IT Abroad

- An IT/Policy Discussion -

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Abstract

The following compilation of essays offers a glimpse into the IT ecosystems of 6 very different nations. Essay 1 surveys the effects of China's policies with respect to intellectual property and censorship. Essay 2 explores the progress and impact of ICT development in India. Essay 3 examines Iran's IT development in relation to its unique political situation. Essay 4 offers a look at the how industrial policy in Japan has affected that nation's information technology profile. Essay 5 analyzes South Korea's rapid emergence as a leading center of information technology. Finally, essay 6 assesses the IT challenges facing Vietnam and the measures currently being undertaken to address them.

CHINA

- Lars Bergstrom

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Introduction

Government policy from the Communist Party of China (CPC) prioritizes the long-term situation of the People's Republic of China (PRC), the party, and its people over pressures from international governments or the short-term needs of individuals or corporations. It is willing to take a very long-term view of these issues which, when compared to the US or EU, makes them look either unresponsive or negligent. However, its policies are carefully chosen with their overriding goals in mind. This chapter will survey the Intellictual Property (IP) and Censorship laws, policies, and methods of enforcement used by the CPC in relationship to Information Technology issues.

Intellectual Property

China's recent entry into the WIPO brings with it an assumption by many that international intellectual property rights (especially patents) will be respected in the identical manner as those of the United States and the European Union. However, as with most of the WIPO member countries (including the United States), China retains several reservations and has not yet changed local laws and practices to completely mirror the WIPO agreements. Most of the formal reservations are concerning the amount of time that applicants have to file and reactions to malformed patent applications [PatentLawNotes, PCTReservations]. However, it's also worth looking at some specific issues in Chinese law, particularly around enforcement, to better understand the current attitude of the PRC towards intellectual property. In line with the general goals of the CPC, the attitude of the government towards patent law favors technology diffusion over exclusive exploitation rights [ForeignPatentDeterminants].

Laws

Patents in China, even International Patent Applications, are allowed to be owned by foreign entites, but any such patents must be applied for by a Chinese agent. These patents are subject to any international law and foreign agreements that the PRC has agreed to, excepting any reservations [PatentLaw, Article 18, 19]. So, on the surface, the naive intuitions about patents should hold. However, many Chinese laws and practices subvert this ideal.

For eaxmple, patents that the Patent Administration of State Council determines are in the best interest of the people may be placed under compulsory licensing. That is, the government will adjucate a licensing price with the licensor, and all those wishing to use the patented material will be allowed to do so - the licensing is non-exclusive from that point forward unless the patent owner can prove the compulsory conditions no longer exist. The conditions under which this may happen are national emergencies, extraordinary states of affairs, or wherever the public interest requires [PatentLaw, Article 50]. After three years of the filing of a patent, *any* entity may request compulsory licensing go into effect for any of the above conditions, which also include anti-competitive behavior [PatentLawRegulations, Article 72].

Infringing uses will always result in a court order to terminate the infringing behavior. Similarly to the United States, damages result (up to triple the amount) against the infringing party; however, unlike the United State, damages only result for *willful* infringement. If a party can not be proven to have had knowledge of the patent, they are not required to pay damages. Additionaly, non-infringing uses of patents include:

- All academic or educational uses
- Any usages that were in effect before the date of filing of the patent

So, unlike in the United States where companies regularly patent IT processes already in wide use [Akamai, Eolas], those uses would be considered non-infringing, even if the patent were granted [PatentLaw, Article 63].

Popular Awareness and Attitude

The transition towards an Intellectual Property-aware culture is a slow one. Typically, this only occurs after a nations has entered a fully developed status on par with other nations and is looking to share property rights [ChinaPropertyProtection]. China is rapidly heading down this path, and the government and local and foreign businesses are continuing to invest in the basic research and development to establish China as a technology powerhouse. However, until this happens and China has as much to gain financially from IP laws as it loses in freedom, it is not likely that the Chinese people or courts will fully support any IP policies.

Blatent piracy is still rampant in China. In a recent study, 68% of respondants admitted to regularly purchashing what they are aware are pirated music CDs. Interestingly, this varies little by background – just over 60% of surveyed PhD-educated individuals made this admission [ChinaPropertyProtection].

A similar attitude is seen towards patent licensing and copyright infringement. There is a strong reluctance to penalize companies for infringing patents, particularly in the high technology and manufacturing industries [IPRTradeWithChina]. Even when companies win claims of direct copyright infringement, their damage claims are often marginalized, sometimes by more than 10,000% [IPEnforcement].

Censorship

The Internet is the medium assumed to be a technological democratizer: all people would have access to all information from every point of view. However, China is a country where that directly violates part of the government's philosopy of prioritizing the continuance of the PRC and the CPC over individual or corporate rights. As such, access to the Internet is censored from China and the government has aggressively controlled access to pornography and topics deemed detrimental to the state [GreatFirewall].

Filtering

All access from China to other parts of the Internet is filtered through a single provider, ChinaNet, which is assumed to provide most of the government's filtering and blacklist services. All Chinese ISPs connect through this provider and they provide additional filtering on top of that of the government [InternetInChina]. A recent test of roughly 200,000 sites from various Chinese ISPs through this network indiciated nearly 2,000 blocked sites. These sites were primarily either pornographic (Playboy, etc.), religious (Asian American Baptist and Falun Dafa), or political (American legal system and anything about Taiwan independence) [InternetFilteringChina].

Self-Censorship

China's laws encourage a high degree of self-censorship by both individuals and businesses. Publication or access to materials that should be blocked is sometimes not immediately acted upon. If its legal stature is of a questionable nature, the government takes actions through one of two forms: direct or indirect. A news agency linked to a site containing pornographic materials, and its internet access was directly revoked for three days [InternetInChina]. On the other hand, a Hong Kong news agency published an editorial critical of mainland politics and the owner of the news agency found a branch of a clothing store he owned in Beijing closed. He was forced to abandon his investment in mainland business in order to continue his Hong Kong paper, and continues to get pressure from the government when his paper exercises free speech in a way that is not complimentary to the government [SelfCensorship].

Conclusion

Despite the rapid embrace of free market capitalism within China, any investigation of the use of Information Technology must be within the frame of the Communist Party of China's goals for the People's Republic of China. Naive application of western intuitions about intellectual property and censorship does not reflect the current state of affairs in China.

Sources

[Akamai] Akamai says judge blocks Digital Island's use of data system. Boston Business Journal, July 1 2002. http://www.bizjournals.com/boston/stories/2002/07/01/daily11.html

[ChinaPropertyProtection] Lina, Wang. Intellectual Property Protection in China. Nanyang Technological University, 2003.

[Eolas] Eolas Files Patent Lawsuit. Wired, Feb 02, 1999. http://www.wired.com/news/print/0,1294,17688,00.html

[ForeignPatentDeterminants] Sun, Yifei. Determinants of foreign patents in China. World Patent Information 25, 2003.

[InternetFilteringChina] Zittrain and Edelman. Empirical Analysis of Internet Filtering in China. http://cyber.law.harvard.edu/filtering/china/

[InternetInChina] Tsui, Lokman. Internet in China: Big Mama is Watching You. University of Leiden, July 2001.

[IPEnforcement] Li, Ling. The Sky is High and the Emperor Is Far Way: The Enforcement of Intellectual Property in China. Stanford University, 2003.

[IPRTradeWithChina] Plasmans and Tan. Intellectual Property Rights and International Trade with China. Presented at: WTO, China, and the Asian Economies: Free Trade Areas and New Economic Relations, 2004.

[GreatFirewall] Yurick, William. Asia/Pacific Rim Update: The Great (Fire)Wall of China. University of Pittsburg, 1997.

[PatentLaw] Patent Law of the People's Republic of China. Last amended August 25,2000. http://www.sipo.gov.cn/sipo_English/flfg/zlflfg/t20020327_33872.htm

[PatentLawRegulations] Implementing Regulations of the Patent Law of the People's Republic of China. July 1, 2001. http://www.sipo.gov.cn/sipo_English/flfg/zlflfg/t20020327_33871.htm

[PCTReservations] PCT Reservations and Incompatibilities. November 15, 2004. http://www.wipo.int/pct/en/texts/reservations/res_incomp.pdf

[PatentLawNotes] Explanatory Notes on the Basic Proposal for the Patent Law Treaty and the Regulations under the Patent Law Treaty. January 20, 2000. http://www.wipo.int/scp/en/documents/pt_dc/pdf/pt_dc_5.pdf

[SelfCensorship] Shemwell, Carol. Self-Censorship and the Press in Hong Kong.

INDIA

- Avichal Singh

ICT for Development (ICT4D) in India

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Do Poor need ICT

The poor in India, numbering at above 260 million, if considered a nation, would form the fourth most populous nation in the world. In India most rural population lacks running water and sanitation systems, electricity is a scarce and unreliable resource; most states are still struggling with high levels of illiteracy and diseases like malaria and polio – unheard of in the developed nations – still claim countless victims. Are ICT programs for development of any use to such a country?

Such arguments are frequently heard against the use of ICT in developing nations. However, we should be careful before we answer them; for the use of ICT for development (ICT4D) is not a yes/no question. I quote Keniston, for I cannot hope to say it better, "the question is not how to use information technologies, or even whether to use them, but under which circumstances, if any, information technologies can be a means - the most cost-effective means - of helping ordinary Indians, especially those in the weaker sectors of the society, meet their fundamental needs and achieve their basic rights" [1].

Possibly the reason why sometimes ICT4D gets so much criticism is the fault of its own proponents, who in their vigor to promote it, put forth arguments, which prove "too much". ICT is not the answer to world hunger and poor don't really need ICT. What they need is economic opportunity, improved nutrition, healthcare and other basic needs. What ICT can be, is a tool to achieve these goals.

And indeed, ICT holds great promise in that role. We have examples from the villagers in Pondicherry (MSSRF), the parched residents of Rajasthan (Jalchitra), and farmers in Dhar (Gyandoot) [†] that ICT can indeed empower and uplift the masses. ICT and specifically the use of computers and Internet, have the ability to alleviate the infrastructure problems in rural India. A villager in any part of India, if connected, can have instant access to virtual services including microfinance, healthcare, education, agricultural advice, grievance redressal etc.

In the subsequent sections we would first examine some challenges and key issues to the use of ICT4D, and then look into public policy surrounding ICT4D.

Challenges & Issues to use of ICT4D

ICT Infrastructure

India and China's ICT infrastructure was comparable in 1995, however while China has leapfrogged ahead, India's infrastructure remains focused in larger cities with very poor diffusion. Unfortunately this gap is likely to increase, as a recent report forecasted that while China Government's ICT spending will increase by 18% in 2005, that of Indian Government is expected to decline by 5%.

Year 2000 Data	India	China
Telephone-mainline/1000	40	167
Mobile phones/1000	12	161
Internet users/1000	15.9	46
ICT Infrastructure Investments*	4.17B	9.2B

Source: UNDP Human Dev Report 2003 [2], Rediff [3]
*2004 data

Private sector efforts in India are unlikely to improve the ICT infrastructure considerably, especially so in the rural areas, where there is less incentive for private companies to make efforts. Indian government needs to back it's rhetoric on IT with

investments to develop the infrastructure that is the backbone of the ICT industry. Government especially needs to focus on laying out the infrastructure beyond the confines of a handful of hub-cities and out to the rural masses.

Government should take care that any policies instituted do encourage ICT diffusion. For instance, changes in telecom policy in the past have opened up the market to private sector and have caused a boom especially in mobile phones. But most of this growth is in urban areas, and the mobile phones growth has mostly been in the population that already has fixed phones. Growth in rural coverage has fallen sharply, the lines added in 2003 are a third of 2002 and in 2004 they were half of 2003. In 2004 only 8,060 Village Public Telephones - usually the first phone in villages without connectivity - were added as compared to 46,271 in 2003 [4].

Although it is said that – "Dial tone is the first step towards the goal of universal access", may be the innovators in India can sidestep this problem. Government should seriously consider and promote alternative technologies for rural access. These include

- Wireless in Local Loop (WLL), demonstrated effectively by the Prof. Jhunjhunwala (IIT-Madras) &
- WiFi (802.11b and other) based access piloted by IIT-Kanpur & Media Lab Asia

Collaboration of Efforts

At any given time, there are multiple ICT4D projects being run in India. Each state government administers their own ICT projects, and within state and central governments ICT projects are spread across various departments and ministries in charge of running them. Apart from that, there are NGOs, University groups and Private companies running their ICT programs. However there is no formal means of coordination between these projects. There is a significant overlap in a lot of programs and there is very little sharing of experiences or best practices [5]. This is compromising the effectiveness of ICT projects by putting forth a piecemeal rather than a coordinated approach.

Partnerships amongst these agents would bring a synergy to the ICT effort, since each agent has it's own set of competencies. While NGO's share a grassroot link to the

masses, universities provide a dash of innovation and government/private sector bring in their resource strength.

A significant step towards this would be a centralized repository of ICT projects. This could also serve as a place for brainstorming new ideas, sharing best practices, ICT event calendar and resource marketplace. Several such databases already exist, notably – Digital Dividend, InDev and IT for Change [6]. Possibly one of them can be adopted as the official repository by the Government, or a new database could be built. The database would receive a good start, if it's made a prerequisite for any public-sponsored ICT project to be registered there.

Serving real needs

A large number of failed projects in IT industry are attributed to incorrect requirements management. The situation is quite similar for ICT4D projects. For instance the CRISP system deployed across the Rural Development agencies by the National Informatics Center (NIC) was grossly under-utilized. But interestingly, while the applications provided by central agencies were not being used, several local applications were developed in many districts [7]. This suggests that the national project was not designed keeping in mind the needs of local administrators.

- ***Adopt a participatory (bottom-up) approach***

The above example exhibits the tradeoff for a top-down approach - while a centralized technology push, could lead to quick execution, it could compromise on effectiveness due to lack of participation. Successful projects are designed bottom-up with a participatory approach, involving the people at whom the project is targeted. For example the 'Village Knowledge Center' project by M.S. Swaminathan Research Foundation(MSSRF), used Participatory Rapid Appraisal (PRA) techniques for a comprehensive information-needs analysis and potential user survey, of 20 villages, before selecting the villages for an experimental telecenter project [8].

- ***Use of appropriate technology***

There is a temptation to ride the technological bandwagon, when sometimes the simplest technology can produce the best result. For example in the 'Dairy Information & Services Kiosk' project an adapted milk-testing machine was used at the cost of $500 as compared to $4000 from the original manufacturer and simple and rugged plastic cards were used instead of smart-cards [9]. Such use of indigenous technology should be supported whenever possible.

It should also be kept in mind that ICT is not simply about computers and the internet. ICT has been used for development projects in India since 1970s [12]. In fact, judging from the statistics of reach of various media, it may be at times more effective to use a medium like radio, television or print. Examples of such projects include 'Kissan (Farmer) Call Center' launched across the country to deliver extension services to the farming community in their local language [†].

Household Reach	
Radio	105 million
TV	70 million
Telephone	8 million
Internet*	1 million

Source: IT for Masses [10] & AIR [11]
*Lists connections

Often new programs for development are started using the latest and greatest technology, when a simple enhancement to an existing development program could produce same or better results. We should look at enhancing existing programs rather than investing excessive time and resources in starting new programs. A good example is the pilot in 'Same language subtitling' of TV shows, which shows how a simple addition can produce substantial literacy skills [13].

The Ities'

Sustainability

Very few donor-funded ICTD initiatives have proven to be self-sustaining once external assistance (financial and material) has run out [14]. While it is accepted that initial costs need to be absorbed by someone, projects usually lack even a long-term plan of financial sustainability.

This clearly needs to change, since ICT4D projects cannot flourish if they always have to be propped up by third-party investments. And this can happen by taking a more professional – almost a venture capitalist view – of ICT projects. Each project should

have a realistic business plan, which assesses the costs (including maintenance which is often excluded), benefits and risks involved. There should be a plan for long-term sustainability with set target-dates for break-even points and recovery of initial investment. Clear performance criterion should be established to judge the outcome of the project, and for a failed project, losses should be cut and an effort should be made to recover as much cost as possible.

There are many encouraging examples in this area which demonstrate a working financial model for ICT projects. 'Gyandoot' [†] project, an intranet connecting rural cybercafés in Dhar, M.P., charges small fees for services like certificates, complaints to administration and posting online advertisements. Another model is Mahiti [15], a private ICT company which has no grant or donation based income. They provide subsidized services to small organizations and charge large organizations regular market rates.

Scalability

India abounds with pilot ICT Projects, but very few are scaled or replicated to a larger audience, and even fewer do so successfully. As per a recent comment by a world bank Informatics specialist, out of 200 ICT e-Governance projects underway in India, only 110 are scalable [16].

We need to ensure that more pilots are scaled to a larger audience; unless all we want to achieve from these projects are IT 'potemkin' villages. We need to be better at selecting and promoting projects which are designed with scalability in mind (e.g. CARD project in A.P.) as opposed to one-off projects (Healthcare pilot in Rajasthan) [†]. Not to say that one-off projects should not be attempted, but funds should be judiciously distributed between projects of these two types.

The problem of scalability is complicated by the diversity in India, which is not only linguistic, but also "regional, agricultural, cultural, climatic, religious, sociological, and political" [17]. It is a challenge to maintain relevancy of content/services provided for one locale to another even a few hundred miles away. For instance the TaraHaat project which was successfully deployed in Uttar Pradesh faced considerable difficulties in expanding to the nearby state of Punjab [18].

Central models of management used to deploy national or state level projects also make it difficult for the project administrators to keep the local needs into consideration. The ideal, yet still elusive, approach would give us the economies of scale that are only possible through centralized top-down models, while still keeping the local requirements in consideration and local populace involved.

Measurability

ICT4D projects are working in an empirical vacuum; there is little evaluative evidence on the effectiveness of these projects. There are some valid reasons for this

- ICT4D is relatively new, as a distinct development field : It is a complex and ongoing task to study the impact of a tool or methodology on society, and isolate and quantify it's effects
- Targeted gains of several ICT4D projects are difficult to measure : A strictly financial model is difficult to adopt for judging ICT projects, since benefits like empowerment, upliftment are difficult to measure.

However there are other factors in play which could be countered [19]:-

- A focus on technology transfer rather than development outcomes, i.e. project success is measured simply by completion of project rather than by observing if the development goals were achieved
- 'Iceberg phenomenon': ICT components are found in different measures in various development projects, but such projects are frequently applied other labels than ICT
- Tendency to hide failures: possibly since most ICT projects are dependent on external-funding there is a tendency to justify projects and under-report failures

ICT4D community understands it has to do a better job in monitoring and evaluating it's projects. However this goal would never be accomplished, if this is an afterthought to the project. Thus from their conception, projects need to define clear outcome indicators and statistics to be collected along the way. Steps should be planned to collect this information at crucial stages in project development.

One challenge to ICT4D is most of the projects have a very specific and local focus, thus information gathered and lessons learned from one project are difficult to apply elsewhere. Therefore we not only need to know 'What' worked for the project, but 'Why' it worked. Such background information could help us generalize the learnings from a project.

Pockets of Progress

In the use of ICT for development, India is not progressing together as a nation. Some states are clearly ahead of others, but even within states there are large disparities. Karnataka an early starter and leader in ICT has been one of the poorest states in India. Andhra Pradesh, the leader in e-Governance projects, is also infamous as the farmer suicide capital [20].

There is a clear disparity in the ICT projects undertaken in the southern and rest of India. Almost half of all projects in India are located in the southern states of Tamilnadu, Karnataka, Andhra Pradesh and Kerala. Together, these states account for just 22% of the country's total population [21]. The Government of India conducted an e-Readiness study in 2003, and the final report listed - to no one's surprise - Karnataka , Maharashtra, Tamilnadu, Andhra Pradesh as the leaders. However 21 out of 35 Indian states & Union Territories (UT) were listed as 'below average' or 'least achievers' [22].

Late-starter states like Punjab and Gujrat, who are in good economic standing in other sectors, stand to gain from the experiences of early-starters and have a fair chance of pulling close to the leaders. However regions like the northwest are severely under-developed. For such regions government has to put in extra effort not only into ICT4D but overall development initiatives to ensure that this gap does not grow. The 'Community Information Center' project which setup 487 ICT centers in the north-east region is a good step towards that direction.

ICT Policy

2004 election results came as a surprise to many, as the previous government which had heralded a boom in IT industry and had given the country the "India shining" slogan was voted out of power. Even state government of Chandrababu Naidu, a strong IT

proponent, who had led several ICT e-Gov initiatives, was ousted. So did this reflect an end to the era of ICT4D in India?

Hopefully not, however this should serve as an eye-opener to those involved in ICT projects. The rural population, largely unaffected by the booming advances of a few urban centers, clearly wants projects/reforms that impact their lives and are designed from the bottom-up to serve their needs. The focus on ICT projects should be 'how' to solve their basic problems, not 'what' technology should be used.

Story so far…

India has experienced significant economic growth, especially in the IT sector, since liberalization began in 1991. In 1986, the Indian government had presented a new software policy, and in 1988 a scheme for Software Technology Parks (STPs) was introduced. However, mostly due to the success of private sector companies, Indian IT sector grew from $150M in 1991-92 to $5.7B in 1999-2000 [23].

An 'IT Task force' was constituted in 1998, to speed up the growth in IT. The effort was unique in that it elicited feedback from the general public and also worked closely with state governments (website states over 10,000 suggestions submitted) [24]. The workforce finally submitted a list of 108 recommendations, a significant number of which were accepted and implemented. This also led to the IT Act 2000 – which established the legal framework for e-Commerce by recognizing digital signatures and such. Also in 2000, a working group on 'IT for Masses' was constituted by the government to look into the widespread diffusion of IT. A four year National e-Governance Action Plan was formulated in 2003.

While the Ministry of Communication and Information Technology handles most ICT policy issues, National Informatics Center(NIC), within the Department of IT, has been the pioneer in ICT4D projects and is involved with most central and even state ICT4D projects.

With the liberalization, there has been a shift away from central government to private sector and state governments. State governments have recently played an active role in promoting ICT development and ICT projects by setting up their own IT departments and IT policy. States can in general be categorized into two categories [25]

- ‘Late starters’ (West Bengal, Punjab etc.) focusing on basic computer awareness, training and attracting national ICT investments, and
- ‘Early starters’ (Karnataka, Andhra Pradesh, etc.) focusing on developing high-end education, infrastructure facilities and attracting multi-national investors

Looking Ahead

While several of the recommendations by the ‘IT Taskforce’ were related to ICT4D and were implemented, India needs a continuation of that in a ‘National ICT policy’. Current ICT policy exists embedded in various places, including the 5 year plan (10^{th} plan 2002-2007), Telecom policy and various action plans such as the National e-Governance Action plan(2003-2007).

The innovation and enterprise to bring ICT to the masses already exists, what India needs is a policy across sectors for use of ICT for development. Although each state is developing it’s own IT policy, that cannot be a substitute for a national ICT policy. This of course needs to be done with involvement and participation from stakeholders at all levels. Possibly this can be achieved by an ICT summit, as the one that was held in Kyrgyzstan with the help of UNDP & GIPI [26].

Another idea would be to setup an over-arching umbrella agency, which would oversee all ICT4D projects. Such an organization could coordinate ICT efforts undertaken by various ministries and departments. Further this agency, could also interface with private companies, NGOs and universities, and encourage and facilitate their participation in the ICT4D process. Thus the idea would be to play a catalytic and enabling role, but not of a clearinghouse, which could make it another bottleneck in the process.

There are a few additional issues of concern related to government policy, which need consideration:-

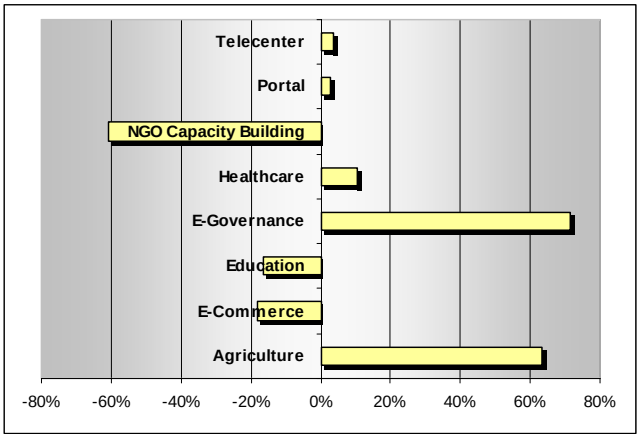
- ***E-Gov – need for balance***

Indian government has placed a high emphasis on implementation of e-Governance, which is apparent from India’s past success in e-Gov projects and the recent National e-

Governance Action Plan(NEGAP) and other government policies. Spending on e-governance has gone up 25% annually from around Rs. 15 billion in 2002 to an estimated Rs. 22 billion in 2004 [27].

While e-Gov does hold great promise, it is important that we approach such projects with the same caution and planning as has been suggested for other ICT projects. E-Governance projects actually pose a high level of risk, 35% of all e-Gov projects in developing nations tend to fail, 50% partially fail with only 15% gaining success. The primary reason cited for their failure is over-reliance on technology as the driving force for success with internal processes remaining unaltered [28]. E-Governance is no magic-wand, before rolling out e-Gov projects the deficiencies in the underlying process should be remedied.

There is also a need to balance resource and investment across the various ICT project disciplines. Statistics from Digital Dividend project database seem to indicate that India has an over-representation in e-Gov projects by 71%. This significant emphasis on e-Gov projects may be drawing resources away from other, equally worthy ICT projects. And that is reflected in under-representation of 'NGO Capacity building' projects by 60%.



Proportional Distribution of Activity Types based on Overall Project Numbers from India

*Graph based on values calculated by author using Project data available at Digital Dividend, methodology used based on Digital Dividend Report [29].

❖ ***ICT Centers – fascination with numbers***

ICT Centers or telecenters are useful tools in bringing ICT access to the rural masses, while keeping the costs down at the same time. However, there has been this trend for central and state governments to announce plans to open XX number of ICT Centers by YY date. Number of telecenters opened should not become our metric of success in ICT4D projects. Since, while such a metric tells us that ICT tools are available, it does not say how they are being used. The goals of such projects should instead be focused on the benefits and services they bring to the general public.

"Connectivity for the sake of connectivity accomplishes very little" - Dr. Allen Hammond, Director of the Digital Dividends program.

❖ ***IT for Masses – waiting for action***

The recommendations of the 'IT Task Force', mostly oriented towards developing IT to meet the global marketplace needs, were submitted on July 1998. An action report published Jul 10, 2000 lists action taken on each of the recommendations. Of the 108 total recommendations, only 7 were not implemented or not accepted, the rest were either implemented or considered ongoing.

The working group on 'IT for Masses' was setup on May 10, 2000 and submitted a list of 46 recommendations in categories of 'Infrastructure and Services', 'Electronic Governance', 'Education' and 'Mass Campaign for I T Awareness'. Some of the recommendations were

- Encourage new communication technologies (Wireless)
- Promote indigenous technology development for low cost Internet access devices
- Five Year IT Plans (by Central and State governments)
- Sharing of experiences and best practices amongst States

As per their website a 'National IT Mission' (NITM) had been set up on Jun 12, 2001 to implement the recommendations of the Working Group. However no information is available on actions taken by NITM. An email to Ministry of Communication and Technology on this issue was unreturned.

While it will probably not be worthwhile to consider those recommendations after such an elapsed timeframe, Government should take note that such efforts are brought to fruition in the future.

Conclusion

While many challenges face the ICT4D movement in India, there are many unique capabilities that give us hope that this effort will move in a successful direction. India has probably the largest NGO community. It has a government with a clear commitment to ICT and e-Governance, and a political and administrative class energized and aware of the possibilities of ICT. It has an extraordinary concentration of technology-driven companies and tech-savvy professionals.

But most importantly, we have our Prof. Jhujhunwalas (IIT Madras/TENET), Rajesh Rajoras (IAS/Gyandoot) and Sugata Mitras (NIIT/Hole-in-the-wall) [†] - dedicated individuals committed toward the goal of IT for masses.

"Never doubt that a small group of thoughtful citizens can
change the world. Indeed, it is the only thing that ever has."
- Margaret Mead

Appendix

Index of ICT Projects

C.A.R.D – Andhra Pradesh	www.ap.gov.in/card (Computer-aided Administration of Registration Department)
Gyandoot	www.gyandoot.nic.in
Healthcare Pilot Rajasthan	See S. Bhatnagar & R. Schware. Eds. Information and Communication Technology in Development. ISBN: 0761994440 New Delhi: Sage Publications India Pvt. Ltd pp. 35-49
Hole-in-the-	www.niitholeinthewall.com

wall (NIIT)	
Jalchitra	http://www.gisdevelopment.net/application/nrm/water/ground/mi03240.htm
Kissan(Farmer) Call Center	www.kisancallcenter.net
TeNeT	www.tenet.res.in The Telecommunications and Computer Networks Group, heads multiple projects in this area
Village Knowledge Center, Pondicherry (MSSRF)	http://www.mssrf.org/special_programmes/ivrp/ivrpmain.htm

References

[†] See Index of ICT Projects

[1] Keniston, K. (Feb 2003). *IT for the Masses: Hope or Hype?.* [online] Available from: http://web.mit.edu/~kken/Public/PDF/EPW_paper.pdf [Accessed: Oct 17, 2004] p.4

[2] United Nations Development Programme. (2003). *Human Development Report 2003.* [online] Available from: http://hdr.undp.org/reports/global/2003/pdf/hdr03_complete.pdf [Accessed: Nov 17, 2004]

[3] World Information Technology and Services Alliance. (2004). *Digital Planet 2004: The Global Information Economy* cited in *ICT spending: China beats India.* (Nov 15,2004) [online] Available from: http://inhome.rediff.com/money/2004/nov/15china.htm [Accessed: Dec 7, 2004]

[4] Uppal, M. (Aug 30 2004). *Rural telephony: the missing link.* [online] Available from: http://in.rediff.com/money/2004/aug/30guest1.htm [Accessed: Dec 1, 2004]

[5] Ibid. Keniston, K. *IT for the Masses: Hope or Hype?.* p.28

[6] See web-page for details on these ICT databases
Digital Dividend: www.digitaldividend.org
InDev: India Development Information network: www.indev.nic.in
IT for Change: www.itforchange.net

[7] S. Bhatnagar & R. Schware. Eds. *Information and Communication Technology in Development.* ISBN: 0761994440 New Delhi: Sage Publications India Pvt. Ltd pp.23-24

[8] United Nations Development Programme. (Sep 2001). *Essentials: Information Communications Technology for Development.* [online] Available from: http://www.undp.org/eo/documents/essentials_5.PDF [Accessed: Nov 26, 2004]

[9] Bhatnagar, S. (2000). *Empowering Dairy Farmers through a Dairy Information & Services Kiosk.* [online] Available from: http://www1.worldbank.org/publicsector/egov/diskcs.htm [Accessed: Dec 10, 2004]

[10] Government of India. (undated). *Working Group on Information Technology for Masses – Background Report* [online] Available from: http://itformasses.nic.in/contant.htm [Accessed: Dec 2, 2004]

[11] *All India Radio – About Us – Growth & Development.* (undated) [online] Available from: http://www.allindiaradio.org/growth.html [Accessed: Dec 7, 2004]

[12] Ibid. S. Bhatnagar & R. Schware. Eds. *Information and Communication Technology in Development*. Preface.

[13] Ibid. S. Bhatnagar & R. Schware. Eds. *Information and Communication Technology in Development*. p.211

[14] Ibid. UNDP. *Essentials: Information Communications Technology for Development.* p.14

[15] Mahiti – About Us. (undated). [online] http://www.mahiti.org/About%20Us [Accessed: Dec 7, 2004]

[16] *Indian e-governance faces uphill task: World Bank.* (Nov 5, 2004). [online] Available from: http://www.siliconindia.com/shownewsdata.asp?newsno=25933&newscat=Technology [Accessed: Dec 7, 2004]

[17] Ibid. Keniston, K. *IT for the Masses: Hope or Hype?*. p.16

[18] Singh, N. (Apr 2004). *Information technology and rural development in India*. (Apr 2004). [online] Available from: http://www.idfresearch.org/pdf/singh.pdf [Accessed: Nov 10, 2004] pp.31-33

[19] Ibid. UNDP. *Essentials: Information Communications Technology for Development.* p.19

[20] Sainath, P. (June 2004). *When farmers die.* [online] Avilable from: http://www.indiatogether.org/2004/jun/psa-farmdie.htm [Accessed: Dec 7, 2004]

[21] World Resource Institute, Digital Dividend. (June 2003, Updated Oct 2004). *Geographic Distribution of ICTs.* [online] Available from: http://www.digitaldividend.org/pubs/pubs_overview_distribution.htm [Accessed: Dec 7, 2004]

[22] Government of India. (2003) *India: E-Readiness Assesment Report 2003.* [online] Available from: http://www.mit.gov.in/ereadiness/ [Accessed: Nov 27, 2004]

[23] Digital Opportunity Initiative. (July 2001). *Creating a Development Dynamic:Final Report of the Digital Opportunity Intiative.* [online] Available from: http://www.opt-init.org/framework/pages/appendix3Case4.html [Accessed: Dec 7, 2004]

[24] *National Taskforce on IT & Software Development – Digest of Suggestions Received*. (undated). [online] Available from: http://it-taskforce.nic.in/selectforum.htm [Accessed: Dec 10, 2004]

[25] Ibid. S. Bhatnagar & R. Schware. Eds. *Information and Communication Technology in Development*. pp. 200-203

[26] Global Internet Policy Intiative. (Apr 2001) *A Process for Developing Internet Policy:*

The Model of the National ICT/Internet Summit. [online] Available from: http://www.internetpolicy.net/practices/process.shtml [Accessed: Dec 7, 2004]

[27] Times of India. (Nov 7,2004). *E-governance clicks with India*. [online] Aailable from: http://timesofindia.indiatimes.com/articleshow/msid-914927,curpg-1.cms [Accessed: Dec 7, 2004]

[28] Deccan Herald. (Nov 6, 2004). *E-governance a big challenge for India.* Available from: http://www.deccanherald.com/deccanherald/nov062004/c11.asp [Accessed: Dec 7,2004]

[29] Ibid. World Resource Institute, Digital Dividend. (June 2003, Updated Oct 2004). *Geographic Distribution of ICTs.*

Method of calculation is same as used in 'Figure 10: Proportional Distribution of Activity Types based on Overall Project Numbers for Each Region'.

Total ICT projects in Digital Dividend database: 1088
ICT projects from India: 258 (23.7% of Total)

ICT Projects	India	Total
Telecenter	65	264
Portal	47	193
NGO Capacity Building	10	107
Healthcare	22	84
E-governance	52	128
Education	61	308
E-Commerce	21	108
Agriculture	38	98

*As per information available on Nov 28, 2004

For example, 40% of the E-Governance projects in the Clearinghouse are located in India, even though overall only 23% of projects in the Clearinghouse come from that region. This is 71% more than would be expected if the number of e-Governance projects in India was proportional to the number of projects in India overall.

IRAN

- Eiman Zolfaghari

Thesis: Recent activities by the Iranian Government have helped to instigate growth into Iran's once fledgling IT industry, whereas U.S sanctions on Iran have had little net effect on this portion of Iran's industry.

Iran's current IT industry and U.S Sanction's effects on Iran's IT industry.

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In this portion of the paper, we will look at Iran's current IT industry, and look at the effects the U.S sanctions have had on that industry. We'll start out with a brief overview of Iran's governmental structure and recent IT history. Then we'll analyze Iran's current IT plans, where we will see that the plans currently in place by the government are helping to grow this once fledgling industry. We will then analyze the U.S sanctions' effects on the current Iranian IT industry, and see that it is having little net effect on this portion of Iran's industry.

Government Background

The current Iranian government is a theocracy based on the ideologies of the late Ayatollah Khomeini. The Islamic Republic of Iran, or IRI, has two split portions of the government: the elected potion, and the appointed or approved portion. The elected portion consists of the President, the Parliament (Majlis), the Council of Ministries (the head of all the Ministries, similar to the Cabinet members in the U.S.), and the Assembly of Experts (clerics elected for eight-year terms). This may sound like a democracy at first, but then there is a non-elected portion of the government: The Supreme Leader, the Council of Guardians, Armed Forces, the Judiciary, and the Expediency Council. The

Council of Guardians and the Supreme Leader wield the most power because they can overturn and veto any law passed by the Parliament for not being 'Islamic'. They also control the Revolutionary Guard, the army set out to protect the 'Iranian Revolution', and all intelligence agencies, of which there is little known about. As has been shown in the last decade, with President Khatami has his moderate agenda, the hard-liners in the Council of Guardians and the non-elected portions of Iran's government have immense power to stop any political movement.

IT Industry Background

Before the Iranian Revolution of 1979, Iran had a robust IT industry, one comparable to the United States at the time. Many foreign suppliers had a presence in Iran, including big name U.S companies such as IBM and NCR. Iranians at the time developed software systems to support the Farsi language using large mainframe IBM machines. *[Nicholshon]* U.S.-Iran relations were strong and the Iranian government unwavering in its alliance with the United States.

After the Revolution, all ties were cut between the United States and Iran. U.S.-based companies, and in fact many other foreign-based companies, pulled out as the new government was seeking to weed out all 'western' influences on the country. Iran experienced a 'brain-drain,' wherein most of the technocrats and intelligentsia fled the country to protect their families from the new government.

The Islamic Republic of Iran (IRI) believed that countries like the United States have caused 'Westoxification' of their culture. Whether or not the West is wholly guilty of corrupting the youth of Iran with alcohol, strip bars, greedy capitalism, or other issues that even the Western world has issues with, is arguable. However, new technologies that make peoples lives better, such as the Personal Computer or the Internet, are hardly signs of 'Westoxification.' And yet, the IRI dismissed all Western influences, and with it went embracing of the ensuing Information Revolution.

This did not last long, however. As the Personal Computer Revolution was occurring in the United States and throughout other countries in the early 80s, Iran was fighting a bitter war with Iraq. At the end of the war in 1988, the Iranian economy was in

shambles. Economists there attempted to open up their borders to international trade, only with limited success.

The first Personal Computers showed up in Iran in 1985. The biggest PC manufacturers, IBM and Apple, however could not legally sell their products in Iran. Thus most Iranians could not afford a personal computer, since parts were expensive to purchase and assemble. As East Asian countries like Taiwan became centers of computer manufacturing, the Iranian market was able to purchase computers without directly involving the United States. After that, all that was needed to have Iran enter into the modern IT world was time to make PC prices more affordable, and give Iranians access to the Internet.

Internet Access in Iran

There had been efforts to bring the Internet into Iran since 1987. As DARPA was connecting various networks around the United States in what would soon become the Internet, IBM was supporting a similar network called BITNET. Some European universities at the time were connected to IBM's BITNET network through the European Academic Research Network (EARN). Through the help of members at the Institute for Studies in Theoretical Physics and Mathematics in Iran, or IPM, Iran became a member of EARN and thus was able to connect to the University of Austria on a 9600 baud leased line in January 1993. *[ORN]* Soon after, many universities connected to the Internet via IPM. As you can imagine, the connection was extremely slow, as dozens of universities were all sharing a 9600 byte bandwidth! IPM soon increased their bandwidth to a 512KB line. Yet after time, universities started propping up their own connections, mostly via Satellite services, and subsequently created ISPs to share access with Iranian citizens. By the late 90s, ISPs were popping up everywhere in Iran, and the competition drove prices for dial-up access to a more affordable level, although still too high for the average Iranian. The state-owned telephone company of Iran, TCI, was not very happy. All telecommunication is supposed to be state controlled. Yet Internet demand was too high for there to be a reasonable consolidation of ISPs. Thus, TCI allowed for ISPs to provide services, yet routinely enforced censorship laws upon them, ensuring they are filtering all 'anti-Islamic' content. The Iranian consumers, however, currently have it good. They are

able to purchase Internet access cards from various existing ISPs, at pretty much the same prices. These cards are sold by the minute, just like phone cards are. When an ISP gets shut down or overly-censored, Iranians can easily switch their service by purchasing another Internet access card. *[Arabshahi]* Thus, Internet access in Iran has been in essence free and uncensored, and the IRI has not been able to fully exert control on it, yet. Thus with this ever increasing demand and capability for free flow on information, the IRI's reaction becomes a very interesting subject to analyze.

Recent activities by the IRI

Recent events in Iran are giving signals that the country is heavily investing in Information Technology. The largest government sponsored event was the passing of the TAKFA framework *[TAKFA, Marandi]*, Iran's National ICT (Information and Communication Technologies) Agenda of 2002. TAKFA's main goals are to: 1. Set aside a budget for ICT-related projects, 2. Ease government regulations to reflect the ICT industry's needs, 3. Create a government position that will look over the TAKFA agenda, and 4. Promoting IT in all parts of the public sector, including the Ministries of government. For Fiscal Year 2004, TAKFA had a budget of $340 Million Dollars for existing ICT projects. All Ministries in the government have been given the recommendation and approval to use 1% of their budget in ICT projects. TAKFA, in effect, has become Iran's version of the National Science Foundation (NSF). *[Sanaray]*

One of the most important aspects of the TAKFA framework is privatization of the IT industry. Currently the government controls most of the important sectors of the economy, like oil, telecommunications, railway, roads, airlines, and shipping. Critics complain that state-controlled companies are what bring down the economy, since there is no competition and inefficiencies among state-owned companies. Iranian President Khatami had pushed early on in his presidency on privatizing key industries. *[Frischenschlager]* These moves were blocked by the Council of Guardians, the fundamentalist legislative vetoing body of the IRI that makes the decision of what is and is not constitutional. A cell phone contract was signed with Turkey-based Turkcell, but the Council of Guardians had also objected to that, citing national security concerns.

[Bitaraf] Yet it seems that he Turkcell deal will go through and that opposition to privatization of telecommunication is less that it has ever been.

The TAKFA plans are also providing incentives for Iranian companies to join up with foreign companies. The reasoning behind this is that the Iranian population tends to be great at engineering and programming, but currently lack the management skills that would make an IT company sustainable and competitive. Thus, as part of the TAKFA framework, Iranian companies can file for financial help from a government controlled 'venture capital' fund, and those companies that get foreign assistance from reputable companies have a higher chance of receiving the award. *[Arabshahi]*

The government is also increasing its support on IT exhibitions, whether it's inside the country or outside. Inside the country, the Iran Informatics Companies Association, which is a government-sponsored group of IT experts, recently held the largest IT exhibit in Iran's history: Elecomp 2004. With over 300 exhibitors and thousands of Iranians visitors attending, it was a great sign that there is great demand and excitement for growing Iran's IT industry. Many Foreign manufacturers were there, such as Samsung, Toshiba, and Seagate. There were even signs for Intel, although Intel did not seem to have an official presence there. *[Elecomp]*

One may wonder, why does the IRI seem as if they are opening up and embracing the demands for a privatized IT industry? Not only are they privatizing, they are giving financial capital to companies who meet their criteria of having potential to succeed. They are promoting expansion of Internet access, and expansion of Internet Service Providers. Could it be that they realize the beauty of the Information Revolution, and that they are genuinely embracing the idea of free flow of information? Are they realizing the benefits of eGovernment and its potential to make government more transparent and efficient? Perhaps, yet more practical and political reasons may exist as well. The Iranian economy is currently unstable and very dependent on oil revenues. *[Frischenschlager]* The unemployment rate of Iran is currently 16.3%. [*Mundi*] A weak economy and weak job growth could mean disgruntled Iranians. And the government wants to do as much as

it can to keep people satisfied enough so that they can remain in power. In order to better the economy, Iran has been expanding its international trade and joining forces with countries in East Asia and the European Union. It has attempted 19 times to enter the World Trade Organization, or WTO. *[Iranmania]* The WTO has strict guidelines that a country must follow before being accepted. One of those rules are that all current members of the WTO must come to a unanimous agreement on allowing Iran in. In all 19 attempts, Iran has been rejected, the main reason being United States' refusal. Other countries in the WTO cite Iran's unstable economy and its large dependence on oil money. Thus, the Iranian government would be wise to get its economy to a point where the IT industry is thriving, so that they can show themselves as a strong player in the marketplace. Then when the only reason they cannot enter the WTO becomes that the United States does not allow for it, they can probably play some political games so that it is to their advantage.

U.S. Sanctions on Iran

Along with the U.S foreign policy of not allowing Iran into the WTO, the U.S. also imposes sanction on Iran, not allowing any items to be bought from Iran by a U.S entity, and not allowing a U.S entity to sell its wares to Iranian nationals or the IRI. Since the Iranian Revolution of 1979 and the Hostage crisis of 1980, the United States has imposed different levels of sanctions on Iran. By 1987, the U.S. banned all Iranian goods being sold in the U.S. And by 2000, on Executive Order by President Clinton, all trade between Iran and the United States was banned. [*USTreas*] The effects that these sanctions had on destabilizing the IRI is arguable, yet it has been shown that the IT industry definitely suffered from these sanctions in the 1980s, yet currently does not seem to have a large effect. In the 1980s, as the Personal Computer was becoming more popular, Iranians had very little access to PCs. Parts were very expensive not only because of the nascent PC market, but also because most PCs manufacturing companies were based in the U.S. As the PC industry grew, it became more internationalized. And the Iranian government, after the election of President Khatami, embraced the global market a bit more and allowed foreign (non-U.S.) companies to do more business in Iran. *[Frischenschlager*]

Thus by the late 1990s, the Personal Computer became more affordable for the average Iranian, although still not affordable enough to all Iranian citizens. Iranian computer companies and retailers are now getting their parts from East Asian countries such as Malaysia and Taiwan. Iranians can purchase a fully-featured PC with Intel CPU and Microsoft software, at lower prices than what it would cost to purchase the same items here in the U.S. *[Arabshahi]* Thus the sanctions on Iran seem to have little effect on the consumers, except that they cannot have the latest hardware that a U.S company creates, but must wait until it is either bundled in a system bought from an East Asian country, or until that idea is reverse engineered.

Another aspect of the sanctions was restricting U.S companies from selling anything in Iran. However, as recent reports show companies like Halliburton, Caterpillar, and General Electric has business there. *[CNN]* These businesses maybe legal since these companies have separate entities in cities such as Dubai, and that all their employees that work for Iranian business are not U.S citizens, thus they cannot be considered under the sanction. Many smaller private companies also use the same loophole to gain access to the Iranian market. An example of this is a small company that currently sells VPN (Virtual Private Network) satellites that are only created in the U.S. to Iran. They way they do it is they work with an Indian company to purchase the Satellite pieces and assemble it in India. Thus, the end product is made in India, thus it is fair to sell to Iranians and the Iranian government, and in fact have been purchased by an ITI Ministry. Thus, U.S companies, if they wish to, could find ways of accessing the Iranian market, although not directly.

Conclusion

The future of Iran is unpredictable, yet if political events do not galvanize the situation there, the IT industry in Iran seems to be going forward. They are going in a direction where the industry is more privatized, the public sector is more e-Enabled, thus potentially more efficient than the current bureaucratic mess that it is. There is good international support for Iran's IT industry, and Iranian IT companies are starting to work in a more IT-friendly environment. The sanctions have had little net effect on Iran's IT industry, and Iran's bids to enter into the WTO may slowly become more reachable, as

they expand their economic stability by embracing the Information Revolution and entering into the 21st Century, or as it current is in Iranian calendar, the late 14th Century!

Bibliography

[Nicholshon] Sahay, Sundeep Nicholshon, Brian. "Building Iran's Software Industry: An Assessment of Plans and Prospects Using the Software Export Success Model," 2003. Available: http://www.sed.manchester.ac.uk/idpm/publications/wp/di/di_wp15.htm

[Arabshahi] Interview with Dr. Payman Arabshahi, 11/23/04.

[Sanaray] Sanaray's Presentation on TAKFA *http://www.sanaray.com/english/?ParTree=AHC*

[ORN] Open Research Network, "Iran's Telecom and Internet Sector: A Comprehensive Survey," 07/15/1999 (on-line) Available: http://science-arts.org/internet/

[Neda] Neda Rayaneh website: http://www.neda.net.ir

[Iranmania] "Call for greater EU role in WTO talks" 11/18/04, Available: http://www.iranmania.com/News/ArticleView/Default.asp?NewsCode=27130&NewsKind=BusinessEconomy

[Molavi] Molavi, Afshin. "Buying Time in Tehran," Foreign Affairs, 10/26/2004 Available: http://www.newamerica.net/index.cfm?pg=article&DocID=2031

[Mostashari] Mostashari, Ali "The Impacts of U.S. Sanctions on the Iranian Civil Society: Consequences for Democratization," Available: http://www.payvand.com/news/04/jan/1056.html

[USTreas] "What you need to know about U.S Sanctions (on Iran)" Available: http://www.treas.gov/offices/enforcement/ofac/sanctions/t11iran.pdf

[Elecomp] Elecomp 2004 Website: www.elecompfair.com Tour: www.elecomptour.com

[Franssen] Franssen, Herman Morton, Elaine "A Review of U.S Unilateral Sanctions against Iran." Available: http://www.mafhoum.com/press3/108E16.htm

[CNN] "U.S. companies are operating in Iran" Available: http://money.cnn.com/2003/05/29/news/iran_sanctions/

[IranExpert] "Iran to adopt gradual privatization program." Available: http://www.iranexpert.com/2004/private20october.htm

[TAKFA] TAKFA Plan, Available: http://www.kitex-ir.com/TAKFA.pdf

[Marandi] Marandi, Behnam Behjat, "The First Signs of TAKFA" http://tehranavenue.com/ec_feature_takfa.htm

[Frischenschlager] Albrecht Frischenschlager, "President Khatami's economic performance" Available: http://www.iranmania.com/news/economy/features/khatami_97-01/default.asp

[Bitaraf] Bitaraf, Mansour Rafii, Fereshteh "Who Opposes Turkcell Deal?" http://www.netiran.com/?fn=artd(1914)

[Mundi] Iran – Unemployment Rate, from CIA World Factbook, Index Mundi Website, Available: http://www.indexmundi.com/g/g.aspx?c=ir&v=74

[PBS] "Iran's Governmental System" Available: http://www.pbs.org/newshour/bb/middle_east/iran/structure.html

JAPAN

- Walker Duhon

Industrial Policy and IT in Japan

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Japan's remarkable economic rise in the Post-WWII period has been the subject of much interest in the West. Devastated by war, 1950's Japan hardly looked like a nation on the verge of becoming an economic power, and yet by the early 21st century, the Japanese people are among the wealthiest on Earth. In the process of its economic "miracle", Japan created institutions and methods that together constitute a new way of thinking about economics and economic development. The thesis of this chapter is that the Japan's model of industrial policy helps to explain the strengths and weaknesses of Japan's IT ecosystem. To this end, I will first give an overview of the values and institutions that form the basis for the "East Asian Economic System" (so-called because though it originated in Japan, many of its elements have since spread throughout the region). Second, I will explore three IT-related industry sectors — software, the mobile internet, and robotics — and explain how Japan's industrial policy has affected each.

East Asian Economic System and Japan

The history behind the Japanese or East Asian model of economic development is a fascinating story[1]. Though its origins lie in Japan, other nations in East Asia have since

[1] Perhaps surprisingly, the intellectual genealogy of the system has a significant American strain Though 19th century German economist Friedrich List is the westerner who can rightly be said to have had the greatest influence on what would become the Japan model, List himself had developed his theories after observing the American system put in place by Alexander Hamilton

adopted many of its practices and institutions, and for this reason we may rightly speak of an East Asian model. But what defines the East Asian Model? The best way to begin understanding it is to contrast it with our more familiar Anglo-American system [1, "The Idea of Economic Success"]:

"Automatic Growth" vs. Deliberate Development

The Anglo-American model has at its foundation Adam Smith's "Invisible Hand", the idea that allowing individuals to act in there own best interests will maximize overall well-being. Central planning is seen under this model as decreasing well-being, as individual entrepreneurs and consumers are in much a better position to decide for themselves how their money should be invested and spent. While "market failures" do exist, these few instances can be accounted for and are exceptions to the general rule that outcomes in a fair market generate the best of all possible worlds.

In the East Asian model the market is viewed more as a tool than the ultimate arbiter of economic outcomes. Central power has its place in guiding development, particularly in removing obstacles and stimulating growth in areas where market forces are insufficient. Individuals acting in their own interests will not necessarily follow that path best suited for a nation's development, both because they will tend to act at cross-purposes and because endeavors beneficial to the group as a whole often entail sacrifice on the part of individuals.

Consumers vs. Producers

The interests of consumers are the ultimate concern of the Anglo-American model. Free Competition is good because it drives down prices and drives out inefficient producers. Producer's gaining and exercising market power through a monopoly or cartel is bad because it produces deadweight loss. Foreign trade is best of all because the consumer gets to choose the best deal out of a wider range of producers. Protecting producers from foreign competition is bad because consumers do not have access to the best value.

In the East-Asian model, capacity to produce is considered more important than the interests of consumers. A society's long-run wealth is determined more by what you can make than what you can consume, so an economic system should do what it can to encourage producers to master and ultimately control technologically advanced economic activities. If this is done, the view is that consumption will take care of itself.

Cosmopolitan vs. Nationalistic

The Anglo-American model holds that everyone can prosper at once. For example, the notion of comparative advantage holds that if all trading parties specialize in what they can produce most efficiently relative to the others, by engaging in trade all parties can be better off.

The East Asian model has been called neo-mercantilist in that it views trade as an instrument of power. While mutual gains can be had through trade, there is also a "zero-sum" dimension in which some parties gain and others lose. The concern is to minimize dependencies on outside parties for danger of losing economic sovereignty.

The general themes above begin to explain many of the institutional differences between the United States and Japan. First, Japan's institutions and practices reflect a distrust of market outcomes leaving ample room for the exercise of power from central authority. Second, the direction of this guidance tends toward nationalistic aims, particularly in terms of trade, and consists of aiding producers so that they can succeed in the international marketplace.

The Civil Service

In concrete terms, throughout the post-WWII period there have been 2 main power centers in Japanese politics: the Liberal Democratic Party (LDP) and the civil service bureaucracies. The relative weight of power between these two entities is the subject of

much debate among political scientists, but it is generally acknowledged that the civil service exercises much more power than comparable institutions in the United States. At the head of the civil service is the Ministry of Finance (MOF) whose powers include effective control over the national budget and jurisdiction over the financial sector. From this position it is able to architect the main thrusts of Japanese economic policy and its initiatives generally express the themes listed in the previous section. The LDP's main role in economic policy is to provide an effective check against the MOF's excesses and to focus attention on issues of local interest to constituents.

In terms of industrial policy, the METI (formerly MITI) is the most critical of the second-tier bureaucracies. Its activities range from coordinating business activities and promoting national champions to sponsoring basic research. In terms of power, the METI ranks below the MOF; as commentator Eamonn Fingleton puts it "the METI proposes and the MOF disposes" [2, p. 32] . Nevertheless, in METI one can see the direct expression of Japanese industrial policy, which is why it has been the subject of so much interest in the west.

Institutions

In Japan, several unique institutions have been designed by the civil service to reinforce its economic goals.

Cartels

While cartels are hardly unique to Japan, the attitude of the government toward them contrasts greatly with the prevailing attitude in the United States. There are several inherent advantages to a cartel based industry structure. One, dividing available capital among a few firms allows each to realize greater economies of scale. Two, by avoiding *kato kyoso*, or "excessive competition" in the domestic market, Japanese producers are better able to use resources to compete abroad. Three, by keeping only a few players in an industry, METI and the civil service is in a better position to monitor and coordinate its activities.

As a point of clarification, Japanese enthusiasm for cartels does not translate into a preference for monopoly. A cartel arrangement is seen to offers a better balance of benefits, and moreover the arrangement limits the power of any one firm, giving the civil service greater control over the industry as a whole.

Keiretsu

Complementing the cartel arrangements are the keiretsu. A keiretsu is a network of relationships between large corporations, their smaller suppliers, and the in the case of the financial keiretsu one or more financial institutions usually headed by a large bank. Keiretsu come in two types [3]: *Capital* keiretsu consist of a large manufacturer and its supplier sub-contractors. Holding the group together are links of cross-ownership in which the root manufacturer holds a significant stake in its suppliers, who in turn hold a stake in the manufacturer and their own suppliers. *Financial* keiretsu are headed by a large *main bank* which serves as a primary source of capital for a diverse array of businesses within its group. The banks tend to own a large stake in their client companies within the group, which in turn own stake in the bank. Complementing the main bank are several smaller financial institutions where similar cross-ownership arrangements exist.

The keiretsu arrangement reinforces stable and closely linked relationships within the group whether it be a firm and its suppliers or its sources of capital (the banks). One advantage of the arrangement is that it facilitates the pooling of risk, giving firms a stronger basis from which to engage in uncertain endeavors. A second advantage is that the arrangement gives incentive for stronger members to help weaker members out during difficult times. Most crucially the structure reinforces a system of bank-based finance rendering the stock market much less important in Japan than in the United States. The resulting difference in corporate behavior is dramatic as it reduces the role of speculative finance. Freed from the requirement to satisfy investors in the short-term, firms can then concentrate on building long-term market share by plowing operating profits back into infrastructure investment and R&D.

Lifetime employment

The employment system in Japan is one of the more curious institutions from the perspective of western observers. It is markedly different from the familiar "hire and fire" approach and as such is often considered by western commentators to be a drag on overall efficiency. The system is marked by three practices:

"Lifetime" employment — Regulatory barriers in Japan make it very difficult (but not impossible) for firms to layoff individuals from firms. While this may seem to limit a firm's flexibility, there are other mechanisms that ease the burden during difficult times; for example, a large portion of Japanese salaries come in the form of bonuses which can be lowered as the need arises. The arrangement is not a complete worker's paradise however, because in return a Japanese worker's job mobility is also severely restricted. Further constricting mobility, the ability of a firm to "poach" on other firm's talented workers is also curtailed. The basic principle behind these restrictions is to strongly tie together employee and firm.

Length-of-service wage system — Major Japanese corporations follow a highly systematized salary structure in which payment and promotion are generally based on seniority rather than merit. While this may seem at first glance to remove the incentive to perform, in fact there are caveats to this general idea that provide appropriate incentive. One example is the practice of forcing poor performers into "early retirement" in their peak earning years. Such individuals often find employment for the remainder of their careers in less desirable positions within the same keiretsu. The great advantage of this system is that it tends to compress the wage scale and this is one reason for the remarkable material egalitarianism in Japan. Besides the societal benefits, the firm itself gains as resources that might otherwise be "wasted" on executive compensation are used to meet other needs.

Enterprise Unionism — In response to regulations on industry-wide unions and because the perceived need for such organizations is reduced by the two previous items mentioned, workers in Japan tend to be organized on an enterprise by enterprise basis.

The end rational behind these seemingly odd practices is to align the interests of employee with firm and worker with management. As one might imagine there are caveats. For one, the system of lifetime employment only strictly applies to large "blue-chip" firms; generally the further down a firm is located in the keiretsu hierarchy, the more its practices are similar to the "hire and fire" system in the United States. Nonetheless, the practice has significant effects on Japanese corporate culture. The employment system, together with the keiretsu structure, allow Japanese firms operate under a different incentive structure than U.S. firms. The keiretsu system of cross-ownerships reduces considerably the classic conflict between the interests of investors and employees. Because the role of the speculative investor is reduced, the focus of the firm then shifts significantly from profits as an end in itself to profits as a means to increase productivity and capture market share.

Strategic Industries

As mentioned previously, in contrast to the Anglo-American model, Japanese policy-makers tend to favor the interests of producers over consumers. What this means in practice is that policies over the decades have been put in place that increase savings at the expense of consumption. These increased savings can then be channeled by the banks into "strategic industries", which for Japan means those industries that can be monopolized with enough expenditure of capital and acquisition of technology. A strategic industry is marked by several characteristics [2, p.35]:

1. High entry barriers. Industries that once acquired can be held except in cases of enormous efforts on the part of competitors.
2. Powerful economies of scale: Industries in which significant productivity enhancements can be had through application of capital, thus making them less vulnerable to competition from cheap labor.
3. Good export prospects: High value, light-weight goods with limited transportation costs, and facing fewer inherent limitations such as cultural and linguistic barriers.

4. Opportunities for research and development: Industries in which significant productivity enhancements can be had through technological improvements.
5. Elastic Demand: goods in which demand rises with incomes are preferred, so Corn Flakes are less desirable than compact disk players.

When one ticks down the list of Japan's leading industries from electronics to advanced materials to machine tools, most possess the characteristics above. Those industries that do not possess the above characteristics such as textiles, publishing, and retail, do not receive the same attention from Japanese policy-makers. Of course, in previous decades Japan had relied on a weak yen and low labor costs to be competitive in labor-intensive manufacturing areas such as textiles, but the history of Japan's development can be seen as the attempt to gradually move into industrial areas for which its growing wealth was not an obstacle to competing in international markets.

This process has continued into recent years, as Japan has shifted its focus in domestic production from more labor-intensive finished products to their more capital and knowledge intensive components. In electronics, though Japanese brands are still prominent on store-shelves, lower labor costs and increasing technological sophistication from its neighbors such as Korea, Taiwan, and China, have driven much of this production offshore to the point that METI estimates Japanese domestic production of such finished goods as TV's, DVD recorders, and digital cameras now account for 27% of the world market [4]. However, Japanese production in the even larger market of electronic component parts and materials is much greater at 50-60% [4].

Japanese market share of manufacturing equipment for electronics is also strong at 54% [4], reflecting the fact that much of the technology responsible for the tremendous gains made China, Taiwan, and Korea is made in Japan. Japanese technology-based strength in components and equipment is the main reason why even though its manufacturing wages are much higher than its neighbors, it still maintains large trade surpluses with the East Asian region as a whole [5]. Commentators on both sides of the Pacific have remarked on the "hollowing-out" of Japan's manufacturing sector in recent years. As stated before,

motivated by cost reductions and the rising yen, Japanese firms have been offshoring many of their more labor-intensive manufacturing activities so that now the share of Japanese GDP engaged in manufacturing has decreased from 29.8% in 1980 to 22.1% in 2002 [6]. Nevertheless, there is some indication that this process has largely run its course and that the model of exporting components and equipment for assembly offshore is a sustainable one [7].

This is a crucial difference between the United States and Japan and does much to explain the IT profiles of each country. Japan's industrial policy reflects the continued importance given to manufacturing. The United States, by contrast, devoted only 13.9% of its GDP to manufacturing in 2002 [8], a figure reflecting steady movement into postindustrial activities such as software, financial services, and entertainment content. As we will now see Japanese strengths and weaknesses in IT tend to reflect this continued reliance on manufacturing.

IT Industries in Japan

Packaged Software

If one had predicted in the late 1980's that the Japanese Software industry would be an also-ran on world markets by 2004, one might reasonably be dismissed as naive. By that time Japan had successfully "caught up" and even asserted dominance in a diverse assortment of hi-tech industries, why should software be any different? Yet, by the mid to late 1990's, as the U.S. was riding high on a software and internet driven boom, it became clear that Japan was still remarkably poorly positioned in packaged software. One popular explanation for this phenomenon is an alleged lack of creativity among the Japanese supposedly traced back to its overly rigid education system. However, this rather simplistic explanation is hard to swallow given that Japanese firms have shown ample creativity in a host of hi-tech industries not least of which being electronics; it is

also flatly contradicted by Japan's singular software success in the creativity driven field of video game development.

A more plausible explanation lies in more subtle institutional and cultural differences. First, one must recognize that the software industries of Japan and the U.S. are differently structured. Historically, software firms in Japan developed as part of the keiretsu system and their chief role was to perform customized contract work for the larger firms. Thus the focus of software firms was not to create products of general use, but to solve the problems of its customers. In some cases the system had some advantages as the customer could rely on solid support from their software subsidiaries, and the proprietary systems were generally thought to offer greater security (albeit through obscurity). Nonetheless, this arrangement stunted the development of a strong, independent, and internationally competitive software industry [9]. For one, software firms were more restricted in their customer base and not allowed to realize the economies of scale necessary to compete in "catch up" mode on international markets. Second, as software packages tended to be customized to the needs of clients within the keiretsu, not only did this present further barriers in terms of economies of scale, but it also undermined the development of common standards. Third, by being relegated to a "support role" , software was not seen as a glamour industry as it was in the United States, consequently it did not attract the highest level of engineering talent [10].

Though these difficulties are substantial, they still do not constitute a full explanation for Japan's lack of presence in packaged software. METI and the civil service had made truly heroic efforts in other industries to promote, subsidize, and coordinate industries to make them internationally competitive, why not software? Some have suggested that Japan is at an inherent disadvantage in that its business culture is not as supportive of entrepreneurs and "startups", as demonstrated by its virtual lack of funding through American style virtual capital. Yet, this lack of an American style business culture had not presented significant barriers in the past and in fact working through large firms has inherent advantages that have served Japanese industry very well in a host of industries. While METI did make some efforts in software as with the Fifth Generation Computing

Project in which it promoted artificial intelligence research, it did not make a concerted effort to promote "national champions" in the packaged software industry as it had in others, why not?

The explanation is two-fold. First, in software even more than other industries such as electronics there is a tremendous first mover advantage because of the prominence of network and "lock-in" effects. Deriving benefits from its own institutional advantages such as a strong university system, by the late 1980's and early 1990's the U.S was clearly a difficult incumbent to unseat. In particular, Microsoft had a rock solid lock in the client space with the Windows operating System and Office products. Similarly, in the next wave of software products inspired by the internet, U.S. incumbency also proved crucial as it derived advantages from everything from its control of the internet backbone, to its role in setting the protocol standards (TCP-IP), to benefiting indirectly from the fact that English was the de-facto standard language of the net (at least for the early years). In short, METI and the Japanese software industry faced significant barriers to entry, barriers that could not be overcome just through technology acquisition and capital, even if the necessary restructuring were to take place.

Second, because packaged software is a labor-intensive activity that has relatively poor export prospects, gaining competitiveness in the industry may not have been considered worth the resources it would entail. One possible reason the lack of sufficient motivation is revealed when one looks at the trade statistics [11][12]. While Japan's software imports are substantial and its software exports virtually nonexistent outside of games, remarkably, game exports alone are enough to cover over 1/3rd of the software trade deficit in any given year. Moreover, when one takes into account exports of video game consoles, net exports from the gaming business as a whole neutralize altogether the net imports of all packaged software in any given year[2]. All of this underscores the fact that much of the $300 billion world software industry is inherently regional — barriers of culture and language prevent software from becoming as lucrative an export business as

[2] Consoles typically generate much more export revenue than the games themselves

one might expect and so tradable packaged software represents only a small portion of the industry.

Not that this means METI is particularly pleased with Japan's position of dependence in software. In particular METI has been pushing adoption of open source software as a way of neutralizing Microsoft's near monopoly lock on the OS and desktop software market [13]. Evidence of METI's enthusiasm for open source was shown last year when open source licensing concerns arose in connection with the SCO case. METI responded by issuing a report reassuring jittery companies against letting "Unnecessary fears" result in "huge loss of opportunities for the (Japanese) software industry" [14]. METI has also recently announced an effort to push Linux adoption throughout the school system to complement its efforts in industry [15]. Most ominously for Microsoft, Japan has been reaching out to its Northeast Asian neighbors, South Korea and China, to create a compatible Linux standard [16].

Keitai and the Mobile Internet

As the age of the internet and E-commerce began, Japanese industrial policy initially presented stifling barriers to progress. Of these, the most obstructive was the highly regulated telecommunications industry. Until the mid-90's, Nippon Telephone and Telegraph (NTT) was an institution comparable to AT&T before its breakup in the early 80's. It enjoyed virtual monopoly power in the telecom market and from that position was able to charge high rates from its customers. Also like AT&T, in return for this position, NTT's industrial labs served an important source of basic research [17].

In 1995, as the balance of benefits appeared to have shifted with the internet, the government began to deregulate the telecom market, and as rates have fallen internet usage on PC's has increased correspondingly. During this period, as the still high rates along land-based lines slowly fell, the telecom market tilted quickly toward the newer, more competitive wireless carriers. The stage was thus set for a new and exciting paradigm — the mobile internet — to fill the E-commerce void. Perhaps ironically, it was an NTT subsidiary "Docomo" (translated "anywhere" in Japanese) that brought the

keitai (mobile phone) revolution into full force. In February of 1999, Docomo introduced a system named “i-mode” for its mobile phones in which customers could gain access to a few useful sites and send e-mail by pressing the “i” button.

Thus, most Japanese would get their first taste of the internet through their mobile phones rather than the PC, but the differences between the paradigms extend beyond the device. The mobile internet offered by Docomo and its rivals has a much sharper focus than the free-wheeling World Wide Web. Fearing users would be turned off by poor experiences, Docomo carefully regulates the content offered. The emphasis is on providing practical services through a relatively small number of high-quality sites. As of 2002, 3,200 official i-mode sites and 60,000 unregulated internet sites were accessible through NTT Docomo’s service [18, p. 74]. Despite being fewer in number, the official i-mode sites are much more popular as Docomo assures that they are appropriate, useful, and of high quality.

Docomo and the other service providers have a business model based on two revenue streams: the fees it collects from content providers, and the monthly charges and downloading fees from mobile users. The content providers themselves typically earn money through charging subscription fees or selling products. One significant advantage of M-commerce over E-commerce is that payments to content providers can be integrated into the monthly phone bill. This frees consumers from the use of their credit card, and because of smaller transaction costs makes practical “micro-payment products” in which just a few cents a day are extracted from customers who subscribe in high volume. As an example, Bandai offered a subscription service for 100 yen per month (<$1) in which a cartoon character a day could be downloaded as a screensaver for the mobile [18, p. 76].

Today, a wealth of services is available to the Docomo customer including email, text messaging, downloadable games and ring-tones. Also available are information services that provide access to train schedules, restaurant menus, GPS services, various media sources for information on weather and sports scores and so on. New services and content are constantly being introduced, but even more fascinating possibilities exist for

the near future. The infrastructure developed for the mobile internet (along with aggressive initiatives to spread the adoption of the IPV6 protocol) may mean that Japan has excellent prospects to be first nation in the world to realize a “ubiquitous” computing network.

Why did the mobile internet emerge so rapidly and so thoroughly in Japan and not in the United States? One, as suggested before, because PC-based E-Commerce was not as widely used in Japan as in the United States, M-Commerce faced little competition from the competing paradigm. Second, the mobile internet suits the Japanese urban commuter lifestyle in which leisure time to spend at home is rare, as is the living space in which to place a full-sized PC. Finally, as explained below, there is another sense in which the mobile internet can be seen as a blessing both born of and sustained through Japanese industrial policy.

An analysis in 2000 by Deutsche Securities of the 36 leading manufacturers that make the nine highly miniaturized enabling components in mobile phones, all but seven are Japanese [19]. From liquid crystal displays to SAW Filters to LEDs, Japanese firms are major players in all and dominant in most of the miniature electronic components that together constitute a cell-phone [20]. Though Japanese handset makers are for the most part not among the major players in the international marketplace, this is somewhat misleading as Japanese electronics firms stand to gain substantially from any mobile phone sold given their positioning in components (as discussed previously the shift away from the manufacture of end-products toward the manufacture of components is a trend that is common across many industry sectors in Japan).

While much focus has been paid on NTT Docomo’s attempts to take i-mode to international markets, so far Docomo has not had overwhelming success it translating its services abroad [18]. Even so, this is not as problematic as it may seem. Though there is some promise for Docomo as an export product, the export potential for mobile phone components is greater still. Thus, even if competing services were to ultimately win in other markets, Japanese industry as a whole still benefits. When one just considers the

booming mobile phone markets in China and India, prospects look especially bright for Japanese electronics makers. The lack of line-based telecommunications infrastructure in each of those countries makes mobile telephony especially attractive and so the industry is assured of experiencing rapid growth for years to come.

Viewed from the perspective of the electronics firms and export-hungry policymakers, Docomo has a vital role as a vehicle that contributes to the continued success of Japanese electronics. From miniaturization to power consumption, mobile phones present substantial technological challenges, and as technological barriers are overcome electronics manufacturers are able to transfer techniques into other domains as well. From this point of view the Japanese consumer, benefiting as they might, has a historically familiar role as the guinea pig for the latest gadgets and gizmos — the Japanese electronics marketplace has long served a testing ground where Japanese firms test the appeal of their products and make adjustments before launching them abroad.

Docomo and the telephone operators are often depicted as the central players in the Keitei revolution. Docomo is seen as having tremendous power over content providers and electronics firms alike in directing developments in the industry. Though this view has some validity, an alternative interpretation is that for all of its visibility Docomo itself is not the central power broker but rather the instrument by which the government is able to drive the larger mobile ecosystem. It has even been suggested that the telecommunications deregulations that launched the Japanese mobile phone market in the early 90's were according to the timetable of the electronics manufacturers as they ramped up the capacity to meet world demand [19]. Supporting this contention is the fact that the Japanese government has considerable direct control over NTT and its subsidiaries such as Docomo. Regardless of which perspective is correct what is clear is that the phone operators, manufacturers, and content providers enjoy very intimate ties. In fact, the term "Kei(tai)retsu" has been coined to describe the formal and informal linkages between the players [21]. These close ties are manifested physically at the Yokosuka Research Park just south of Tokyo. In what is certainly the greatest concentration of mobile industry players in the world, Docomo along with the other

service providers and leading manufacturers have all set up offices and laboratories in the area. Cartel-like behavior is also seen in the manner by which access to technology standards are developed and disseminated. The larger electronics firms such as NEC, Matsushita, Fujitsu, and Mitsubishi Electric co-develop specifications for the latest models with Docomo, while other firms must wait for them to be published. Finally, beyond simple collaboration, Docomo directly subsidizes the leading Japanese manufacturer's R&D efforts [22].

Robotics

Robotics is one IT domain in which Japan is clearly unrivaled. The Japanese robotics industry asserts leadership in virtually all areas from usage, where Japan is home to close to 50% of the world's robots despite having only 2% of the world's population [23], to patents filed [24], to production (as much as 50% of Japan's robots are produced for export [25]). Its share of production is even greater than the statistics indicate as Japanese robotics firms supply crucial components to foreign makers.

While certainly a valuable export industry, the true value of robotics has been its role in increasing the productivity of Japanese manufacturers. Japans overall commitment to factory automation is one reason why it is able to maintains a significant manufacturing base even in the face of tough competition from East Asian rivals. But the advantages of automated production do not end with productivity enhancements, as in many advanced manufacturing areas it is the precision of robotic automation that is most critical.

Industrial policy has played a crucial role in the research and adoption of robots. As one might expect METI has offered subsidies and sponsored several basic research initiatives up to and including the recent "Humanoid Robotic Project", of which Honda's "Asimo" was its most famous product. However beyond government sponsored research projects, it is Japan's labor system that gives it a crucial edge in this area. Japan's employment system short-circuits the conflict between the firm's interest in productivity enhancement and the worker interests in remaining employed. Because Japanese workers have little reason to be threatened, they generally welcome robotic automation with open arms.

But Japanese officials and the robotics industry are now looking beyond factory automation. METI expects that the domestic robotics industry will grow to 1.8 trillion yen (~$17 billion) by 2010, as robots will be introduced in such diverse fields as entertainment, hazardous duty, medical assistance, household chores and construction. Research in construction robotics and automation is particularly demonstrative of the different corporate cultures of the U.S. and Japan. The 5 major construction companies in Japan (Shimizu, Taisei, Kajima, Obayashi, Takenaka) each devote 1% of their combined yearly revenue toward research and development [26, p.8]. When this research was first undertaken in the early 1980's it was hoped that robots would introduce productivity and overall cost improvements to construction. An additional goal was to attract more young people to the field of construction by reducing the hazard and monotony of the work.

At first, the firms concentrated on "single-use" robots in which a specialized machine would perform designated tasks such as "concrete floor finishing" or "spray painting". However from a productivity standpoint this approach was disappointing. Although in many cases, the single use robots performed the designated task with greater efficiency and precision, the gains were often cancelled out by the overhead associated with transporting the robot, and the time spent "programming" the robot for its run. Still there were demonstrable gains in the overall work environment as the robots succeeded in alleviating construction workers from some hazardous and tedious duties.

Given the limitations of single-use robots much work of late has been shifted toward "Full construction automation" where the entire construction process is automated. Though in some cases there have been productivity enhancements, overall the chief benefit is a less noisy, cleaner, and safer work environment. In addition, it has opened up employment opportunities for women in the field as the premium on muscle is reduced.

While some research in the field of construction automation has been carried out in U.S. universities and elsewhere, Japanese industry provides the lion's share [26]. Moreover,

lacking straightforward economic incentives, robots have not been deployed by construction firms in the U.S. whereas in Japan large automated construction projects have already been undertaken (though at this time conventional construction is still most common). Why would Japanese construction firms devote so much of their resources on technology that has so far had little effect on the bottom line? For one, the labor and keiretsu system gives employees as a whole much more influence over corporate practices than in the U.S., and so improvement in the quality of the work can be seen as an end in itself. Second, because Japan has much stricter immigration laws, it can't count on new immigrants to fill the manpower gap as in the United States. Forced to attract recruits from the existing pool of labor, Japanese firms are provided further incentive to improve working conditions. Third, because Japanese industry is less geared toward short-term profit and not as subject to investor pressure, they are more willing and able to engage in long-term research projects such as construction automation.

Lessons for the United States

For a number of reasons, the western business press has painted an especially bleak picture of Japan's economic performance in the 1990's. Though Japan's economy faced difficult hurdles during the period, from the collapse of the Real Estate Bubble and the resulting Banking troubles to the East Asian financial crisis in the late-90's, it is important to keep those troubles in perspective. At first glance when looking at GDP growth figures during the period, Japan performed relatively poorly compared to the United States (as did much of the developed world), but one must remember that the calculation of GDP depends to a great extent on subjective assumptions so there is ample room for methodological differences among nations to affect the resulting numbers. In fact, a recent collaboration between the economist Dale Jorgenson and the METI found that during the period 1990-2000, Japan averaged a respectable 2.0% growth rate when using U.S. measurement standards vs. 3.3% over the period for the United States [27]. On a per-capita basis, remembering that Japan experienced virtually no population growth during the period, the margin shrinks considerably to 1.7% for Japan as opposed to 2.2% for the U.S. These numbers do not approach those of Japan's "Juggernaut" years

in the 80's, but they hardly signal a "Depression" as commonly claimed. In fact, by other measures of concern to Japanese policy-makers, such as net overseas assets, Japan's position improved substantially during the 90's [28, p.233].

Regardless of the macro-economic picture, Japan's success in key IT domains such as the mobile internet and robotics may yield some lessons for American policy-makers. For one, consider the manner in which Japan is continuing to leverage its strength in electronics to great effect in the mobile internet. As America's leading IT enterprises such as IBM and HP compete to shed the last remnants of their once vaunted hardware businesses, what are the long-term implications for U.S. competitiveness in IT? Remembering that the U.S.'s former position in hardware and electronics had much to do with the success it now enjoys in software, can we now claim with confidence that software and services alone are a sufficient foundation to remain on the leading edge of information technology?

A second and related lesson concerns how policy-makers think about IT in the context of the U.S.'s industrial profile. While software firms loom large in America's corporate landscape, their contributions to the national economy in terms of revenue and exports is remarkably small. Google has lately been the darling of the business press but at the end of the day its revenue in 2003 amounted to less than $1 billion. Microsoft with its virtual monopoly in desktop software and great strength in other areas, had revenues last year that were much more substantial at a little less than $40 billion. Yet this figure is still relatively small compared to a General Motors ($185 billion) or even a single large electronics firm like Hitachi ($68 billion). While software provides a valuable contribution to our national economy, the real value of software and IT to our industry profile is not so much as a business in and of itself, but as a productivity enhancer in other domains. The U.S. has enthusiastically employed IT technologies to boost productivity in the office environment, but in the crucial area of advanced manufacturing relative neglect of robotics and automation vs. Japan (and even the E.U.) puts the U.S. at a competitive disadvantage. While Japan may possess advantages in these fields deriving from their industrial policy, the U.S. also has key advantages deriving from its strong

university system and its tradition of publicly funded basic research. If these advantages can be better utilized and then complemented by an appropriate incentive structure for industry, there is no reason why the U.S. can't improve its position in automated manufacturing.

References

1. Fallows, James. Looking at the Sun: The rise of the new East Asian Economic and Political System. (Vintage Books, 1994)
2. Fingleton, Eamonn. Blindside: Why Japan is still on Track to Overtake the U.S. by the year 2000. (Houghton Mifflin, 1995)
3. Nakamura, Masao. 'The Japanese Business and Economic System: Globalization and evolutionary Change'.(Euro-Asia Management Studies Association Annual Conference 'EAMSA 2000: Globalisation and the Uniqueness of Asia')
4. 'Nakagawa Report: Toward a Sustainable and Competitive Industrial Structure' (METI, May 2004)
5. 'Japanese Trade in 2003' (JETRO). http://www.jetro.go.jp/en/stats/statistics/
6. "Topic Report: Invigorating Japan's Service Sector". (JETRO, Japan Economic Monthly, Vol. 6, September 2004)
7. Rowley, Ian and Hiroko Tashiro. "So Much for Hollowing Out". (Businessweek, 10-11-2004)
8. 'Mending Manufacturing'. (Economic Policy Institute, EPI Briefing Paper #144, 9-2004). http://www.epinet.org/content.cfm/briefingpapers_bp144
9. 'The Future Evolution of Japanese-US Competition in Software: Policy Challenges and Strategic Prospects'. (Japan Information Access Project, 1995)
10. Mashima, Reiko. 'The Turning Point For Japanese Software Companies: Can They Compete In The Prepackaged Software Market?'. (Berkeley Technology Law Journal, vol11) http://www.law.berkeley.edu/journals/btlj/articles/vol11/Mashima/html/text.html
11. 'JETRO Japanese Market Report. Software Products—Business Packages' (JETRO, March 2003)
12. 'Japan's Video Game Industry'. (Japanese Economy Division, 2004)
13. Toyoda, Masakazu. 'Open Source Software Policy in Japan'. (METI, 2003)
14. 'Don't stop using Linux: Japan gov't'. (CNET, August 26 2003)
15. Millard, Elizabeth. 'Japan Launches School Project To Encourage Linux' (TechNewsWorld, 7-30-2004) http://www.technewsworld.com/story/35459.html
16. Dickie, Mure and Michayo Nakamoto. 'Asia seeks to log off Microsoft' (Miami Herald, 4-3-2004) http://www.miami.com/mld/miamiherald/business/international/8343362.htm
17. McIntyre, John R. Japanese Technical Standards. (Quorum Books, 1997)

18. Coates, Ken and Carin Holroyd. Japan and the Internet Revolution. (Palgrave, 2003)
19. Fingleton, Eamonn. 'Earth to Mondale: Where's the Beef?'. (2001) http://www.fingleton.net/view_art_un.php?AID=236)
20. Nikkei Electronics Asia. 'Mobile Phone Components Reported in Short Supply' (March 24, 2000)
21. Meyer, Richard. 'Kei(tei)retsu'. (J@panInc. Magazine, January 2002) http://www.japaninc.net/article.php?articleID=665
22. 'Docomo to chip in half to develop third-generation cell phones', The Nikkei Weekly, 20 Jan. 2003
23. 'Worldwide investment in industrial robots up 19% in 2003…' Press Release ECE/STAT/04/P01 (UNECE, 10-20-2004) http://www.unece.org/press/pr2004/04stat_p01e.pdf
24. 'When it comes to robots, Japan has leg up on rivals'. (The Asahi Shimbun, 5-25-2004) http://www.asahi.com/english/business/TKY200405250141.html
25. 'Japan's Next-generation Robot Industry Promises Growth'. (JETRO, Invest Japan No. 5) http://www3.jetro.go.jp/iv/cybermall/newsroom/newsletters/iv_no5/14-15.pdf
26. Cousineau, Leslie and Nobuyasu Miura. Construction Robots: The Search for New Building Technology in Japan. (ASCE Press, 1998)
27. Information Technology and the G7 Economies (updated manuscript and tables), *World Economics*, Vol. 4, No. 4
28. Fingleton, Eamonn. Unsustainable. (Thunder Mouth's Press, 2003)

SOUTH KOREA

- Hyojoo Kang

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Overview of South Korean Information Technology Development

In the past four decades, South Korea has gone from abject poverty, classified at levels comparable to the poorer countries of Africa and Asia [CIA World Fact Book, 2004], to having the highest proportion of high speed internet connections in the world [ITU Internet Reports: Birth of Broadband, 2003]. This stunning transformation has been driven by a combination of governmental policies, competition in information technology (IT) industries, external pressures from interactions with foreign countries and industry, and socio-economic factors.

Government IT Policies

The Korean government has developed information infrastructure in part through efforts that stimulated both the supply and demand of that infrastructure. The Korean government established a non-permanent agency called the 'Korea Informatization Promotion Committee' in 1996 to oversee and coordinate information implementation and policies encompassing the legislative, judiciary and administrative branches of the

government. The government set aside the 'Informatization promotion fund' for the agency to initiate and manage various projects. Along with the Ministry of Information and Communication (MIC), the agency launched a series of programs including the promotion of high-speed telecommunication networks, promotion of IT in rural areas, certification of network bandwidth in buildings, internet training, and support for the spread of personal computers (PCs).

Informatization Promotion Plans

Informatization promotion plans focused on problems that were unlikely to be adequately addressed by the private sector. The 'Public Work Project (1998-2001)' focused on tasks that set up national and public databases in 91 government institutions that included national audio-video archives digitization projects, the digital library project, laws and regulations, employment statistics, foreign affairs and trade information database implementation projects, etc.

The 'Knowledge Information Resource Management Project (2000~)' is designed to implement digital systems for sharing information of general utility such as scientific, medical and business databases. The project will implement core technologies that are expected to be in high-demand, but are difficult for any single commercial enterprise to develop by itself.

The 'Super Highway Network Project (2002~2005)' promotes installing super highway network through two billion dollars worth of soft loans to commercial enterprises and direct investment in infrastructure. In the past, governmental development of business models has proven a successful strategy for fostering new industries and part of this project includes the development of a business model for 20 Mbps subscription services. By 2005, the project is planned to supply 84% of the total households (16M) with 20Mbps high-speed network via Tera bps network and 2Mbps mobile terminal bandwidth using technologies like xDSL, CATV modem, satellite, IMT-2000, and FTTH service. An additional aspect of this project includes the establishment of a computing "Grid" for basic science and medical research.

In the wake of the economic crisis in Asia in 1997, these programs created many governmental jobs in IT, easing unemployment and developing the country's human IT resources.

Promotion of IT in Rural Areas

South Korea reformed local government in 1991 to make it more democratic and representative of local needs. The provincial governments are good examples of the competitive nature of the society. The central government stimulated the provincial offices with information on the advantages of governmental informatization (e.g., "paperless bureaucracy") and examples of success stories of rural informatization. The local communities tended to compete to implement better infrastructure. For example, the provincial office of Kangwon announced that one of the most rural towns in the nation, which completely lacked IT infrastructure in 2000, would be made a model case for the implementation of broadband Intranet. Samsung won the contract to build this infrastructure and benefited by demonstrating (and advertising) that they are capable of fully wiring the town. Such projects spurred competition in neighboring communities to develop their own informatization. Many IT companies began making profits by doing business with the rural communities. These companies tended to specialize in various subjects such as organizing and spreading folk culture, collecting weather forecast data, farming data, community finance and communication, etc. [Informatization Promotion Committee].

Cyber Building Certificate System

The Cyber Building Certificate System was introduced in 1997. The government set three levels of standards based on the network bandwidth to be issued to buildings with high-speed telecommunication capacity. The certification provides motivation for builders to enhance the broadband infrastructure of apartments and buildings during construction. This system worked particularly well in the Korean housing patterns discussed below.

Information Training Programs

The government deployed training programs to boost Internet use among the population. Government subsidies were granted to private IT/Internet training institutes, especially those that target housewives, allowing them to take Internet courses at an affordable price. The program was a success and created an internet "boom" among housewives. Since housewives typically control the purchasing power in the Korean household, the diffusion of computers and internet access was facilitated by the housewives' familiarity with information technology.

"One PC for Everyone" Project

The Ministry of Information and Communication (MIC) set out a vision for a knowledge-based economy (1995) where every citizen has access to a computer. The project included subsidies to low income households for PC purchases and provided computers to schools.

IT Industry landscape

Since the deregulation of telecommunication market in 1990s, competition in the broadband market driven growth of internet access while forcing companies to compete on quality of service. Korea Telecom (KT) was the incumbant provider, dominating voice telephony. KT and was initially reluctant to provide DSL service. However, when Hanaro entered the market for data transfer services, KT was compelled to begin offering DSL services at a projected loss (though it has since become a major source of revenue for KT). In the meantime, Hanaro built a state of the art fiber optic network in the most of the urban areas of S. Korea. Their entry into this market was facilitated by the fact that the last mile was not owned by their competitor, the incumbant KT, but by the landlords of the apartment complexes [International Technology Service, DTI 2001]. Another competitor, Thrunet, entered the market through the use of existing cable TV networks [Yun et al, 2002].

The Korean government has kept the regulatory barriers for entry into the market low and there are now seven major competitors in broadband service, both within and

between the different broadband technologies. Such fierce competition, early in the development of high speed internet infrastructure, kept service prices low which in turn led to explosive growth in demand [Yun et al, 2002]. The government has further fostered competition by measuring and advertising the quality of service of the various providers including actual transfer rates and the length of time between requests and installation of service. In addition, since 1997 the government has facilitated high tech entrepeneurs by providing tax breaks for high tech businesses.

Relationship with foreign coutries

Competition has not been completely unfettered. Foreign companies are limited to 49% equity in domestic companies [Korea Times, 2004]. Initially, Korea had to import 80% of broadband equipment, mainly from Lucent, Alcatel and Cisco, and even the domestically manufactured equipment utilized imported processors. However, domestic companies have begun manufacturing more broadband equiptment and in 2001 had captured 40% of the market [Network Times, 2001]. Exports have driven much of S. Korea's economic development over the last four decades and the high tech industries have grown to a significant share of those exports. Information and communication technologies now account for a third of Korea's exports [Kelly et al. ITU]. There appears to have been positive feedback between the growth of Korea's domestic broadband market and its emphasis on exports. As of 2001, Samsung was the fourth largest manufacturer of cable modems in the world [Samsung Telecom News 2001 Summer]

The Korean broadband market now appears to be saturated. This has increased pressure on the Korean IT industry to look abroad for new markets. The Korean IT industry has been stimulated to develop integrated information services by winning contracts to export their broadband technology to a host of foreign countries including Mongolia, Malaysia, Vietnam, Japan, Indonesia, Brazil, Chile, Argentina, India, and Thailand.

The same pressures of a saturated domestic market and exports to foreign markets is now driving the development of wireless broadband infrastructure [SK Telecom, 2004 and E-business forum 2003]. 40% of cell phone users in Korea are now accessing the

internet through their phones and Korea Telecom is currently rolling out 11 Mbps wireless LAN service [MIC, 2004] . Competition for 2.3GHz wireless licenses, called "WiBro," is currently driving development of wireless LANs with speeds up to 54 Mbps [Korea Times, 2004].

Socio-cultural and Economic factors

South Korea's leadership in broadband access was not inevitable. The other three Asian Tiger economies of Hong Kong, Singapore and Taiwan all have smaller populations and higher per capita income compared to S. Korea [Kelly et al. ITU]. However, a variety of socio-cultural and economic factors have had dramatic impacts on the development of information infrastructure in S. Korea.

Population density and housing pattern.

The fact that 80% of the population live in densely populated urban areas, and half of them reside in large apartment complexes, facilitated the deployment of broadband infrastructure. The ADSL technology which utilizes existing telephone lines works best within 2.5 mile of a local exchange; over 90% of the Korean households are within that radius (ITU, 2001b). Therefore, the "last mile" has been a less serious problem in Korea than in other countries.

The 'PC Bang (Room)' and Online Games

Internet cafes called 'PC Bang' started to emerge in 1998 and by 2001 there were more than 21,000 PC Bang equiped with fast PCs and broadband internet connections [International Technology Service, DTI, 2001]. These cafes are typically open 24 hours a day. The spread of the PC Bang was a major driver of demand for broadband content and services in the early phase of broadband deployment. Most PC Bang users were initially drawn to audio/video rich on-line games requiring high-speed access that was not commonly available in their homes at the time. The PC Bang allowed users to discover the benefits of high-speed access, which eventually lead to the residential demand for

broadband. The popularity of online games is considered an indispensible part of the Korean broadband development initiative.

Education Fever

High priority is given to education in the Korean society and it is a major factor in people's financial success. People are accustomed to spending enormous amounts of money on educational resources. The government and commercial players deliberately promoted the educational benefits of broadband to successfully exploit this cultural value and drive demand.

Conclusion

The rapid development of broadband infrastructure in South Korea has emerged out of the confluence of public policy, economic competition, and a variety of socio-economic factors that have hastened the adoption of high speed internet services. Perhaps the surest sign of this success is that broadband access in Korea is now so ubiquitous that it is taken for granted and viewed as a necessity, much like any other utility [International Technology Service, DTI, 2001].

References

1. CIA World Factbook (2004) http://www.cia.gov/cia/publications/factbook/geos/ks.html
2. The Economist, June 21, 2001. "Broadband blues" http://www.economist.co.uk/printedition/displayStory.cfm?Story_ID=666610&CFID=2420499&CFTOKEN=3647187
3. Hyungbin Yun, Heejin Lee, and So-Hye Lim. (2002) "The Growth of Broadband Internet Connections in South Korea: Contributing Factors." Working paper. Asia-Pacific Research Center, Stanford Institute for International Studies http://aparc.stanford.edu/publications/20032/

4. Jeong, K. and King, J. 1997. “Korea’s national information infrastructure: Vision and issues.” In National Information Infrastructure Initiatives. Eds. B. Kahin and E. Wilson III.112-149. The MIT Press.
5. Aizu, Izumi (2002) A Comparative Study of Broadband in Asia: Deployment and Policy. 3rd Draft (http://www.anr.org/web/html/output/2002/bbasia0929.pdf)
6. Liberalization and Deregulation http://www.american.edu/carmel/jw6194a/Korea_files/liberalization.htm
7. Informatization Promotion Committee, Government, http://www.ipc.go.kr/
8. International Technology Service, DTI, 2001 http://www.brunel.ac.uk/~csstjjc/Mission%20Report%20v3.pdf
9. Telecommunication and Infrastructure http://www.american.edu/carmel/jw6194a/Korea_files/telecom_infra.htm
10. Network Times, 2004 http://www.networktimes.co.kr/
11. Korea Times, Citigroup Devours Korea’s Lucrative Market, 2004
12. Samsung Telecom News, Summer, 2001
13. SK Telecom, 2004 http://www.sktelecom.com/eng/about_skt/overseas/wireless_internet/
14. E-business forum, Global News Analysis 2003 http://www.ebusinessforum.com/index.asp?doc_id=6397&layout=rich_story
15. Ministry of Information and Communication, 2004.11-12 http://www.ica.or.kr/en/krit_01_read.asp?board_seq=201&seq=1402&page=2
16. Korea Times, Competition fierce for Portable Internet Service License, 2004 http://www.ica.or.kr/en/krit_01_read.asp?board_seq=201&seq=1631&page=1

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Open Source Software in Vietnam Today

Open source software(OSS) penetrated Vietnam in early 1990; however, the use of OSS applications remains limited (Nguyen 2004). Open source was introduced mainly at universities, research institutes, and provinces in Hanoi, Ho Chi Minh City, Can Tho, and Hue (Tran et al. 2003). Presently there are few Vietnamese government-owned companies that are doing business via OSS, such as the Ministry of Defense and Ministry of Police use OSS for security applications (Nguyen 2004).

Two present companies that exist to provide operating systems and office applications are CMC and the VietKey Group. They have recently developed Vietnamese versions of Open Office and Linux, and are already loading OS onto all their new machines. CMC, which has begun in 2000 and incorporates Linux with their PCs, has installed Linux OS and Office applications for more than a hundred of schools in Vietnam. CMC provides Linux OS and Office Suite based on Red Hat 7.1 and OpenOffice.org 1.0 (Tran et al. 2003). The first localized Linux occurred from CMC and Vietnam Electronic Informatics Corporation(VEIC). This localized Linux allowed assimilation, development, and use of open source operating system Linux, development of OSS for office and database management system, and open source tools for the internet and intranet (Tran et al. 2003).

VietKey Group, which has a fully localized Linux OS under its name, has signed agreements with many Vietnamese PC makers, such as SingPC, Green MeKong, and Vietnam Electronic Informatics Corporation, to install Vietkey Linux in their products (Nguyen 2004).

In 2003, there were approximately 100,000 PCs that had Linux installed on them. Other companies, such as CDIT Center and Nhat Vinh Company, have created other OSS-based applications (Nguyen 2004). CDIT Center has developed some NET service applications and Nhat Vinh Company has developed Web and e-commerce applications. The Institute of Mathematics and the Institute of Mechanics of Hanoi University of Technology, Cadpro has developed high performance computing applications (Nguyen 2004).

Moving Vietnam forward via Open Source

Recently, the Vietnamese government is endorsing a plan that would require that all state-owned companies and government ministries to use open source by 2005, and expect all computers that are made and sold in Vietnam to have open source products installed on them (Stocking 2003). Vietnam is "trying to step by step to eliminate Microsoft" said Nguyen Trung Quynh of Vietnam's Ministry of Science and Technology. The OS initiative sparked due to Vietnam's rampant problem of software piracy, which threatens to derail the country's economic aspirations (Stocking 2003). The United Nations Development Program acknowledged that by having OSS in Vietnam, it would strengthen Vietnam's technology sector and resist software piracy, which is a big problem that could ruin the country's economic aspirations.

In addition to this plan, the Vietnamese government approved a master plan in March 2004 that would allow developing of open source software in Vietnam for the 2004-2008 period. In doing so, this would allow further development and use of OSS in Vietnam (Nguyen 2004). Such implementation would help Vietnam break away from international vendors, increase IT security and sovereignty, and allow the country's penetration into the IT world.

Challenges and Difficulties towards OSS use in Vietnam

Although Vietnam has made initiatives to promote the use and development of OSS, it has not accomplished the results they had hoped for. Using illegal software is common practice in Vietnam because it weakly observes software copyrights. For that reason, there is a lack of urgency to use and develop OSS. There is a 95% piracy rate; hence, there is no economic incentives or savings to encourage use of OSS. There is a huge dependency on international software vendors like Microsoft, which makes OSS a secondary option. This leads to negative outcome for OSS because users fear that it requires too much effort to switch from one familiar computing environment completely to a foreign platform, in this case, from the pirated Microsoft to OSS (Tran et al. 2003). People are not well informed of the benefits of OSS in order to be motivated to adopt this new endeavor. Furthermore, there is a lack of OSS-based applications for universalized and localized applications (Nguyen 2004).

Currently in Vietnam, there is a lack of OSS specialists, lack of knowledge on OS principles, and lack of specialized OSS support services (Tran et al. 2003). These limitations make it impossible to have efficient and effective installation, operation, exploitation, development, and problem solving of OSS. This problem is further enhanced by the scattering of Research and Development that persists in Vietnam (Nguyen 2004). Due to the advent of planning and rapid implementation over just few years, there is not enough time to properly train and educate staff on OSS.

The Objective

Because Vietnam lacks successful implementation of OSS, a symposium titled "Open Source Software Movement in Vietnam" was held in Thailand in March 2003. In order to help Vietnam gradually progress into a dominated OSS society, the meeting established the overall goals to help push the OSS movement forward:

- Disseminate OSS spirit and principle
- Retraining and training
- Promote OSS localization
- Promote the establishment of OSS support services

- Promote OSS use where possible, particularly in the public administration sector
- Prepare to implement the Business Technology (BTA) with the US, particularly in software intellectual property.

Vietnam is currently considering an extreme or moderate approach to advance Vietnam's OSS policy (Tran 2002). Similar to France and Brazil's governance over OSS policy, Vietnam can enforce by law that all public administration must use solely OSS; hence, restricting their freedom to choose. Another approach is to have the government impose the use of open standards but persuade the use of OSS. These two approaches remain in debate.

The Perks and Drawbacks of OSS in Vietnam's public sector

Because the Microsoft Windows and Office Pro cost twenty-two month's wages of an average Vietnamese, which causes a technological divide between the rich and poor nations, OSS can prove to be a much needed and viable option. OSS is low cost, independent, and secure. Tran and other OS advocates declare that OS is more secure than Microsoft because the codes that programmers use to write are publicly accessible to the Internet community (2002). OSS is adaptable and highly reliable because OSS does not violate current standards. OSS has no legal restriction on redistribution and has shown to be long lasting. As a result, there are many implementation possibilities that can facilitate new technology development in Vietnam.

Despite the aforementioned, there remains drawbacks for not supporting OSS in Vietnam as reported from the European Commission (2001). OSS lacks accountability because there is deficient record keeping of the present outcomes and effects of OSS implementation, in terms of users' satisfaction, cost savings, and its efficiency. As a result, there are no data to assure that such development can be produced. The reduced set of supported hardware and business applications, in combination with insufficient guidelines, will incur costly OSS implementation because of the need for 're-training' to mitigate the inefficiencies (European Commission 2001).

OSS Policy For Vietnam

After meeting and collaborating at a 2002 conference titled "Open Source: A Case for e-government" which was held in Washington DC, Vietnamese policy makers have devised a plan to help advance the country in the international open source movement. The policy encourages the need to affirm the role and benefits of OSS in IT development, particularly in Vietnam's software development. There is a need to strengthen the training on OSS in all aspect and recommend strongly the use of OSS applications where possible, especially for those that are highly dependent on proprietary vendors. It is dire to disseminate different projects on the use of OSS in public and government sectors, to localize OSS, and to study and test a business model for Vietnam. The policy pushes to have localized OSS offer to many kinds of users as a useful and safe product with all the support services. Vietnam should promote the national and regional cooperation on OSS between developing countries and create its own Vietnam Open Source Software Association (European Commission 2001).

Open Source is remedy for Vietnam's IT success

Vietnam is not going solo on this momentous OS movement. Vietnam is part of an international movement, as much as philosophical as it is technological. South Korea, Japan, and China have already announced their desire to work together to develop OS alternatives to Microsoft. They, along with Vietnam, have begun their quest to make OS the dominant software so that they can break away from their dependence of proprietary vendors and gain independence of their information technology. These countries believe that no corporation should stand between the computer and its users. Furthermore, the economic logic of using free hardware is too tough to resist. Gradually, Vietnam's IT will rapidly advance and subsequently wipe out Microsoft, and it is all thanks to the open source movement.

Vietnam - Information Technology

IT Background

Vietnam is unarguably behind in its implementation and application of information technology (IT), but the government has shown strong commitments for IT growth through new investments and policies. The government believes that IT will be instrumental for both poverty reduction and economic development. Since 1991, the government has recognized the need for IT development, yet despite numerous declarations, no substantial progress has been made. The four key challenges of IT development in Vietnam are infrastructure, industry, applications/content and human resources, but the government together with international aid organization are determined to make IT work.

Current IT Environment

The government maintains control over most telecommunication and internet services, but it has attempted minimal liberalization of the market. VNPT, a government-owned company, dominates 91 percent of the telecommunications infrastructure and operation of services; the remaining market shares are divided up to a handful of companies, most still influenced by the government. In addition to the central government, the Military, Ministry of Industry and local government compete among themselves for management of VNPT operations and services.

High cost of internet service remains a major obstacle for IT development. Since Internet service licenses were first provided in 1997, Vietnam has developed two low-speed lines connecting Hanoi and Ho Chi Minh City to the outside world. Internet usage from 2000 to 2002 increased by about 100 percent, however amounted to only 0.2 percent of the population.1The government has a monopoly of prices, but allows companies to decrease prices with official approval. Much debate looms over whether a monopoly or a competitive market is best for Vietnam's IT development. Recognizing

the importance of internet access, local governments of the two major city, Hanoi and Saigon, subsidize cost of services for qualifying businesses. [Trong] Internet usage in primary and secondary education is limited due to availability of computers and appropriate funds while universities allow students limited access. [Belawati]

Current education and training are poor for IT development. The problem lies in that Vietnam has a surplus of programmers. Curriculums need to be updated to diversify training in other technical fields, such as software analysts, engineers, project managers and other middle managers. IT training are available through major universities, usually through faculties of mathematics and infomatics. IT faculties also setup private facilities to train additional student. However, due to lack of qualified lecturers and limited computing facilities, training programs mostly are more theoretical oriented and are not practical training. [Ministry]

Strategies for IT Development

On July 17, 2002, The government approved *The Master Plan for Information Technology Use and Development in Vietnam by 2005.* The plan hopes to increase IT level to medium, comparable to other countries in the region. Internet usages among the population will be average compared to the world. IT industry will achieve an average growth rate of 20-25 percent and value of software output will be $US500 million. Goals also include to train over 50,000 IT specialists at all levels, whom half will be high-level professionals. Additional modern telecommunication and Internet infrastructures will be built to meet the standard of quality and availability comparable to other countries around the region. [Ministry]

The *IT Master Plan* consists of the following key provisions and programs. The government will develop legal framework, mechanisms and policies for favorable and preferential conditions for IT use and development. This task of IT administration and management are allocated among the many branches and departments of the government. The main provision is mandate all government ministries and operating agencies to develop and implement their own IT plans. Moreover, training of government officials will spread awareness of IT and set the pace for IT integration.

As of 2004, the government has updated the *IT Master Plan* with a draft of the *Information and Communications Technology (ICT) Strategy for Vietnam.* Though the original plan appears to fall short of its goal by 2005, the new plan calls for further expansion of ICT with new goals in four key areas, infrastructure, industry, applications and content, and human resource development. The plans aims for enough infrastructure to allow 1 in 4 people access to either fixed or mobile telephones by 2010. Furthermore internet usage will be at 1 in 612 by 2010; urban professionals and business internet usage will be at 100 percent by 2010. Despite current exports of software at US$100 million, the plan aims to have a turnover of US$1.2 to 2.0 billion and to be an international competitor by 2020. ICT experts are to increase to 100,000 by 2010. [Achieving MDGs]

IT for Growth

Behind the push for IT development is the goal for poverty reduction and economic development. Especially in the rural and isolated regions of Vietnam, there is an urgent need to provide accessibility to social, health, and education services. The government and international donors hope to use IT as a tool for these goals by increasing efficiency and communication of information. Goals include providing the youth of Vietnam with possibilities for increased opportunities, both economical and educational, through high technology and distant learning. Gender inequalities will be lowered by providing women educational and literacy programs. Most promising, IT in healthcare will enable information exchange and diagnosis from developing countries by the means of broadcasting of health education and disease prevention. [Achieving MDGs]

IT Conclusion

The government is convinced on the importance of IT development as a catalyst for an industrialized and modernized country, but limited human resources and bad

management are hampering the widespread use of internet services. The core problem lies around the government's tight control of the market and prices. Despite the challenges to IT development, there are many signs of willingness by both the government and the people to adopt IT. Students are showing much interest in IT and related fields as career paths. Given some time to develop Vietnam's IT human resource, IT development is an inevitable path to modernization for Vietnam.

References

Part I: Open Source Software Fact Sheet. 2001 Jul. European Commission, http://europa.eu.int/documents/index_en.htm. Accessed 12/01/05.

Nguyen, Q. 2004. Vietnam and Open Source Software - Situation, Challenges, Plans. Information Technology Office, Ministry of Science and Technology, Vietnam. http://h0lug.sourceforge.net/. Accessed 11/20/04.

Stocking, B. 2003. Vietnam Embracing Open-Source Products. Mercury News. http://www.siliconvalley.com. Accessed 11/20/04.

Tran, C. 2002. How Vietnam Faces to Open Source Software? Open Source: A Case for e-government, Washington DC. http://h0lug.sourceforge.net/00.viet/fl0@vnisbiz/02flohow/tl-chuong_infodev/html. Accessed 11/30/04.

Tran, C. and M. Ha. 2003. Open Source Software Movement in Vietnam. Asia Open Source Software Symposium. Phuket, Thailand. http://www.asiaosc.org/. Accessed 11/20/04.

Belawati, Tian. *Vietnam: ICT Use in Education. http://www.unesco.org*, 2004

Bezanson, Kieth et al. *Vietnam at the Crossroads: the Role of Science and Technology*. Ottawa, Canada: International Development Research Centre, 1999.

Ministry of Education and Training, *Master Plan for Information Technology in Education forthe Period of 2001–2005*, http://gauge.u-gakugei.ac.jp/apeid/apeid00/seminar/papers/Viet Nam/TOKYO2000_paper.doc, 2000.

Trong, Nguyen. *IT in Administration of Hochiminh City, Vietnam.* UNDP-Vietnam, 2002.

United Nations Development Programme, *Achieving MDGs through ICT: Experiences and Challenges in Vietnam*. UNDP-Vietnam, 2003.

United Nations Development Programme, *UNDP in Vietnam: Annual Report 2003-2004.* UNDP-Vietnam, 2004.

Vietnam Consultative Group. *Vietnam Development Report 2004.* Vietnam Development Information Center, www.vdic.org.vn, 2004.