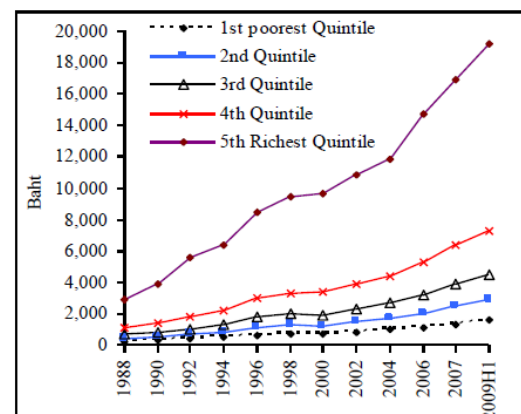
Source: NESDB

**Figure 93. The average income of an individual in the top 20 percent of the income distribution was nearly 13 times that of the bottom 20 percent (Average 1988-2007)**



Source: NESDB

**Figure 94. The growth rate of incomes in the different income brackets has been similar over the years, which has kept inequality largely unchanged.**



Source: NESDB

<sup>122</sup> Drawn from World Bank, Thailand Economic Monitor, Nov 09, page 50



## Explaining Gini Coefficient<sup>123</sup>

The Gini index is denoted by the following equation:

$$GINI = \frac{\sum_i \sum_j |y_i - y_j|}{2N^2 \bar{y}}$$

This index can be expressed geometrically using the Lorenz Curve.

Lambert and Aronson (1993) decomposed the Gini Index into three parts as follows:

$$GINI = GINI_B + \sum_i \frac{N_i}{N} GINI_{Wi} + R,$$

where  $N$  and  $N_i$  are the populations of the whole country and its subgroup  $i$ , respectively, ( $N = \sum_i N_i$ ).  $GINI_B$  denotes the Gini Index of the whole country when the income distribution in all groups is perfectly equalized. In other words, this is the Gini Index between groups. The second term is the population weighted average of the Gini Indices of each of the groups ( $GINI_{Wi}$ ). This can be interpreted as the Gini Index within groups. The interpretation of the last term is not very easy. Lambert and Aronson claimed that this term is a mixture of a between group and a within group inequality and not decomposable.

Bourguignon (1979) and Shorrocks (1980) proposed a decomposable inequality index which is defined axiomatically. Let us set four axioms that inequality measures ought to satisfy. These are the weak principle of transfers, income scale independence, the principle of population, and decomposability. Weak principle of transfers means that the inequality measure increases when the Lorenz curve goes wholly outside. Income scale independence is satisfied when the inequality measure is unaffected by proportional changes of everyone's income. The principle of population implies that the inequality measure is independent of population changes under constant income shares. Decomposability means that inequality of the whole population is a consistent function of the inequality in its subgroups. Any inequality measure that satisfies these four axioms is a generalized entropy measure.

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<sup>123</sup> Source: Asian Development Bank

MLD is one of these generalized inequality measures.

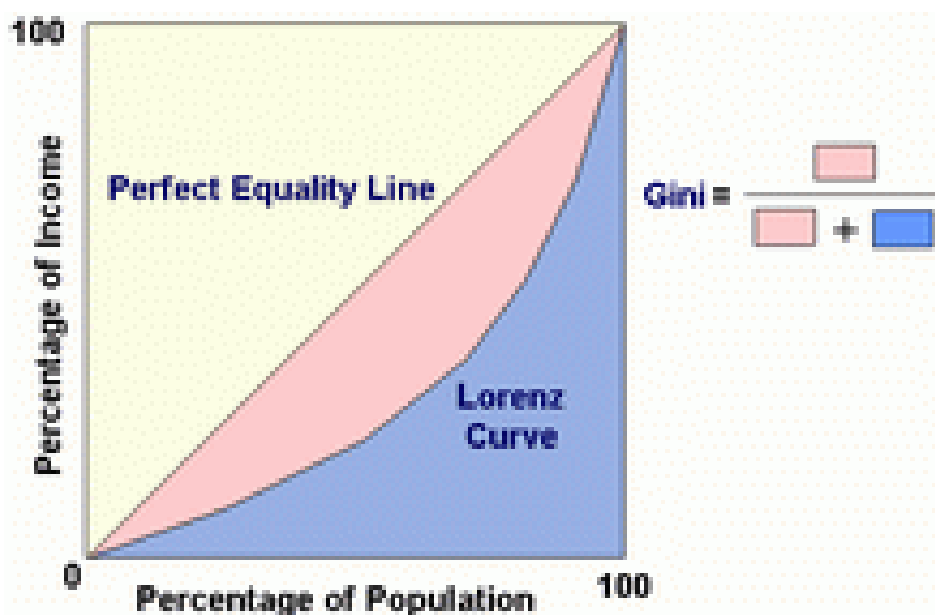
$$MLD = \ln(\bar{y}) - \frac{1}{N} \sum_i \ln(y_i)$$

MLD is decomposable as follows:

$$MLD = MLD_b + \sum_i \frac{N_i}{N} MLD_{wi}$$

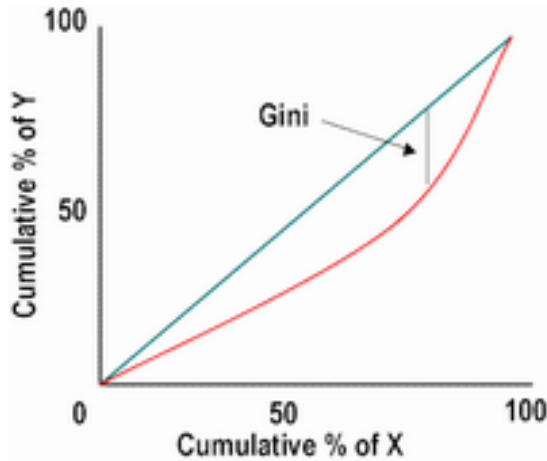
where  $MLD_b$  and  $MLD_{wi}$  are between-groups and within-groups MLD. Between-groups MLD is the MLD of the whole population when income within groups are perfectly equalized. The advantage of MLD is in its intuitively-appealing property that it can be expressed by the sum of between-groups MLD and the population weighted average of within-groups MLD. This index is used to decompose Thailand's income inequality into interregional and intraregional inequalities for an overview, using data from the HSES.

#### Gini coefficient<sup>124</sup>

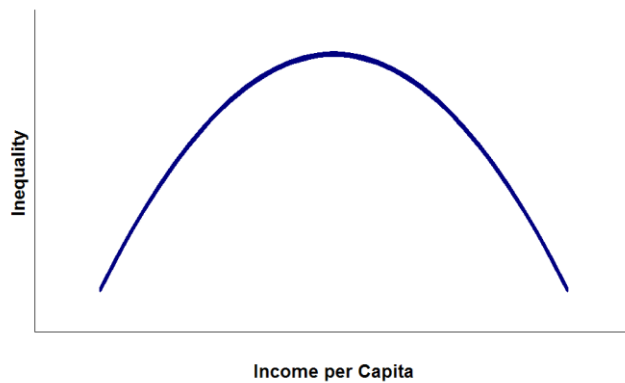


<sup>124</sup> [http://en.wikipedia.org/wiki/Gini\\_coefficient#Definition](http://en.wikipedia.org/wiki/Gini_coefficient#Definition)

## Lorenz Curve



## Kuznets Curve<sup>125</sup>



<sup>125</sup> Source: [http://en.wikipedia.org/wiki/Kuznets\\_curve](http://en.wikipedia.org/wiki/Kuznets_curve)

See also:

- World Bank, ICT at a Glance
- National Statistical Office, Share of Households Current Income By Decile Groups and Region :2007  
Highest income = 24142 baht: capita. Lowest income = 1001 baht: capita
- Asian Development Bank Reports
- Factsheet-Human Development Report 2009, UNDP
- HDI rank for Thailand, Human Development Report 2009, UNDP

## APPENDIX 4

### Labor Force Survey 2009

Bank of Thailand

EC\_RL\_009\_S3 : Labour Force Survey (New Series)

(Unit : Thousand persons)

Last Updated : 03 Mar 2010 13:41

Retrieved date : 30 Mar 2010 13:51

	2009 p	2008	2007
1 Population 1/	66,879.44	66,320.50	65,739.96
2 Age Under 15 2/	14,062.67	14,417.62	14,695.46
3 Age 15 Up	52,816.77	51,902.89	51,044.50
4 Labour Force 3/	38,426.76	37,700.39	36,941.98
5 Employment 4/	37,706.32	37,016.61	36,249.46
6 of which underemployment 5/	604.93	507.78	596.71
7 Agriculture	14,692.55	14,699.12	14,306.01
8 Agriculture , hunting and forestry	14,228.35	14,283.25	13,862.41
9 Fishing	464.20	415.87	443.60
10 Non-Agriculture	23,013.79	22,317.50	21,943.44
11 Manufacturing	5,373.91	5,453.27	5,619.23
12 Electricity , gas and water supply	102.21	106.39	101.77
13 Construction	2,302.96	2,214.04	2,148.74
14 Wholesale and retail trade , repair of vehicles and personal and household goods	6,047.63	5,754.28	5,574.40
15 Hotels and restaurants	2,592.91	2,384.25	2,342.96
16 Transport , storage and communications	1,140.82	1,117.09	1,058.06
17 Financial intermediation	375.27	373.13	341.86
18 Real estate , renting and business activities	744.10	731.51	717.33
19 Public administration and defence , compulsory social security	1,348.69	1,299.30	1,250.96
20 Education	1,132.67	1,061.56	1,045.93
21 Health and social work	698.92	681.39	633.41
22 Other community , social and personal service activities	837.60	825.65	750.33
23 Private households with employed persons	237.65	217.71	233.16
24 Other 6/	78.46	97.94	125.32
25 Unemployed Persons	572.33	521.98	508.48
26 ( rate of unemployment )	1.49	1.39	1.38
27 Looking for Work	111.42	93.32	89.24
28 Not Looking for Work	460.92	428.66	419.24
29 Seasonal Inactive Labour Force	148.10	161.80	184.05
30 share of total labour force	0.39	0.43	0.50

Source: National Statistical Office

## World Bank's Knowledge Economy Index<sup>126</sup>

### World Bank's Knowledge Economy Index\*

Rank in 2008	Change in rank from 1995	Country
1	0	Denmark
17	7	Taiwan (China)
19	-2	Japan
21	0	Singapore
26	-3	Hong Kong (China)
31	-3	Korea
46	1	Malaysia
55	11	Brazil
<b>63</b>	<b>-10</b>	<b>Thailand</b>
77	18	China
93	3	Indonesia
96	12	Vietnam
100	4	India

\* KEI is a simple average of 4 sub-indexes which represents the 4 pillars of the knowledge economy: (1) economic incentive and institutional regime, (2) education and training, (3) innovation and technological adoption, and (4) information and communications technologies (ICT) infrastructure.

Source: World Bank

## Estimate of U.S. Jobs Created or Retained By Investment in Network Infrastructures<sup>127</sup>

**TABLE 1: ESTIMATES OF U.S. JOBS CREATED OR RETAINED BY INVESTMENTS IN NETWORK INFRASTRUCTURES**

	Investment	Total Jobs	Jobs in Small Businesses
Broadband	\$10 billion	498,000	262,050
Health IT	\$10 billion	212,000	121,675
Smart Grid	\$10 billion	239,000	140,500
<b>Total</b>	<b>\$30 billion</b>	<b>949,000</b>	<b>524,225</b>

<sup>126</sup> Source : [http://info.worldbank.org/etools/kam2/KAM\\_page5.asp](http://info.worldbank.org/etools/kam2/KAM_page5.asp)

<sup>127</sup> Source: The Digital Road to Recovery: A Stimulus Plan to Create Jobs, Boost Productivity and Revitalize America. Robert D. Atkinson, Daniel Castro, Stephen J. Ezell, January 7, 2009. [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1334688](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1334688)

## APPENDIX 5

### Global Microscope on the Microfinance Business Environment 2009<sup>128</sup>

Overall score		Regulatory Framework		Investment Climate		Institutional Development	
Country	Score	Country	Score	Country	Score	Country	Score
1 Peru	73.8	=1 Cambodia	87.5	1 Chile	73.3	=1 Bolivia	75.0
2 Bolivia	71.7	=1 Philippines	87.5	2 Turkey	68.1	=1 Peru	75.0
3 Philippines	68.4	=3 Bolivia	81.3	3 Bosnia	65.6	=3 Ecuador	66.7
4 India	62.1	=3 Kenya	81.3	4 Morocco	59.7	=3 India	66.7
5 Ghana	60.9	=3 Kyrgyzstan	81.3	5 Panama	58.3	=3 Nicaragua	66.7
6 Ecuador	59.7	=3 Peru	81.3	6 Costa Rica	58.1	=6 Colombia	58.3
7 Nicaragua	58.7	=7 Ghana	75.0	7 Mexico	57.5	=6 El Salvador	58.3
8 Colombia	58.6	=7 Pakistan	75.0	8 Peru	56.4	=6 Guatemala	58.3
=9 El Salvador	57.5	=7 Uganda	75.0	9 Trinidad and Tobago	56.1	=6 Honduras	58.3
=9 Uganda	57.5	=10 Ecuador	68.8	10 Ghana	54.4	=6 Philippines	58.3
11 Pakistan	56.5	=10 Tajikistan	68.8	11 Uganda	54.2	=11 Dominican Republic	50.0
12 Kyrgyzstan	56.2	=10 Tanzania	68.8	12 Brazil	53.6	=11 Ghana	50.0
13 Kenya	55.8	=13 Colombia	62.5	13 Armenia	53.1	=11 Sri Lanka	50.0
14 Cambodia	54.1	=13 DRC	62.5	14 India	51.9	=14 Bangladesh	41.7
15 Guatemala	51.8	=13 El Salvador	62.5	15 Jamaica	51.7	=14 Kyrgyzstan	41.7
16 Panama	50.9	=13 India	62.5	16 Colombia	51.4	=14 Pakistan	41.7
17 Paraguay	49.5	=13 Paraguay	62.5	17 Philippines	50.6	=14 Panama	41.7
18 Honduras	49.3	=13 Yemen	62.5	18 Kenya	50.0	=14 Paraguay	41.7
19 Tanzania	48.4	=19 Georgia	56.3	19 Pakistan	49.2	=14 Uganda	41.7
20 Chile	48.0	=19 Mexico	56.3	20 Nicaragua	47.5	=20 Argentina	33.3
21 Mexico	47.3	=19 Mozambique	56.3	=21 Bolivia	46.1	=20 Armenia	33.3
22 Dominican Republic	47.0	=19 Nicaragua	56.3	=21 Georgia	46.1	=20 Brazil	33.3
23 Georgia	45.1	=19 Nigeria	56.3	=23 El Salvador	45.8	=20 Chile	33.3
24 Brazil	44.0	=19 Panama	56.3	=23 Uruguay	45.8	=20 Costa Rica	33.3
25 Armenia	43.9	=19 Rwanda	56.3	=25 Cambodia	45.6	=20 Georgia	33.3
26 Bosnia	43.1	=26 Armenia	50.0	=25 Mongolia	45.6	=20 Kenya	33.3
27 Bangladesh	42.7	=26 Bosnia	50.0	=27 Bangladesh	42.5	=20 Mexico	33.3
28 Costa Rica	42.5	=26 Brazil	50.0	=27 Guatemala	42.5	=20 Nepal	33.3
29 Yemen	42.1	=26 Cameroon	50.0	29 Senegal	41.9	=20 Tanzania	33.3
=30 Sri Lanka	40.4	=26 Chile	50.0	30 Sri Lanka	39.4	=30 Bosnia	25.0
=30 Tajikistan	40.4	=26 Dominican Republic	50.0	=31 Mozambique	38.9	=30 Cambodia	25.0
32 Mozambique	40.3	=26 Guatemala	50.0	=31 Paraguay	38.9	=30 China	25.0
33 Nigeria	39.4	=26 Honduras	50.0	=33 Indonesia	38.3	=30 Haiti	25.0
34 Rwanda	38.6	=26 Madagascar	50.0	=33 Lebanon	38.3	=30 Indonesia	25.0
35 DRC	36.8	=35 Bangladesh	43.8	35 Tanzania	37.8	=30 Mozambique	25.0
36 Indonesia	35.2	=35 China	43.8	36 Argentina	37.5	=30 Nigeria	25.0
37 China	34.1	=35 Costa Rica	43.8	37 Venezuela	37.2	=30 Rwanda	25.0
38 Haiti	33.4	=35 Ethiopia	43.8	38 Azerbaijan	36.4	<b>30 Thailand</b>	<b>25.0</b>
39 Senegal	32.6	=35 Haiti	43.8	39 Yemen	35.6	=30 Yemen	25.0
40 Madagascar	32.3	=35 Indonesia	43.8	40 Ethiopia	35.3	=40 Azerbaijan	16.7
41 Cameroon	31.6	=35 Mongolia	43.8	=41 Dominican Republic	35.0	=40 Cameroon	16.7
42 Ethiopia	31.3	=35 Senegal	43.8	=41 Kyrgyzstan	35.0	=40 DRC	16.7
43 Argentina	30.8	=43 Azerbaijan	37.5	43 Nigeria	34.2	=40 Ethiopia	16.7
=44 Morocco	30.3	=43 Lebanon	37.5	44 China	33.1	=40 Lebanon	16.7
=44 Turkey	30.3	=43 Morocco	37.5	<b>45 Thailand</b>	<b>31.1</b>	=40 Madagascar	16.7
=46 Mongolia	30.0	=46 Nepal	31.3	46 Tajikistan	30.8	=40 Senegal	16.7
=46 Nepal	30.0	=46 Sri Lanka	31.3	47 Rwanda	30.3	=40 Tajikistan	16.7
48 Lebanon	29.3	=46 Uruguay	31.3	48 Honduras	29.7	=40 Trinidad and Tobago	16.7
49 Azerbaijan	29.0	=46 Vietnam	31.3	49 Haiti	29.4	=40 Turkey	16.7
50 Uruguay	28.4	=50 Argentina	25.0	50 Vietnam	28.6	=40 Uruguay	16.7
51 Venezuela	24.1	=50 Jamaica	25.0	51 Madagascar	28.1	=40 Venezuela	16.7
52 Jamaica	23.7	=50 Turkey	25.0	52 Ecuador	27.5	=52 Jamaica	8.3
53 Trinidad and Tobago	22.9	=50 Venezuela	25.0	53 DRC	25.8	=52 Mongolia	8.3
54 Vietnam	21.6	<b>54 Thailand</b>	<b>12.5</b>	54 Cameroon	24.7	=52 Morocco	8.3
<b>55 Thailand</b>	<b>21.2</b>	=54 Trinidad and Tobago	12.5	55 Nepal	20.8	=52 Vietnam	8.3

<sup>128</sup> Source: "Global Finance and the Microfinance Business Environment," The Economist Intelligence Unit, 2009.

## Bank Rakyat Indonesia<sup>129</sup>

### **A description of the BRI's microfinance program and its potential application to Thailand.**

BRI's microfinance system is the world's largest and most profitable microfinance network in the world. BRI's goal to establish itself as the largest bank in the region serving the microfinance and SME sectors has paid off huge. In 2006 the bank attributed more than 60% of its total loans to these sectors with more than 40 million clients by the end of the year, contributing to a net income growth in excess of 11% for 2005 to 2006. BRI's success has lead it to be the guiding light for microfinance institutions around the world, as the model is being taught in top financial and educational institutions around the world from Harvard to London School of Economics.

BRI's model requires that borrowers pledge collateral, which plays a limited role in determining the creditworthiness relative to traditional banking approaches. BRI's insight has been to find better ways to lend against household income rather than against assets. The loans are then offered at commercially-viable fees. The interest rate on these loans is on average about 2.5 % per month; however, 90 % of borrowers get part of their interest costs back in the form of a rebate. If borrowers make all of their payments within a six-month period, or in a timely manner, they get back 0.5 per month. Otherwise, the 0.5 % is kept by the bank as a penalty.

One of the keys, and probably necessities, in Indonesia in order to achieve sustainable development is the continued growth and advancement in the field of microfinance. Financiers around the world have looked to microfinance as an essential instrument in an approach to create jobs, increase incomes, and alleviate poverty. Although Indonesia has a variety of options in terms of micro-financial services, restricted access to these services inhibits the progress needed to achieve the full potential of these programs on sustainable growth and development. As more and more people gain access to these financial services, the effects become very apparent throughout the economic infrastructure as more opportunities arise to increase wealth of the population, enhance business activities, generate employment and increase income of poor or low-income households.

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<sup>129</sup> Source: <http://www.bri.co.id/>

## APPENDIX 6

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### Malmquist Index<sup>130</sup>

The **Malmquist Index** (MI) developed in the 1980s, can be used to compare the production technology of two economies. It is named after Professor Sten Malmquist, on whose ideas it is based. The MI is based on the concept of the *Production function*. This is a function of maximum possible production, with respect to a set of inputs pertaining to capital and labor. So, if  $S_a$  is the set of labor and capital inputs to the production function of Economy A, and  $Q$  is the production function of Economy A, we could write  $Q = f_a(S_a)$ .

While the production function would normally apply to an enterprise, it is possible to calculate it for an entire region or nation. This would be called the aggregate production function.

To calculate the Malmquist Index of economy A with respect to economy B, we must substitute the labor and capital inputs of economy A into the production function of B, and vice versa. The formula for MI is given below.

Where:

$$Q_1 = f_a(S_a)$$

$$Q_2 = f_a(S_b)$$

$$Q_3 = f_b(S_a)$$

$$Q_4 = f_b(S_b)$$

Note that the MI of A with respect to B is the reciprocal of the MI of B with respect to A. If the MI of A with respect to B is greater than 1, the aggregate production technology of economy A is superior to that of economy B.

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<sup>130</sup> Source: "The ICT Sector Across Countries: Productivity Analysis Using DEA and Malmquist Index", Somesh.K. Mathur, IIT Kanpur (India).



## APPENDIX 7

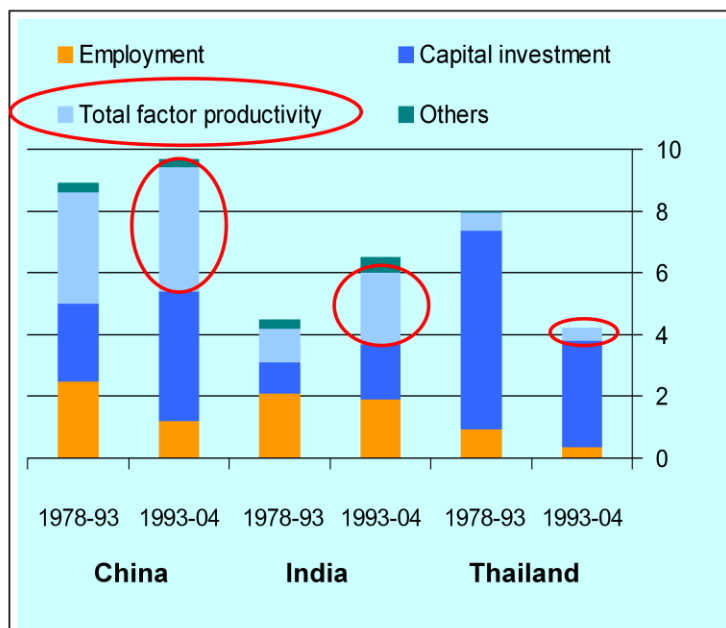
### Thailand Investment Climate Assessment Update<sup>131</sup>

The following slides are extracted from Thailand Investment Climate Assessment Update, The World Bank, June 08.

This chart ties investment to GDP growth and productivity, comparing Thailand with China and India. The World Bank argues that low investment levels in Thailand (especially in ICTs) drive lower productivity and lower GDP in the time period indicated.

#### Sources of GDP growth -- China, India, & Thailand

(Annual average % increase)

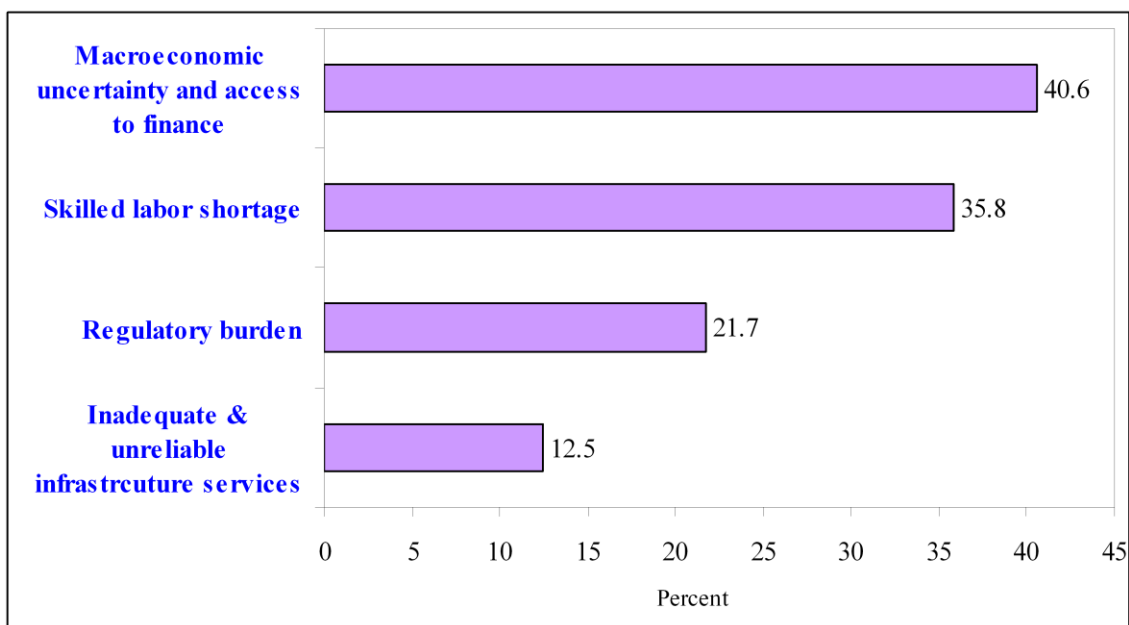


Source : Barry Bosworth and Susan Collins (Thailand's data is from WB study with NESDB, 2005)

<sup>131</sup> Source: [http://siteresources.worldbank.org/THAILANDEXTN/Resources/333295-1249970320257/TH\\_ICA\\_Update08\\_fullreport.pdf](http://siteresources.worldbank.org/THAILANDEXTN/Resources/333295-1249970320257/TH_ICA_Update08_fullreport.pdf)

The chart below links uncertain government policies to low levels of investment in Thailand:

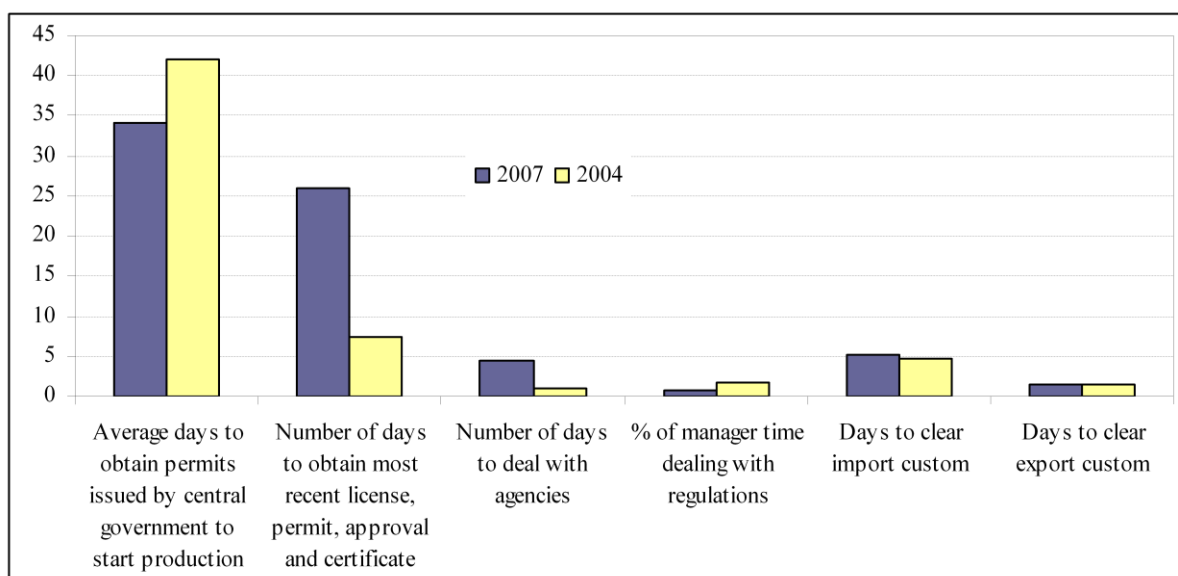
### Top Constraints to Business and Investments (Percent of 1,043 firms in 9 manufacturing industries surveyed)



Source: Thailand Productivity and Investment Climate Study 2007 (PICS 2007), World Bank with NESDB and Foundation of Thailand Productivity Institute

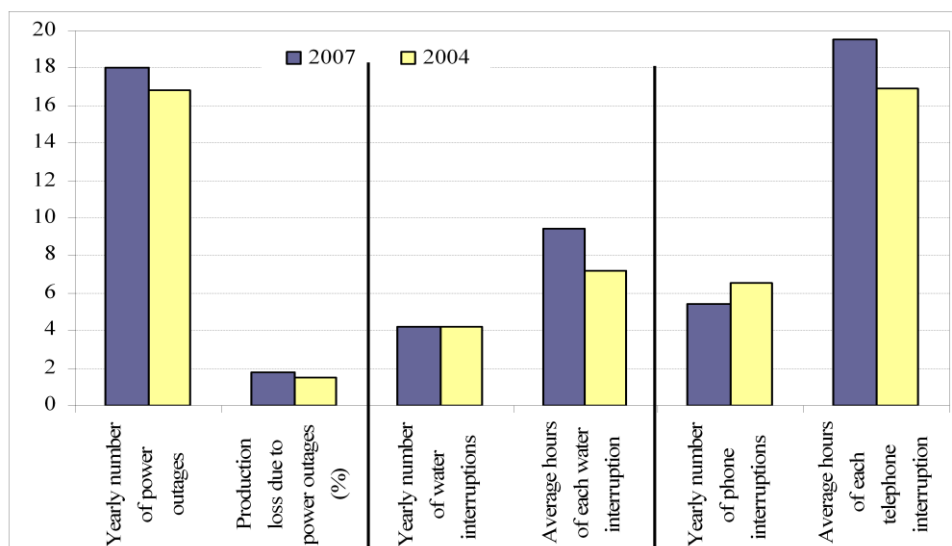
The chart below links regulatory framework to productivity scores in Thailand:

### Objective Measures of Regulatory Framework



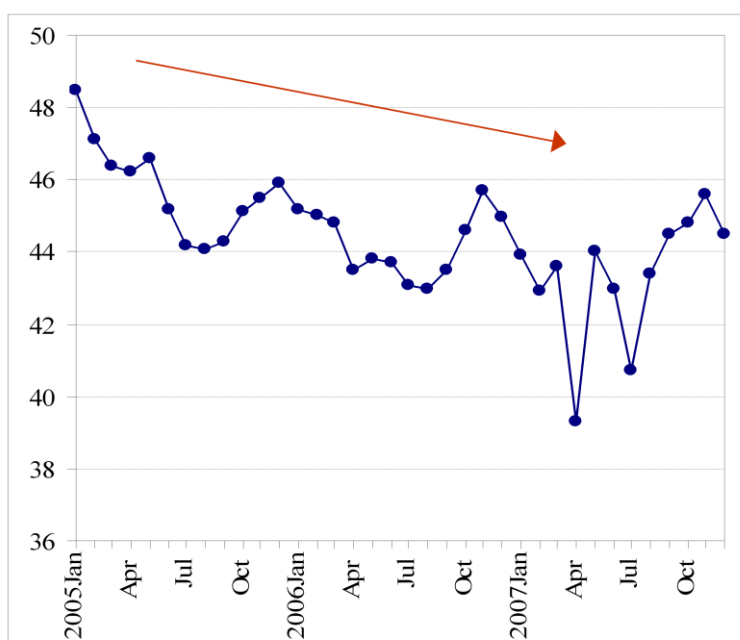
The chart below links infrastructure investments to quality of services available to business in Thailand:

### Objective Measures of Infrastructure Services



The chart below indicates the low confidence of business and industry in the government’s ability to improve the investment climate.

### Business Sentiment Index



Source: Bank of Thailand

The chart below shows that, despite many government policies announcing the “knowledge economy” Thailand is falling increasingly behind other countries as a knowledge economy.

**World Bank’s Knowledge Economy Index\***

Rank in 2008	Change in rank from 1995	Country
1	0	Denmark
17	7	Taiwan (China)
19	-2	Japan
21	0	Singapore
26	-3	Hong Kong (China)
31	-3	Korea
46	1	Malaysia
55	11	Brazil
<b>63</b>	<b>-10</b>	<b>Thailand</b>
77	18	China
93	3	Indonesia
96	12	Vietnam
100	4	India

\* KEI is a simple average of 4 sub-indexes which represents the 4 pillars of the knowledge economy: (1) economic incentive and institutional regime, (2) education and training, (3) innovation and technological adoption, and (4) information and communications technologies (ICT) infrastructure.

Source: World Bank

## Asia Telecom Business Environment Rankings

The chart below shows the relatively poor business environment in Thailand compared to other countries.

**Table: Asia Telecoms Business Environment Rankings**

Country	Limits of Potential Return		Risks To Realisation of Potential Returns		Telecoms Rating	Rank Q409 (Q309 Rank)
	Telecoms Market	Country Structure	Independence of Regulator	Country Risk		
Japan	71.3	66.7	90.0	86.8	75.3	1 (1)
Singapore	57.5	80.0	90.0	78.4	71.0	2 (2)
Australia	59.4	83.3	70.0	79.8	69.9	3 (4)
Malaysia	60.5	63.3	90.0	74.2	67.7	4 (6)
Hong Kong	52.5	76.7	80.0	83.8	67.2	5 (3)
South Korea	60.0	63.3	90.0	68.0	66.5	6 (5)
Taiwan	52.5	63.3	90.0	77.6	64.5	7 (7)
India	67.5	35.7	70.0	53.0	57.9	8 (8)
China	57.8	35.0	70.0	69.7	55.8	9 (9)
Indonesia	55.0	42.7	60.0	46.1	51.4	=10 (12)
Pakistan	57.5	42.7	70.0	28.5	51.4	=10 (10)
Philippines	47.5	46.7	60.0	49.7	49.5	12 (11)
Cambodia	49.5	54.0	50.0	38.9	49.1	13 (13)
Bangladesh	52.5	33.0	60.0	44.1	47.6	14 (15)
Laos	42.8	60.0	50.0	39.1	47.5	15 (14)
<b>Thailand</b>	<b>45.0</b>	<b>32.7</b>	<b>60.0</b>	<b>58.0</b>	<b>46.2</b>	<b>16 (18)</b>
Vietnam	42.5	36.7	60.0	52.9	45.3	17 (16)
Sri Lanka	31.5	30.0	50.0	51.6	36.9	18 (17)

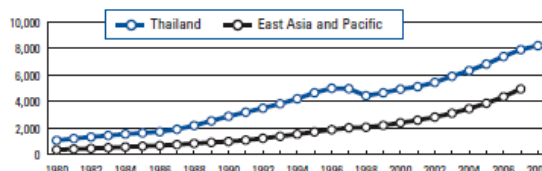
Scores out of 100, with 100 highest. The Telecoms BE Rating is the principal rating. It is comprised of two sub-ratings 'Limits of Potential Returns' and 'Risks to Realisation of Returns', which have a 70% and 30% weighting, respectively. In turn, the 'Limits' Rating is comprised of Telecoms Market and Country Structure, which have a 65% and 35% weighting and are based upon ARPU/subscriber numbers and growth of the mobile telecoms industry (Market) and the broader economic/socio-demographic environment (Country). The 'Risks' rating is comprised of Market Risks and Country Risk which have an equal weighting, respectively, and are based on a subjective evaluation of industry regulatory issues (Market) and the industry's broader Country Risk exposure (Country), which is based on BMI's proprietary Country Risk Ratings. The ratings structure is aligned across the 14 industries for which BMI provides Business Environment Ratings methodology, and is designed to enable clients to consider each rating individually or as a composite, with the choice depending on their exposure to the industry in each particular state. For a list of the data/indicators used, please consult the appendix at the back of the report. Source: BMI

# Thailand

## Key indicators

Population (millions), 2008.....	64.3
GDP (US\$ billions), 2008.....	273.2
GDP per capita (US\$), 2008.....	4,115.3
GDP (PPP) as share (%) of world total, 2008.....	0.80

GDP (PPP int'l \$) per capita, 1980-2008

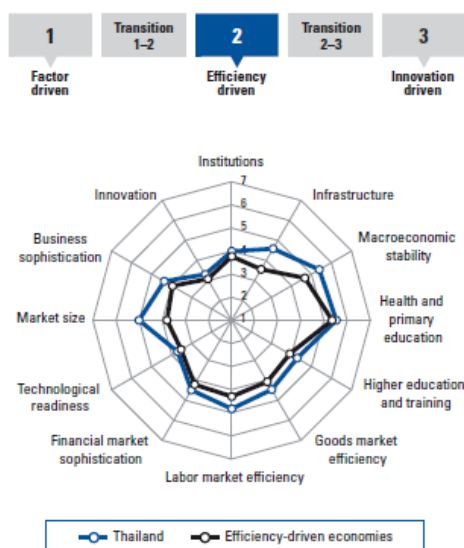


## Global Competitiveness Index

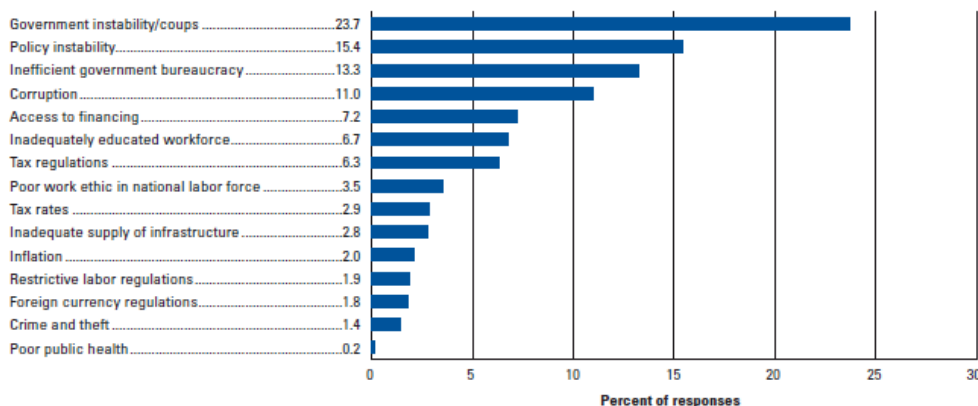
	Rank (out of 133)	Score (1-7)
<b>GCI 2009-2010</b> .....	<b>36</b>	<b>4.6</b>
GCI 2008-2009 (out of 134).....	34	4.6
GCI 2007-2008 (out of 131).....	28	4.7
<b>Basic requirements</b> .....	<b>43</b>	<b>4.9</b>
1st pillar: Institutions.....	60	4.0
2nd pillar: Infrastructure.....	40	4.6
3rd pillar: Macroeconomic stability.....	22	5.4
4th pillar: Health and primary education.....	61	5.5
<b>Efficiency enhancers</b> .....	<b>40</b>	<b>4.5</b>
5th pillar: Higher education and training.....	54	4.3
6th pillar: Goods market efficiency.....	44	4.5
7th pillar: Labor market efficiency.....	25	4.8
8th pillar: Financial market sophistication.....	49	4.5
9th pillar: Technological readiness.....	63	3.7
10th pillar: Market size.....	21	5.0
<b>Innovation and sophistication factors</b> .....	<b>47</b>	<b>3.8</b>
11th pillar: Business sophistication.....	43	4.4
12th pillar: Innovation.....	57	3.3

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## Stage of development



## The most problematic factors for doing business



Note: From a list of 15 factors, respondents were asked to select the five most problematic for doing business in their country/economy and to rank them between 1 (most problematic) and 5. The bars in the figure show the responses weighted according to their rankings.

## The Global Competitiveness Index in detail

INDICATOR	RANK/133	INDICATOR	RANK/133
<b>1st pillar: Institutions</b>		<b>6th pillar: Goods market efficiency</b>	
1.01 Property rights	73	6.01 Intensity of local competition	41
1.02 Intellectual property protection	77	6.02 Extent of market dominance	59
1.03 Diversion of public funds	63	6.03 Effectiveness of anti-monopoly policy	53
1.04 Public trust of politicians	71	6.04 Extent and effect of taxation	40
1.05 Judicial independence	54	6.05 Total tax rate*	56
1.06 Favoritism in decisions of government officials	66	6.06 No. of procedures required to start a business*	60
1.07 Wastefulness of government spending	43	6.07 Time required to start a business*	89
1.08 Burden of government regulation	50	6.08 Agricultural policy costs	70
1.09 Efficiency of legal framework in settling disputes	42	6.09 Prevalence of trade barriers	80
1.10 Efficiency of legal framework in challenging regs	50	6.10 Tariff barriers*	78
1.11 Transparency of government policymaking	60	6.11 Prevalence of foreign ownership	80
1.12 Business costs of terrorism	107	6.12 Business impact of rules on FDI	44
1.13 Business costs of crime and violence	61	6.13 Burden of customs procedures	60
1.14 Organized crime	73	6.14 Degree of customer orientation	23
1.15 Reliability of police services	88	6.15 Buyer sophistication	46
1.16 Ethical behavior of firms	64		
1.17 Strength of auditing and reporting standards	52	<b>7th pillar: Labor market efficiency</b>	
1.18 Efficacy of corporate boards	73	7.01 Cooperation in labor-employer relations	28
1.19 Protection of minority shareholders' interests	43	7.02 Flexibility of wage determination	89
		7.03 Rigidity of employment*	24
<b>2nd pillar: Infrastructure</b>		7.04 Hiring and firing practices	29
2.01 Quality of overall infrastructure	41	7.05 Firing costs*	84
2.02 Quality of roads	35	7.06 Pay and productivity	38
2.03 Quality of railroad infrastructure	52	7.07 Reliance on professional management	61
2.04 Quality of port infrastructure	47	7.08 Brain drain	32
2.05 Quality of air transport infrastructure	26	7.09 Female participation in labor force*	53
2.06 Available seat kilometers*	16		
2.07 Quality of electricity supply	41	<b>8th pillar: Financial market sophistication</b>	
2.08 Telephone lines*	84	8.01 Financial market sophistication	33
		8.02 Financing through local equity market	32
<b>3rd pillar: Macroeconomic stability</b>		8.03 Ease of access to loans	35
3.01 Government surplus/deficit*	34	8.04 Venture capital availability	49
3.02 National savings rate*	34	8.05 Restriction on capital flows	87
3.03 Inflation*	41	8.06 Strength of investor protection*	11
3.04 Interest rate spread*	51	8.07 Soundness of banks	43
3.05 Government debt*	66	8.08 Regulation of securities exchanges	36
		8.09 Legal rights index*	83
<b>4th pillar: Health and primary education</b>			
4.01 Business impact of malaria	79	<b>9th pillar: Technological readiness</b>	
4.02 Malaria incidence*	95	9.01 Availability of latest technologies	53
4.03 Business impact of tuberculosis	66	9.02 Firm-level technology absorption	61
4.04 Tuberculosis incidence*	97	9.03 Laws relating to ICT	68
4.05 Business impact of HIV/AIDS	104	9.04 FDI and technology transfer	50
4.06 HIV prevalence*	107	9.05 Mobile telephone subscriptions*	21
4.07 Infant mortality*	36	9.06 Internet users*	75
4.08 Life expectancy*	87	9.07 Personal computers*	78
4.09 Quality of primary education	69	9.08 Broadband Internet subscribers*	78
4.10 Primary enrollment*	53		
4.11 Education expenditure*	44	<b>10th pillar: Market size</b>	
		10.01 Domestic market size index*	22
<b>5th pillar: Higher education and training</b>		10.02 Foreign market size index*	18
5.01 Secondary enrollment*	82		
5.02 Tertiary enrollment*	43	<b>11th pillar: Business sophistication</b>	
5.03 Quality of the educational system	67	11.01 Local supplier quantity	24
5.04 Quality of math and science education	62	11.02 Local supplier quality	40
5.05 Quality of management schools	59	11.03 State of cluster development	35
5.06 Internet access in schools	41	11.04 Nature of competitive advantage	63
5.07 Local availability of research and training services	61	11.05 Value chain breadth	42
5.08 Extent of staff training	62	11.06 Control of international distribution	62
		11.07 Production process sophistication	66
		11.08 Extent of marketing	47
		11.09 Willingness to delegate authority	76
		<b>12th pillar: Innovation</b>	
		12.01 Capacity for innovation	59
		12.02 Quality of scientific research institutions	60
		12.03 Company spending on R&D	47
		12.04 University-industry collaboration in R&D	44
		12.05 Gov't procurement of advanced tech products	58
		12.06 Availability of scientists and engineers	54
		12.07 Utility patents*	68

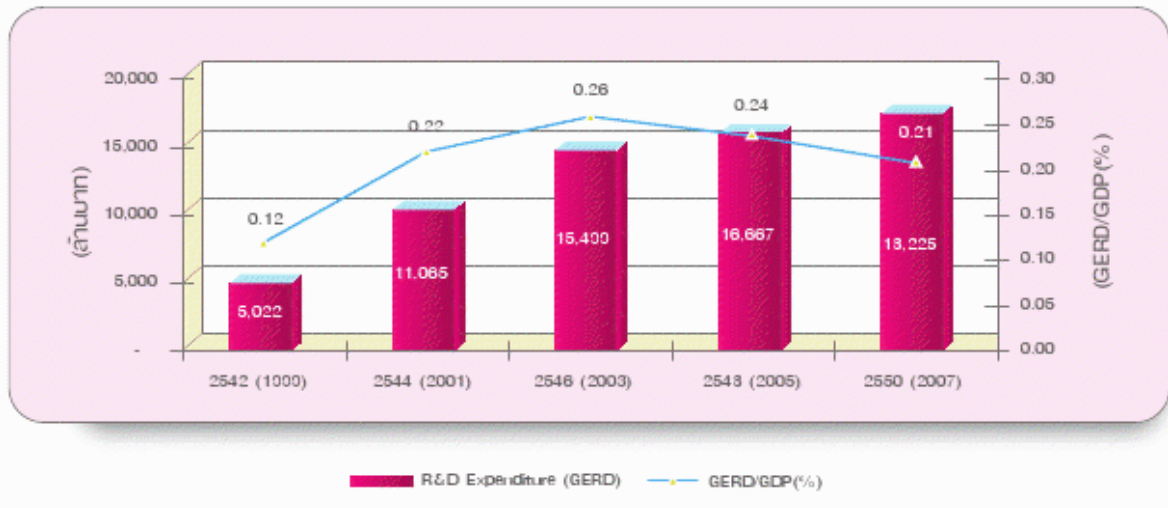
\* Hard data

Note: For further details and explanation, please refer to the section "How to Read the Country/Economy Profiles" at the beginning of this chapter.

## APPENDIX 8

### R&D Expenditure and Gross Domestic Expenditure on R&D/GDP in 2000-2007<sup>132</sup>

รูปที่ 1 ค่าใช้จ่ายทางการวิจัยและพัฒนาต่อผลิตภัณฑ์มวลรวมภายในประเทศ (GERD/GDP)  
ปี 2542 – 2550



<sup>132</sup> Source: 2009 National Survey on R&D Expenditure and Personnel of Thailand, Chapter 1, Office of the National Research Council of Thailand.  
<https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbXZaXRIMjU1MnxneDo2YWE2NTIkN2U0NzU1Yjg5>  
<https://sites.google.com/site/site2552/>



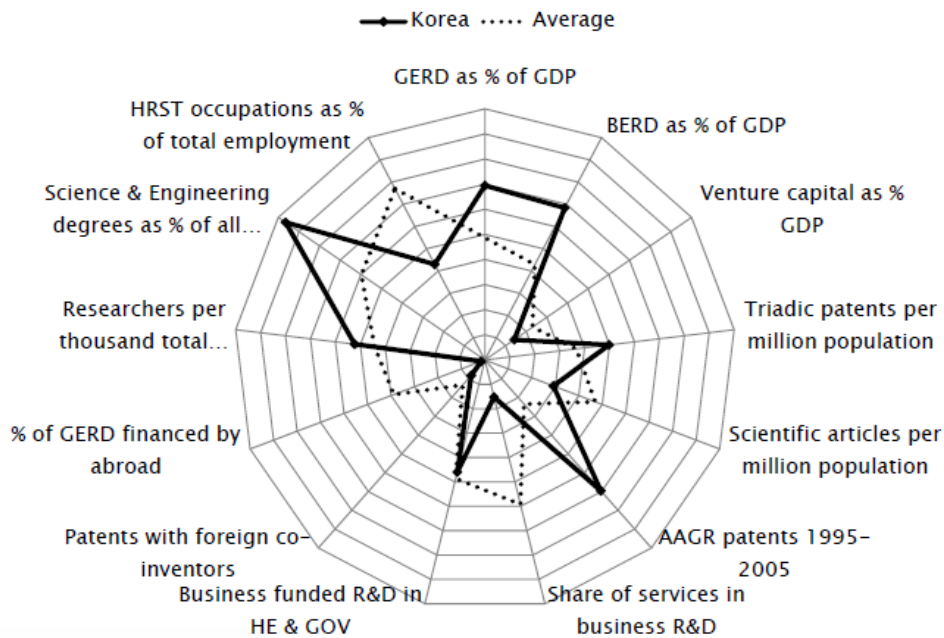
## Sources of Economic Growth (1991–2000)

Per annum	GDP	Physical Capital	Human Capital	Labor Supply	TFP	(R&D)
ROK Growth Rate (Ratio)	6.26 (100.0)	2.92 (46.6)	0.78 (12.5)	1.13 (18.1)	1.42 (22.7)	0.68 (10.9)
USA Growth Rate (Ratio)	3.21 (100.0)	0.76 (23.7)	0.24 (7.5)	0.91 (28.3)	1.29 (40.2)	1.29 (40.2)

Source: Lee, Jong-wha, Increasing Growth Rate through R&D (2005)

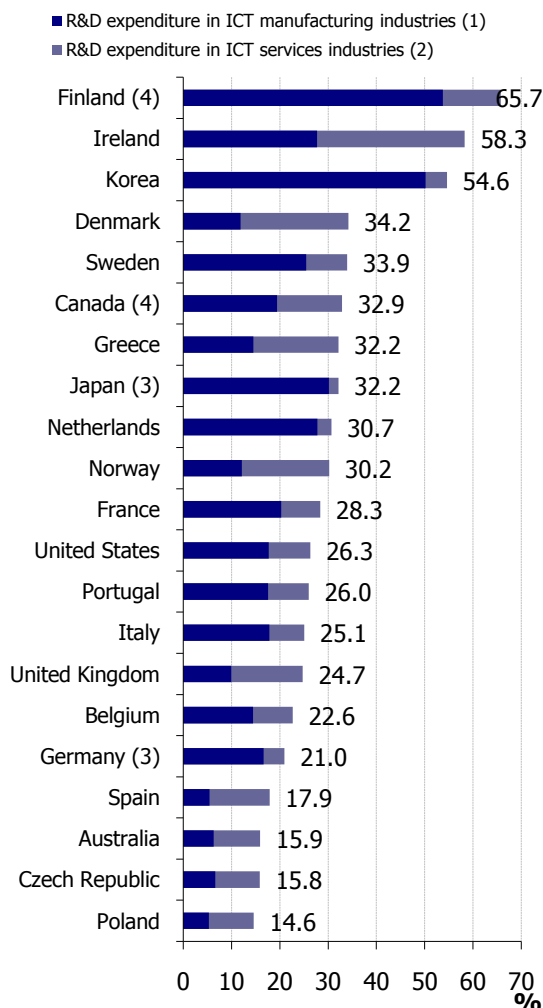
<sup>133</sup> Source: The Korean Approach to Innovation policy, Gwang-Jo Kim, UNESCO  
[http://www.unescobkk.org/fileadmin/user\\_upload/Director\\_Documents/090500GJ\\_Kim\\_presentation.pdf?bcsi\\_scan\\_EE192555F742B2DF=0&bcsi\\_scan\\_filename=090500GJ\\_Kim\\_presentation.pdf](http://www.unescobkk.org/fileadmin/user_upload/Director_Documents/090500GJ_Kim_presentation.pdf?bcsi_scan_EE192555F742B2DF=0&bcsi_scan_filename=090500GJ_Kim_presentation.pdf)

# Innovation Profile of Korea



Source: OECD, Science and Innovation Country Notes (2008)

## OECD ICT Indicators: R&D Expenditure in Selected ICT Industries, 2005<sup>134</sup>



1. As a percentage of business enterprise sector R&D expenditure ISIC, Rev. 3 codes: 30 (manufacture of office, accounting and computing machinery; 32 (manufacture of radio, television and communication equipment and apparatus) and 33 (manufacture of medical, precision and optical instruments, watches and clocks).
2. ISIC, Rev. 3 codes: 642 (telecommunications) and 72 (computer and related activities).
3. Division 64 not included.
4. Due to unavailability of data for class 642 (telecommunication), division 64 is included in services ICT R&D as a proxy.

<sup>134</sup> Source: OECD estimates based on ANBERD and RDS databases, June 2008.  
[http://www.oecd.org/document/23/0,3343,en\\_2649\\_34449\\_33987543\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/23/0,3343,en_2649_34449_33987543_1_1_1_1,00.html)

## APPENDIX 9

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For an overview of best practices in economic stimulus activities, incorporating an assessment of how broadband has been factored into this activity see below:

### Technology Strategies toward Meaningful Broadband in Thailand

In 2009, Stimulus Plans were announced in 43 countries costing US \$2.18 trillion or 3.5% of the world's GDP. Most but not all of these stimulus efforts were in high-income countries and several of them incorporated broadband infrastructure in their stimulus plans.<sup>135</sup> Beginning with the nine trillion broadband infrastructure initiative of the Obama Administration in the USA and the \$30 billion public-private partnership to build a national fiber optic network in Australia, many of these projects aimed to lessen the inequities that would occur if broadband were available in cities and not in low-income rural sectors. According to a London-based telecommunications advisory unit of HSDB Bank, each Asian nation must look beyond investments in backbone to public private partnerships that cause market forces to create entire "broadband ecosystems" to serve the mass population in each country.

For an excellent analysis of the way in which broadband and other ICT investments were integrated into economic stimulus plans of the G-20 (see ITIF<sup>136</sup>). How Broadband could serve as an Enabler of Thai Stimulus based on international best practices? For Example, Strategic ICT Roadmap for Malaysia mooted by National Information Technology Council (NITC) and re-iterated for the Ninth Malaysian Plan,<sup>137</sup> the way in which ICTs and broadband specifically were successfully integrated into the economic stimulus. The following synopsis provided a summary of this data<sup>138</sup>.

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<sup>135</sup> Source: Detecon Asia-Pacific: "Technology Strategies toward Meaningful Broadband in Thailand: 4 Sep. 2009

<sup>136</sup> Driving a Digital Recovery: IT Investments in the G-20 Stimulus Plans [www.itif.org/files/g20-stimulus.pdf](http://www.itif.org/files/g20-stimulus.pdf)

<sup>137</sup> Strategic ICT Roadmap for Malaysia: [www.mosti.gov.my/.../National%20ICT%20Roadmap%20for%20Malaysia.pdf](http://www.mosti.gov.my/.../National%20ICT%20Roadmap%20for%20Malaysia.pdf)

<sup>138</sup> Source: Detecon Asia-Pacific: "Technology Strategies toward Meaningful Broadband in Thailand: 4 Sep. 2009, P.18-20.

## Broadband Stimulus Plans- Global Snap Shot<sup>139</sup>

Governments in this sample snapshot have pledged hundreds of billions of dollars of public money to develop broadband infrastructure, yet it is still too early to quantify benefits.

### Asia Pacific: Broadband Stimulus Snapshot

Singapore	Malaysia
<ul style="list-style-type: none"> <li>■ <b>Title:</b> NG National Broadband Network (NGNBN)</li> <li>■ <b>Goal:</b> NBN capable of delivering speeds of 1Gbps and beyond.</li> <li>■ <b>Timeframe:</b> 2008-2012</li> <li>■ <b>Funding:</b> S\$750 million from public sector in form of a grant to the Netco to support network implementation.</li> <li>■ <b>Status:</b> N/A</li> </ul>	<ul style="list-style-type: none"> <li>■ <b>Title:</b> National Broadband Plan (NBP)</li> <li>■ <b>Goal:</b> Promote a knowledge-based society through establishment of universal access and service (UAS) to broadband with 50% household penetration by 2010.</li> <li>■ <b>Timeframe:</b> 2004 (published), 2006-2010 (roll-out)</li> <li>■ <b>Funding:</b> RM3.72 billion (Ninth Malaysia Plan period)</li> <li>■ <b>Status:</b> 22.9% broadband penetration (Q1 Y2009)</li> </ul>
Japan	Philippines
<ul style="list-style-type: none"> <li>■ <b>Title:</b> Zero Broadband Areas Elimination</li> <li>■ <b>Goal:</b> 100% broadband penetration by 2011, with 90% via high speed, via local government grants for 1/3 of costs to build infrastructure to address the digital divide.</li> <li>■ <b>Timeframe:</b> 2008-2011</li> <li>■ <b>Funding:</b> ¥6.2 billion in FY2008 via government grants</li> <li>■ <b>Status:</b> Broadband fixed access is only 23.6% (2009)</li> </ul>	<ul style="list-style-type: none"> <li>■ <b>Title:</b> National Broadband Network (NBN)</li> <li>■ <b>Goal:</b> Cheaper and accessible broadband across the country, regulatory reforms, and development of human resource skills to support development of ICT-industry.</li> <li>■ <b>Timeframe:</b> 2004-2020 (Medium Term Develop. Plan)</li> <li>■ <b>Funding:</b> US\$330 million for infrastructure (USD\$650 million for operations over 15 years) from public sector.</li> <li>■ <b>Status:</b> Cancelled by Philippine President in Oct 2007.</li> </ul>

<sup>139</sup> Source: Detecon Asia-Pacific: "Technology Strategies toward Meaningful Broadband in Thailand: Sep. 4<sup>th</sup>, 2009

## Europe: Broadband Stimulus Snapshot

United Kingdom
<ul style="list-style-type: none"> <li>■ <b>Title:</b> Digital Britain</li> <li>■ <b>Goal:</b> Universal access to broadband of at least 2Mbps by 2012</li> <li>■ <b>Timeframe:</b> 2009-2012</li> <li>■ <b>Funding:</b> £200m (via £6/year "Broadband Tax" from landline subscribers) &amp; up to five other private partners.</li> <li>■ <b>Status:</b> 10% of households cannot get 2Mbps access.</li> </ul>

Germany
<ul style="list-style-type: none"> <li>■ <b>Title:</b> Federal Government Broadband Strategy</li> <li>■ <b>Goal:</b> Broadband access available nationwide before end of 2010, with 75% having at least 50Mbps by 2014.</li> <li>■ <b>Timeframe:</b> 2009 (strategy published)</li> <li>■ <b>Funding:</b> min. €180 million by public sector with private investment of €50 billion expected between 2009-2012</li> <li>■ <b>Status:</b> N/A</li> </ul>

France
<ul style="list-style-type: none"> <li>■ <b>Title:</b> Digital France 2012</li> <li>■ <b>Goal:</b> Universal access to high-speed broadband (minimum 512Kbps at a maximum cost of 35 euros) by the end of end 2012.</li> <li>■ <b>Timeframe:</b> 2008-2012</li> <li>■ <b>Funding:</b> €10 billion (over 10 years) from public sector.</li> <li>■ <b>Status:</b> Target for achieving goal revised to 2010.</li> </ul>

Finland
<ul style="list-style-type: none"> <li>■ <b>Title:</b> National Broadband Strategy</li> <li>■ <b>Goal:</b> Universal access to broadband (minimum 1Mbps) by 2010.</li> <li>■ <b>Timeframe:</b> 2008-2015</li> <li>■ <b>Funding:</b> € 200 million of public funding from state, municipal and EU sources.</li> <li>■ <b>Status:</b> Strategy revised to require that at least 99% of households have 100Mbps broadband access by 2015.</li> </ul>

## Australasia: Broadband Stimulus Snapshot

Australia
<ul style="list-style-type: none"> <li>■ <b>Title:</b> National Broadband Initiative</li> <li>■ <b>Goal:</b> Establish an open access (wholesale) national broadband network with speeds of 100Mbps to 90% of households and 12Mbps to the rest of the population.</li> <li>■ <b>Timeframe:</b> 2009 (published), 2010-2018 (rollout)</li> <li>■ <b>Funding:</b> US\$30 billion from public sector.</li> <li>■ <b>Status:</b> N/A</li> </ul>

New Zealand
<ul style="list-style-type: none"> <li>■ <b>Title:</b> New Zealand Government Broadband Initiative</li> <li>■ <b>Goal:</b> Establish an open access ultra fast broadband to 75% of New Zealanders where they live, work and study over the next ten years.</li> <li>■ <b>Timeframe:</b> 2009 (published), 2010-2020 (rollout)</li> <li>■ <b>Funding:</b> NZ\$1.5 billion public with extra private sector</li> <li>■ <b>Status:</b> Draft proposal published for comments.</li> </ul>

## Various Other Continents / Countries: Broadband Stimulus Snapshot

Africa - Ghana
<ul style="list-style-type: none"> <li>■ <b>Title:</b> ICT Backbone Development Programme</li> <li>■ <b>Goal:</b> Advanced telecoms infrastructure to ensure broadband internet access countrywide within the next two years .</li> <li>■ <b>Timeframe:</b> 2009-2011</li> <li>■ <b>Funding:</b> US\$150 million by public sector.</li> <li>■ <b>Status:</b> N/A</li> </ul>

Africa - Kenya
<ul style="list-style-type: none"> <li>■ <b>Title:</b> National Optical Fibre Broadband Infrastructure</li> <li>■ <b>Goal:</b> Extend broadband transport infrastructure across the country providing fast access to the internet by end of 2009, interconnecting with new undersea cable links.</li> <li>■ <b>Timeframe:</b> 2008-2010</li> <li>■ <b>Funding:</b> US\$60 million by public/private sector.</li> <li>■ <b>Status:</b> National backbone completed in 2009.</li> </ul>

India
<ul style="list-style-type: none"> <li>■ <b>Title:</b> Free Broadband in India (Broadband Policy 2004)</li> <li>■ <b>Goal:</b> Provide free high-speed broadband connectivity (2Mbps) to all citizens via state-owned providers BSNL and MTNL by the end of 2009.</li> <li>■ <b>Timeframe:</b> 2007-2009</li> <li>■ <b>Funding:</b> Universal Service Obligation Fund (USOF)</li> <li>■ <b>Status:</b> Not yet achieved; India has not announced any new broadband stimulus within the economic downturn.</li> </ul>

Eastern Europe - Estonia
<ul style="list-style-type: none"> <li>■ <b>Title:</b> National Broadband Network Plan</li> <li>■ <b>Goal:</b> construct a nationwide superfast broadband network, with 90% of the country having access to 100Mbps by 2012, with the rest connected by 2015.</li> <li>■ <b>Timeframe:</b> 2009-2015</li> <li>■ <b>Funding:</b> US\$91.45 million from public sector + private</li> <li>■ <b>Status:</b> N/A</li> </ul>

## North America: Broadband Stimulus Snapshot

USA
<ul style="list-style-type: none"> <li>■ <b>Title:</b> Broadband Technology Opportunities Program</li> <li>■ <b>Goal:</b> Provide broadband in unserved areas and improved broadband in underserved areas. Provide broadband education, training, equipment and support.</li> <li>■ <b>Timeframe:</b> 2009 (published), 2010-2012 (rollout)</li> <li>■ <b>Funding:</b> US\$4.7 billion public sector (grant of 80%)</li> <li>■ <b>Status:</b> Part of US\$7.2 billion broadband stimulus plan, intended to support 25,000 jobs/year for project lifetime</li> </ul>

USA
<ul style="list-style-type: none"> <li>■ <b>Title:</b> Distance Learning, Telemedicine &amp; BB Program</li> <li>■ <b>Goal:</b> Provide loans to fund cost of construction, improvement and facilities to provide broadband to rural communities (coverage area must be 75% rural)</li> <li>■ <b>Timeframe:</b> 2009 (published), 2010 onwards</li> <li>■ <b>Funding:</b> US\$2.5 billion from public sector (loans)</li> <li>■ <b>Status:</b> Part of US\$7.2 billion broadband stimulus plan, intended to support 25,000 jobs/year for project lifetime</li> </ul>

Canada
<ul style="list-style-type: none"> <li>■ <b>Title:</b> Broadband Canada: Connecting Rural Canadians</li> <li>■ <b>Goal:</b> Extend broadband coverage to unserved and underserved Canadians, with at least 1.5Mbps access to participate in the digital economy.</li> <li>■ <b>Timeframe:</b> 2009 (published), 2010 (start of rollout)</li> <li>■ <b>Funding:</b> C\$225 million by public sector + extra private</li> <li>■ <b>Status:</b> Part of C\$43.6 billion economic stimulus plan</li> </ul>

## Thailand's Stimulus II, "Strong Thailand"

The information below is a summary of news reports which describe Stimulus activity enacted by the Thai government.

In 2009, the Thai Parliament approved a 1.43 trillion baht three year stimulus package to revive economy, called Strong Thailand 2012. This project incorporated 6,000 development projects including rural and urban infrastructure, education, public health facilities. It aims to lift economic growth by 1.5% per year. Overseen by finance minister, Korn Chatikavanij, he announced that the stimulus packages have two principles: public-private joint investment and investment projects by government and state enterprises. NESDB will be directed to evaluate the development projects. The US\$3.35 billion plan package included measures for direct cash handouts for low-income households, tax cuts, expanded welfare services and subsidies for transportation and utilities. This initiative was also aimed at bolstering private consumer spending.

Expected beneficiaries allocations will go to the following:

- Increase in welfare payments
- An extension of educational institutes and bursaries
- Support for agricultural credit growth
- Direct subsidies for utility and transport costs
- Low income households may receive a 2,000-baht monthly living allowance
- Special provisions are expected to be made for the reeling tourism sector.

The announced new fiscal measure is in addition to the "Six Measures" package implemented by the previous Samak Sundaravej administration.

At the end of March 2009, the Thai Finance Ministry announced a proposal for a new stimulus package aimed at 20 million working Thais in the informal sector, which was excluded from the government's 2,000-baht handout announced in the earlier stimulus package.



To assist the utilities industry, the government is reputedly delaying taking power from large generators and moving up the timeline for power purchases from new, small power producer projects. The initiative is a response to the government's push for infrastructure project investment as part of its economic stimulus package and to encourage private investment in smaller infrastructure projects (such as small power producers), to augment investment in large scale infrastructure developments backed by the government.

- **Implications for IT spending: low impact** — there will be aligned spending opportunity for IT arising from initiatives for the utilities industries. There may also be some ripple effect to guard against the impact of the financial crisis on IT budgets, particularly in transportation industry, but overall little impact on IT is expected as a result of the measures.

## **How Broadband Could Enhance Thai Government Stimulus Measures**

As regards the question of how broadband could enable the specific goals of Thai stimulus, the data suggests the following:

### **Creative Economy**

A number of factors converge to cause the Thai government to embrace a rather abstract concept, “creative economy” as a priority in the government’s stimulus plans. The Second stimulus plans earmark 1.43 Trillion baht to promote the growth of this concept. But though the promotion of Thai software will be incorporated into this plan, broadband was not identified as an enabling factor that should be deployed to achieve the transformation Thailand’s economy needed to leverage the economic payoff from the creativity of its citizens. The data is clear that, in a number of ways, broadband may boost creativity at the individual and enterprise level. A 2008 study of Dutta and Mia<sup>140</sup> argued that broadband has special appeal to a “creative class” of workers and would be essential to any society, like nation, that was intent on establishing a “creative economy.” These broadband features, they found, were conducive to creativity:

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<sup>140</sup> Visit <http://www.insead.edu/v1/gitr/wef/main/fullreport/index.html>

- Peer to peer learning.
- Use of blogs, wikis, social networking in learning.
- Decentralized, dynamic approaches to capturing and disseminating knowledge
- Broadband enables innovations to occur outside the boundaries of traditional institutions and hierarchies to produce unconventional content, goods and services
- Broadband enables creative collaboration among teams, whether they work sides.

# THE MBR GLOSSARY

Our glossary has three purposes:

1. It defines some new terms, invented by the author of MBR and used here for the first time.
2. It mentions some time-worn phrases, but puts them in a new context, thereby altering their meaning a bit.
3. It also mentions standard jargon in one field that maybe unknown to another. Since MBR was meant for an interdisciplinary readership, we hope to clear up any confusion we have caused by defining these terms here.

## Deep Localization:

When MNCs export their products and services to developing countries they often “localize” them, which usually refer to superficial changes, not altering the product in a fundamental way. MBWG proposes a process of “deep localization” in which MNCs essentially would become willing (or forced) to fundamentally alter their products, services, pricing, franchising models, distributions systems, measurements and design methodologies to produce new genres of goods and services that are specifically adapted to the MOP.

## Digital Divide:

This refers to the gap between those able to benefit from digital technology and those who are not. It refers to disparities within and between countries. The term was introduced in 1993 in the United States and became the basis of an international movement of policy officials from government, business and academic beginning in 1999<sup>141</sup>. Currently, the ICT stakeholders who are driving efforts to close the Digital Divide have embraced broadband as their highest priority. Meaningful Broadband Report owes its ideas and methods to the ideas that have been introduced by these stakeholders located in developing countries all over the world.

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<sup>141</sup> International Telecommunication Union. Digital Divide Overview. <http://www.itu.int/ITU-D/digitaldivide/>

### Economic Multiplier Impacts:

This refers to catalytic activity in which economic transactions, including technology purchases, can elicit a virtuous circle of effects<sup>142</sup>.

### Ecosystems:

Also called “enterprise ecosystems” or “business webs,” this linguistic rip-off of the ecology movement refers not to the natural environment but to a fundamental innovation in corporate culture: the idea that, increasingly, business supply chains are tightly interwoven to the point that they should be understood as one interconnected whole. One of the primary purposes of digital technology has been to help corporations achieve ecosystems, enabling seamless integration with their business partners. (Think of how Walmart’s use of technology to blend its operations with its suppliers, for example.) This idea is fundamental to Meaningful Broadband, in which we argue that closing the Digital Divide requires moving broadband-enabled ecosystems into the low income sector. This is not entirely a new idea. A recent innovation in technology-enabled ecosystems came from Don Tapscott in his 2003 book, *The Naked Corporation: How the Age of Transparency Will Revolutionize Business*, in which he predicted that increasingly, non-business partners (universities, NGOs, government agencies) would be incorporated directly into business supply chains. This trend, an aspect of public private partnerships is fundamental to the concept between public/private partnerships in which governments share costs and risks within ecosystem.

### Ethical Finance:

This refers to financial systems that are design to achieve ethical impacts. In MBR two types of ethical finance are consider: socially responsible investment (in advanced countries) and sharia in MBR argues that ethical finance should be an important source of investment to build meaningful broadband ecosystem. Ethical finance institutions should serve as complement to commercial finance within Public Private Partnerships designed to achieve Meaningful Broadband Ecosystem.

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<sup>142</sup> Jane Nelson, IBLF Policy Paper 2003, Number 4. The Price of Wales International Business Leaders Forum, Economic Multipliers: Revisiting the core responsibility and contribution of business to development. <http://www.iblf.org/docs/EconomicMultipliers.pdf>

### **Ethnography:**

This is a method used by anthropologists to assess user experience (UX), including Meaningful User Experiences. As UX has become increasingly important to technology designers, anthropologists have been hired by technology corporations.

### **First Person Science:**

This term refers to the science of experience or “contemplative science” or “Science of Consciousness<sup>143</sup>” in which the aim is an accurate depiction of the nature of subjective experience. One method used in first person science is called “self-reports,” and an aim of innovators in first person science is to achieve more accurate reporting of one’s own experience. First Person Science will be incorporated into the methodology for MUX which is being developed for MBWG.

### **Human Computer Interaction (HCI):**

This international professional field, mixing academic and corporate researchers, looks beyond conventional personal computer applications to new ways that machine can reflect and enhance human experience. It is the basis of a number of international professional networks, journals and conferences. It evolved from the innovations of Xerox PARC (Palo Alto Research Center<sup>144</sup>) in the 1980s and, like the related field “ubiquitous computing<sup>145</sup>,” owes its inspiration to PARC’s CTO, Mark Weiser.

### **MBWG:**

A working group in Thailand made up of the CEO’s and focal points, senior executives, from the five largest telco operators in Thailand (TOT, AIS, DTAC, True, and CAT) along with senior executives from the NTC, and a secretariat from Chulalongkorn University represented by Craig Warren Smith (Founder of the Digital Divide Institute).

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<sup>143</sup> Chalmers, D (1999). First-Person Methods in Science of Consciousness. Arizona Consciousness Bulletin.

<http://consc.net/papers/firstperson.html>

<sup>144</sup> Brad A. Myers. "A Brief History of Human Computer Interaction Technology." ACM interactions. Vol. 5, no. 2, March, 1998. pp. 44-54. <http://www.cs.cmu.edu/~amulet/papers/uihistory.tr.html>

<sup>145</sup> Mark Weiser's Homepage concerning topics of Ubiquitous Computing and HCI. <http://www.ubiq.com/weiser/>

### Informal Economy:

This refers to the informal non-legal economic realities that persist in all economies and particularly the low-income and rural sectors of development economies. MBWG's strategy for promoting sustainable development is based on preserving the non-commercialist behavior of informal economies which continue to cultivate long-standing spiritual and cultural values. However, MBWG also seeks to combine the best informal economies with the best elements of formal economies, which would provide legal protection, reduce MOP penalties and create new options for wealth and learning by low income citizens<sup>146</sup>.

### Internet Economy:

This is another term introduced by Don Tapscott (who also introduced Wikinomics by the way) which refers to the idea that the interaction between marketers, financiers and technology innovators produce a new kind of economics that transcends the typical understanding of the business cycle embedded in macroeconomic theory. Meaningful Broadband itself proposes that a digital economy could be operable in the Middle of the Pyramid. It suggests that markets could arise among low income users that can serve as a complement to the economic-development and educational programs of governments. In combination commercial and government innovations could produce "economic development effects" that bring much of the MOP into a new global middle class. This hypothesis represents an extension of current theory on digital economy.

### Last Mile:

This refers to the method by which connectivity reaches the final leg of its journey towards the end user.

### Leapfrogging:

This refers to the capacity of a primitive economic system to "leapfrog" over more modern intermediate technologies to embrace the latest technologies. The most successful example

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<sup>146</sup> \* Schneider, Friedrich. 1994. "Measuring the Size and Development of the Shadow Economy. Can the Causes be Found and the Obstacles be Overcome?" In Hermann Brandstaetter and Werner Guth, eds., *Essays on Economic Psychology*. Berlin: Springer Publishing Co., 193-212.

\*Schneider, Friedrich, and Dominik Enste. 2000a. "Shadow Economies around the World: Size, Cause and Consequences." International Monetary Fund Working Paper, February, 26.

of leapfrogging is the developing countries' embrace of the cell phone. Meaningful Broadband Report aims at leapfrogging entire broadband ecosystems. It is a more difficult challenge than leapfrogging a single technology.

### **Meaningful Broadband:**

In this case, the word "broadband" has been broadened to include not just internet architecture or Last Mile technologies, but the sum total of broadband-enabled technologies (incorporating the design of devices and software used by the devices.) Making broadband "meaningful" refers to the idea that all these technologies work together to create meaningful impacts on uses, on communities, on cultures and on societies. "Meaningful" is used precisely in MBWG's model. The term itself will be operationalized to the point that meaning can be measured. High speed internet that is usable, affordable and empowering. The term refers not to internet architectures alone but to Last Mile solutions (getting the connectivity to users), devices (smart phones or scaled down notebooks) and software.

### **Meaningful Broadband Ecosystems:**

These are interwoven products and services that bring broadband to users in which the explicit aim is to achieve meaningful and ethical impact on users, their communities, their cultures and their societies.

### **Meaningful User Experience (MUX):**

This is an extension of the notion of "user experience" (UX<sup>147</sup>), which is a principle used in the design of next-generation digital technologies. Increasingly, UX is the factor that most determines the success or failure of an application. Some technology labs have researchers with job descriptions like "Director of User Experience." MUX is a more complicated notion because it causes the technology designer to anticipate and test the meaning of the technology to the intended user. To adequately test for meaningfulness, MUX has to be operationalized, which means all assumptions about "meaningful" have to be made explicit, and subject to measurement. Digital Divide Institute hopes to introduce an innovative methodology for operationalizing MUX based on a tripartite version of scientific method (first person science, second person science, and third person science).

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<sup>147</sup> Jesse James Garrett, (2000). The Elements of User Experience. <http://www.jjg.net/elements/pdf/elements.pdf>

### **M Factor:**

This refers to how “meaningfulness” is factored into various elements of Meaningful Broadband Ecosystems.

### **Meaningful Design:**

This refers to the innovations in mobile broadband software design in which the aim is to establish MUX.

### **Meaningful Finance:**

This refers to financial systems that aim not only for ethical or socially beneficial impacts, but which promote MUX.

### **Middle of the Pyramid (MOP):**

The MOP concept represents an elaboration of the Bottom of the Pyramid (BOP) thesis associated with Prof CK Prahalad<sup>148</sup>, which emphasizes that much of the world’s potential wealth lies in uncovering economic value that lies among the bottom four billion population. Prahalad challenges multinational corporations to engage in market-development for the BOP. The Middle of the Pyramid refers to 2.3 billion persons who occupy the middle section of the world’s economic pyramid. Estimates vary about the annual income of these citizens, but for our purposes we are putting the figure at US 1,000-\$4,000, though some say that about 40% could be added to this figure by calculating the value of the non-cash “income” that could be tapped as MOP embraces mobile banking, and as it becomes incorporated into the formal economies of emerging markets.

### **MOP Penalty:**

The additional costs paid by citizens of the Middle of the Pyramid for goods and services compared with TOP citizens who often enjoy price advantages and discounts.

### **Mindful Prototyping:**

This refers to the innovative system of developing next-generation mobile software in which mindfulness meditation is integrated directly into a process of rapid prototyping to achieve

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<sup>148</sup> Prahalad, C.K "The Fortune at the Bottom of the Pyramid" (Wharton School Publishing, 2004)



MUX. A reason for this innovation is that mindfulness can enhance collaboration between professionals from different fields that come together to produce instant prototype designs.

#### **Mobile Broadband:**

This refers to high speed internet delivered to mobile devices via 3G, WIMAX, satellites, cable, or Peer to Peer mechanisms. Mobile broadband can come to users through pre-paid services or through post paid subscriptions. To achieve a critical mass of mobile broadband, entire broadband ecosystems must be constructed.

#### **Official Development Assistance (ODA):**

This refers to Official Development Assistance<sup>149</sup>, a term used by OECD<sup>150</sup> and its donor member countries to distinguish economic assistance from security assistance to developing countries. ODA is design to complement and reinforce foreign direct investment. In light of the “financial meltdown” and the recession in advanced countries, OECD is likely to propose a closer alignment between ODA and FDI. This alignment could benefit Meaningful Broadband Ecosystems in developing countries.

#### **Peer to Peer (P2P):**

A method that uses open source technologies to promote community-based, bottoms up use of digital technologies. P2P also includes a method for delivering Last Mile connectivity to users in remote rural villages, which will be incorporated into the Indonesia’s Meaningful Broadband Ecosystem.

#### **Public Private Partnerships (PPPs):**

In PPPs, governments join into partnership arrangements with commercial providers to reduce risks to the commercial providers, allowing them to achieve returns on investments that satisfy private investors. PPPs for telecommunications infrastructures are already quite common, such as in the Republic of Indonesia’s Palapa Ring project. Usually PPPs are non-speculative, e.g. private investors can expect only modest recurrent returns on investments. These factors make PPPs ideal ethical finance institutions, such as Sharia banks that are

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<sup>149</sup> The Story of Official Development Assistance: A History of the Development Assistance Committee and the Development of Co-operation Directorate. <http://www.oecd.org/dataoecd/3/39/1896816.pdf>

<sup>150</sup> OECD Organization Homepage. [www.oecd.org/](http://www.oecd.org/)

required to follow restrictions against speculative practices. MBWG hopes to extend PPPs deeper into the telecommunications industry beyond Backbone infrastructure investments to other aspects of the broadband systems.

### **Socially Responsible Investments (SRI):**

This refers to ethical finance systems funded mostly by pension funds and other institutional investors as a result of shareholder activism. Valued at over US\$2 trillion, many consider SRI an alternative to conventional speculative banking practices of advanced countries. MBR proposes that SRI and Sharia banking become aligned in a global ethical finance system.

### **Spiritual Computing:**

This is a paradigm of technology design, developed by this author, in which spiritual experience (expressed in secular or religious terms) influence the generation of new technologies in the field of social networking, search, home computing, multimedia, education and health care. In Indonesia Islamic computing, MBWG will draw insights from spiritual computing and consider its role as a “killer app” in the broadband ecosystem.

### **Telecenters:**

Telecenter is a public place where people can access computers, the Internet, and other digital technologies that enable them to gather information, create, learn, and communicate with others while they develop essential digital skills. While each telecenter is different, their common focus is on the use of digital technologies to support community, economic, educational, and social development—reducing isolation, bridging the digital divide, promoting health issues, creating economic opportunities, and reaching out to youth for example.

### **Three-Tiered Strategy:**

This refers to a strategy of management of multinational corporations in which the companies pursue three strategies simultaneously: one for the Top of Pyramid (TOP), one for the Middle of Pyramid (MOP) and one for the Bottom of Pyramid (BOP.) Each strategy includes hiring strategies, management innovations, measure systems, R&D and market-development activity. Each introduces a different suite of products and services. The dividing line between TOP and MOP is that, MOP markets require a longer time frame to

achieve returns on investment. Also, MOP serves more corporate functions than just ROI. In addition to being self-sustaining, it can indirectly serve other business units and functions, e.g. by boosting PR, R&D, and public affairs strategies. In the case of Microsoft, one of the reasons that they have adopted a three tiered strategy is to encourage the governments to enforce anti-piracy regulations. Regarding the dividing line between MOP and BOP, the BOP businesses cannot be self-sustaining and require subsidy via public/private partnerships. PPPs are also viable in the MOP.

# MEANINGFUL BROADBAND WORKING

## GROUP IN THAILAND: FAQ

- **What is meant by “Meaningful Broadband?”**

Meaningful Broadband refers to an innovative framework of broadband deployment for emerging markets that was born in Indonesia<sup>i</sup> and reflects best practices in the 15-year global movement to close the Digital Divide. The term refers to the need for coordinated deployment of “broadband ecosystems” – encompassing *backbone, Last Mile options, devices and content* – which have *meaningful impacts* on users.

- **What is the Meaningful Broadband Working Group (MBWG) in Thailand?**

It is a coalition between regulators and telecommunications operators in Thailand, initiated by Chulalongkorn University and is supported by a secretariat housed within the University’s Center for Ethics of Science and Technology.

- **Is this coalition common in other countries?**

No. Normally at odds with each other, operators and regulators usually do not join voluntarily into a coalition of this type. It may be the only such national coalition in the world when the “public-private divide” in telecommunications industry becomes transcended, resulting in new forms of cooperation.

- **Why is this needed?**

Thai government, lagging in broadband deployment, urgently needs to accelerate high speed internet in order to enhance the productivity of government services, and achieve essential public policy reforms.<sup>ii</sup> The private sector urgently needs broadband for market growth. But these goals cannot be reached without new forms of public private cooperation and cost sharing with the private sector.

- **Isn't broadband, by its very nature, beneficial to society?**

No. Broadband is not a public good. It is a powerful force for change that can bring benefit or harm to a society (or more likely a combination of both). Still in its infancy, broadband is not just another medium of communications but a *meta-medium* which will soon encompass all other media. Increasingly, broadband does not merely convey information but increasingly it will shape behavior of citizens. Given the consequences of broadband to society, it is essential that broadband be harnessed by leaders to achieve optimal benefits to society – and to anticipate and mitigate any harmful impacts.

- **What kind of negative impacts could occur if broadband is deployed for no explicit ethical purpose?**

If guided by the unsound public and private policies and any ill-conceived regulatory mechanisms, broadband could accelerate gaps between rich and poor undermine fundamental traditions and values, accelerate urban sprawl while undermining rural economies, and cause addictive behaviors, particularly among poorly educated young persons.

- **What meaningful impacts can be achieved through broadband?**

Meaningful broadband properly deployed and funded, could bring equity to emerging markets, scale up microcredit and boost SME growth, creating a new middle class that could bring stability to fragile economies. Broadband could shift the locus of economies towards human resources development via lifelong learning, workforce development, and SME growth. It serves as a trigger for education reform as well as introducing informal interactive learning via edutainment. It could cause a reverse emigration from Bangkok back to rural villages and it could promote eco-tourism (e.g., through broadband enabled English language training) and introduce “smart infrastructures” through which countries can reduce their carbon footprint. Broadband could enhance the productivity and accountability of government bureaucracies, reducing corruption while strengthening democracies process from the bottom up. It could enhance the “creative economy” in Thailand, tapping the openness and creativity of Thais to enhance the competitiveness of the Thai economy. It could enhance the quality of Thai higher education and teacher training as well as cause the academic sector to move towards online curriculum, furthering lifelong learning. Broadband is essential for extending banking services to the unbanked and in that way to promote savings and creditworthiness among low income populations. Finally, broadband could communicate the ethics advocated by His Majesty the King (Sufficiency Economy).

- **Can't markets, left to themselves, produce these benefits?**

No. Private sector investment and market-development activities are essential but not sufficient to deliver the benefits of broadband. Market forces must be reshaped through public policy, regulation, subsidy and voluntary practice to enhance benefits of broadband as well as to minimize harm. However, none of these positive changes made possible by broadband can emerge without the coordinated and skillful development of broadband ecosystem. Perhaps more than any other industry, telecommunications industry is itself constructed as a “compact” between public and private sectors. This compact needs to be re-drawn in the digital age?

- **So is this something that has to be pushed on the private sector?**

No. Support for meaningful broadband has come more from business than government. Though mobile supply chains have been able to achieve remarkable cell phone penetration without active assistance from government, they have not had corresponding success with inducing cell phone users to upgrade to internet. To fulfill their own ambitious goals for broadband penetration, commercial forces must get help from government. They cannot get this help without establishing broadband as a public good, e.g. Assuring governments that broadband will have meaningful impacts. To successfully leapfrog into broadband, the private sector needs to establish policies that move into close alignment with government reformers.

- **Is that the purpose of Meaningful Broadband Working Group in Thailand?**

Yes. The aim of Meaningful Broadband Working Group (MBWG) in Thailand is to accelerate broadband penetration. It must do so in a way that fulfills commercial goals while also enabling specific public policy reforms sought by governments.

- **What outcome are the expected from MBWG?**

Once MBWG understand how market forces are planning to introduce broadband to Thai citizens and institutions, MBWG may well consider new public-private partnerships that bring new money to the table in the form of public-private partnerships. The ultimate outcome of MBWG is a genre of public private partnerships that could support the meaningfulness of broadband.

- **Why is membership so restrictive?**

The six members of the Working Group, by themselves, are a core group of motivated stakeholders who can make quick decisions that are urgently needed within the time frame that Meaningful Broadband is achievable. Given the breadth of private sector participation in MBWG, representing a 94% market share, it is unlikely that any single commercial bias could enter MBWG's formulations. Furthermore, all of MBWG's deliberations will be transparent. They will be guided by Chulalongkorn University Secretariat.

- **Where and how did the Meaningful Broadband framework emerge?**

After 15 years of deliberations and hundreds of conferences on the topic of "digital divide," held all over the world, the theme of broadband has emerged as the highest priority among governments, think tanks, business associations, intergovernmental agencies, NGOs, and leading corporations that have been involved in the discussion about how to harness digital technology for public benefit. These leading institutions now agree that developing countries cannot compete effectively with advanced countries without an approach to broadband that is designed for their needs.

- **How did Indonesia set the stage for MBWG in Thailand?**

The model we are using was originally formulated in Indonesia. Republic of Indonesia's Department of Information and Informatics (DepKominfo) asked an NGO called Investor Group Against Digital Divide (IGADD) to recommend an innovative broadband policy. This policy, which has resulted from interactions with over three hundred leaders of Indonesia, is being presented in three stages, framework development, through a document called Meaningful Broadband Report, model construction, in which an economic model will address investor criteria for entering new public private partnerships, and implementation phase which will emphasize public/private partnerships. IGADD is linked to the Meaningful Broadband Working Group through the Digital Divide Institute, and DigitalDivide.org, which is also the web site for MBWG.

- **How is Chulalongkorn University involved?**

MBWG was created on February 23, 2009, in an event at the university hosted by the chairman of the University Council Dr. Charas Suwanwela. At this event, various CEOs and regulators responded positively to the invitation to join the Working Group. At the same time, the university's Center for Ethics of Science and Technology, led by Prof Soraj Hongladarom, accepted the role of Secretariat for MBWG, which is directed by Prof Craig Warren Smith.

- **How is the Office of the Prime Minister involved?**

MBWG has held meetings with the Office of the Prime Minister, and in these meetings MBWG has requested a holistic vision of how this current Kingdom of Thailand government can be served by broadband. MBWG has formally requested a process of its interface with the Cabinet and the National Economic and Social Development Board. MBWG wishes the government to clarify how its own goals could be served by broadband and, in this light, to clarify how the costs and risks of delivering these broadband-enabled benefits should be shared with broadband.

- **Who funds MBWG?**

Funding for the launch activity for MBWG was provided by Nokia Siemens Network and Chulalongkorn University. Next stage funding, for framework development, was provided by the National Telecommunications Commission. A budget for ongoing operating support of MBWG will be presented for consideration to the members of MBWG in its July meeting. Additional research funds are requested of NESDB and Crown Property Bureau.

- **What is MBWG's international agenda?**

A number of intergovernmental agencies with offices in Bangkok – World Bank, ADB, ITU, ASEAN, UNESCO, and EU – have each offered their services to MBWG to provide best practices. ASEAN has invited MBWG to propose Meaningful Broadband as a framework for the regional cooperation and national capacity building to close Digital Divide in the nine Asian countries.

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<sup>i</sup> See [digitaldivide.org](http://digitaldivide.org)

<sup>ii</sup> A document defining the way in which MBWG can fulfill the goals of the current government is being prepared by MBWG.