

The background of the top half of the page is a dark green color with a light green circuit board pattern. The pattern consists of various lines, curves, and dots, resembling a complex electronic circuit.

ASIA INNOVATION POLICY STUDY

INSEAD

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Table of contents

Executive Summary	1
1. Innovation is powering Asia's competitiveness	3
The rise of Asia as a global innovation powerhouse	
Fundamentals for growth in IT capabilities	
Promoting a culture of IP creation	
Collaboration as a bedrock for global innovation	
2. Harnessing the value of technology standards	9
Governments' role in shaping technology standards	
Asia's experience in creating <i>de facto</i> standards	
Standards and interoperability	
3. Governments' dual role in ICT	15
Government procurement of technology products and services	
Distinguishing between nurturing and hand-picking winners	
4. Legal frameworks of IP protection	19
Recognizing the importance of patents and IP	
Encouraging R&D investment and patent creation	
Select Bibliography	23

EXECUTIVE SUMMARY

Public policy in the information society needs to focus not only on overcoming the digital divide, but more importantly on stimulating the demand for information and communications technology (ICT) and encouraging technological innovative activities on a broad scale. Because of the rapid advances in ICT, one of the greatest challenges for policy-makers today is to recognize the extent to which technology will have a fundamental and structural impact on the way economies function and people's standard of living, and harness this potential to benefit the country.

Technology innovation has become a crucial competitive advantage in business. Research conducted in support of the INSEAD Global Innovation Index, which ranks nations according to their innovation performance, clearly illustrates the importance of policy-making as one of the main pillars that determines individual countries' and regions' response to the challenge of innovation. It also emphasizes that every country has its own strengths and deficiencies with respect to innovation-related policies and practices, and policy decisions have to be tailored to suit each country's specific requirements.

The purpose of this white paper is to provide further guidance for policy-makers in Asia who seek to improve their countries' economic strategies and readiness to respond to the many complex developments presented by the rise of global innovation. It offers policy-makers and business leaders a neutral platform for discussion and a useful tool in drawing a roadmap towards increased networked readiness. Strengthening this response-readiness will directly impact a country's ability to adopt and benefit from leading technologies, increased human capacities, and organizational and operational developments.

The research undertaken to produce this document included the following components:

- An extensive overview of INSEAD's leading-edge research in innovation, technology management, and entrepreneurship;
- Qualitative, analyst interviews conducted in Asia with a number of government officials, regulators, technology vendors, incubators, technopreneurs, venture capitalists, and innovation management experts, as well as INSEAD faculty in Singapore and in France.

The report was produced by a team of INSEAD's Asia-based researchers working under the guidance and supervision of INSEAD Affiliate Professor Patrick Turner. Professor Turner is based with INSEAD's Asia Campus in Singapore. His research and teaching interests have focused on issues related to innovation, new business creation, and entrepreneurship.

The highlights of the research document include the following:

- **There is clearly a role for the government in the digital economy, but it is not the traditional role of an economic regulator** as under the obsolete science and technology policy of 'picking the winners', but more of a facilitator, enabler, and orchestrator of innovative activities. Governments also need to know when to disengage (after an initial period of facilitation) and let the private sector and market forces take over.

- Governments typically play an active role as policy-makers but they tend to overlook their role as customers of technology. **Healthy development of domestic technology sectors requires that governments recognize and balance their dual roles as policy-makers and customers.** Mindful of their role as a customer, governments should give consideration to interoperability and make choices based on specific functional needs.
- **Speed to market is an essential factor to consider in innovation policy.** The diffusion dynamics of first-generation technology is markedly different from that of fast-moving technology adoption today. In many practical situations, the market for an innovative technology will have moved on while the policy-makers prevaricate.
- Examples of sound policy-making aimed at promoting innovation have emphasized increasing consumer choice. As such, **practical factors such as consumer investment to date and emerging consumer preference should not be overlooked** when governments act to influence innovation outcomes.
- **Incubation efforts do not always prove to be an essential tool in nurturing local companies.** Many Asian entrepreneurs and technology vendors have shown that they are capable of adapting existing technologies or creating new ones to create demand-specific solutions. Governments can speed-up the process by motivating models of collaboration between local players and international partners, which will enable indigenous companies to expand their market-reach and strengthen their knowledge and expertise.
- **Protection of intellectual property rights is vital for all organizations, not only technology firms.** They help to strengthen a company's competitiveness, as well as its negotiating platform and overall value proposition.
- **There have been a number of regional IT initiatives growing from environments that encourage decentralized, market-driven innovation.** Policy-makers focusing on innovation will do well to study the dynamics of market behaviors that are becoming more commonplace in Asia, such as private players taking the initiative to enter into industry consortia.

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Chapter One

INNOVATION IS POWERING ASIA'S COMPETITIVENESS

THE RISE OF ASIA AS A GLOBAL INNOVATION POWERHOUSE

For many years, innovation and research and development (R&D) centers have been largely the preserve of the developed world. European, United States (US), and Japanese companies have focused these high-end activities in their home markets and other key markets in which products need to be adapted to meet local requirements.

However, over the last few decades, the logic of R&D internationalization has been changing in two ways: first, as companies have fanned out across the globe to access the potential of new markets, the footprints of their R&D activities have become more international or dispersed in character; second, with the rapid emergence of new centers of competence in Asia over the past few years, the rate of R&D internationalization has increased and looks set to continue to grow significantly. There is no doubt that there will be a significant wave of innovation emerging from across Asia in the coming years.

“The Asian region must be committed to the role innovation will play if we are to succeed in a truly sustainable economic model of development.”

- *President Gloria Arroyo,*
Philippines

To maintain a competitive edge, Asian companies are moving beyond traditional 'assembly' manufacturing, and integrating R&D and innovation into their business models to maintain a competitive edge.

Until the mid- to late 1990s, Asian economies were primarily confined, albeit quite comfortably, to the role of standard manufacturing centers, largely offering low-cost labor and resources. As Shantanu Bhattacharya, Associate Professor of Operations Management at INSEAD, points out: “The initial strength in manufacturing was enabled by a mix of homegrown manufacturing process competence combined with Western forms transferring knowledge and technology to Asia to obtain advantages from a lower cost structure arising from labor and favorable tax regimes.”

Innovation capabilities built up by high-growth ventures in Japan, South Korea and Taiwan were highly guarded within tight supply chain structures – a trend that was compounded by Japan's isolationist tendencies and China's political and business seclusion to create an environment where other Asian economies derived little incentive or resources to build their own R&D and design capabilities.

This predisposition to remain within the comfort zone of standard manufacturing was greatly challenged as Asian firms became increasingly aware of the following trends:

1. Owing to improvements at the macro level, the labor cost in these countries rose, and hence, the countries' competitive edge began to diminish; and
2. The advantage of labor costs gives a sustainable competence only in the presence of other low-cost drivers like infrastructure, logistics support and knowledge competence. ^[1]

[1] Contents synthesized from Professor Shantanu Bhattacharya's contribution to *Growth Challenges for Asian Entrepreneurs*, an INSEAD InnovAsia publication series sponsored by Credit Suisse. Source details: “Building Design and R&D competences”, *Growth Challenges for Asian Entrepreneurs*, Issue 05, October 2006.

Globalization has led to R&D outsourcing, which in turn is enabling Asian economies to emerge as technological hubs specializing in innovation 'offshoring'.

The opening up of international markets for technology and design has favored latecomers, who predominantly come from Asia.

With China's emergence as a leading offshore manufacturing platform, other Asian countries realized the need to abandon strategies dealing primarily with the upgrading of the traditional assembly line, and instead began to set their sights on the structural transformation of their manufacturing segments.

According to the *UNESCO Institute for Statistics 2005 Science Report*, Asia's gross expenditure on R&D grew by almost 4% between 1997 and 2002. During the same period, R&D expenditure in Europe and the U.S. fell by approximately 1%. In 2005, Asian R&D reached 38.7% of the global total, compared to North America's 37.5% and Europe's 23.6%.

"In recent years, innovation has pushed itself to the very top of policy-making and senior executive agendas. What has put it here can be summed up in one word: globalization."

- Professor Soumitra Dutta,
INSEAD

As companies begin to compete on the basis of global standards, traditionally favored policies like tax deductions and lower wages are no longer sufficient in providing a competitive boost to innovation. Instead, enhancing long-standing capabilities and competitiveness has become a crucial requirement for companies to thrive and succeed in the global economy. This shift has

been brought about by rapid changes in consumer preferences, high rate of technical obsolescence, improved quality and shorter product development cycles. To cope with these pressures in a cost-effective manner, multinational companies (MNCs) around the world are seeking to create ecosystems of suppliers to whom they can turn to for innovative ideas.

MNCs have begun to outsource many of their R&D functions to local partners in emerging markets, including Asia. Intel, for example, has set up platform definition centers in India, China, Brazil and Egypt. This trend is predominant in innovation related to materials, product, process and component, and the design aspects of electronic and software development. China's home-grown corporate giants such as Lenovo (which took over IBM's personal-computing unit in 2005), and appliance maker Haier prove that domestically developed products can match up to international expectations in design and innovation. The rise of Asia as an important location for 'innovation off-shoring' has begun to challenge the general perception that technological innovation must be based in MNCs' home countries.

The extent of the globalization of innovation was revealed by *INSEAD's 2006 survey, "Innovation: Is global the way forward?"* which looked at 186 global companies with a combined R&D spending in 2004 of \$76.4 billion. In 1972, less than half of all R&D sites were located outside companies' home countries. Almost 30 years later, this figure had jumped to more than two thirds.

FUNDAMENTALS FOR GROWTH IN IT CAPABILITIES

One of the key findings of the *INSEAD-WEF Global information technology report 2006-2007* [2] was the strong link between investment in educational institutions and rising levels of income per capita, growing success in reducing poverty and an increasing ability to establish a presence in the global economy. According to Augusto Lopez-Claros, Chief Economist and Director of WEF's Global Competitiveness Network: "The top rankings of Switzerland and the Nordic countries show that ... competent macroeconomic management, coupled with world-class educational attainment and a focus on technology and innovation, is a successful strategy for boosting competitiveness in an increasingly complex global economy."

"The most cited reason for establishing a new foreign R&D site was access to qualified staff."

- INSEAD/Booz Allen Hamilton survey

There are no shortcuts to building up the country's base in IT – a broader pool of education and IT talent is a necessary requisite for ongoing investment in research and innovation.

"Over the past four decades or so, the development strategies of East Asian nations interacted with the investment strategies of US-based ICT companies to generate a global supply of ICT labor ... As a result new possibilities to pursue high-tech careers, and thereby develop their productive capabilities, have opened up to vast numbers of individuals in a number of East Asian nations."

- Professor William Lazonick, INSEAD

Ireland provides an excellent case in point. Well known for software exports and shared services management since the late 1980's, Ireland's ICT industry share in GDP in 2003 was 16%, and ICT exports accounted for 33% of its total exports. INSEAD research has shown that education played a vital role in the rise of the 'Celtic tiger'. Some of the key government policies instrumental in effecting this success include initiatives aimed at increasing PhD output in ICT related fields, sustained investment in the higher education system, the

"Presidential Young Investigator Program" which encourages young researchers to stay in research, and the "National Development Plan" that sets aside US\$4.9 billion from 2000 to 2006 to enable research in niche technologies.

The experience of countries in transition that are located in other parts of the world can also be good source of inspiration for building IT competitiveness.

Estonia – Harnessing technology as an enabler of progress

In the INSEAD-WEF Global information technology report 2006-2007, Estonia ranked 20th, just ahead of Ireland (21st) and France (23rd). More importantly, the country stood out for the 'impressive progress' it had made within the past decade in terms of networked readiness and general competitiveness. Since its independence in 1991, the government "saw technology as a key enabler for not just promoting the development of the country but also for promoting an open and informed society with a transparent, open government." Presently, Estonia has one of the most modern telecommunications networks in Europe, low connectivity costs and high rates of computer literacy, which have led to an explosion of innovative service applications, notably in banking, education, health, transport and public administration.

Source: *Global information technology report 2006-2007*, INSEAD-WEF

[2] Produced in collaboration between INSEAD and the World Economic Forum, *The Global Information Technology Report* is the authoritative benchmark of global IT strategies. Based on qualitative and quantitative data collected from over 100 nations, the report includes a 'Networked Readiness Index' which measures each country's readiness for the digital networked era.

Effective investment and employment policies can help countries to reverse the outflow of knowledge from 'brain drain', and instead create a 'brain gain'.

Asian economies are well aware of the importance of a sound educational foundation for their population to ensure that their citizens can rapidly advance towards a knowledge-based economy.

Despite the allocation of resources toward the creation of an enormous pool of talent, a significant hurdle in the process has been the outflow of knowledge and potential from Asia to the West. According to INSEAD Professor Philip Anderson, "there are tens of thousands of engineers and scientists pouring out of Asia's best graduate schools every year." Asian nations thus face the need to create domestic employment opportunities, through either foreign direct investment or investment by local governments and businesses, to transform a potential 'brain drain' into an actual 'brain gain'. The interaction of a national development strategy and a corporate investment strategy can help to lure talents back home, and encourage nationals to seek education and experience at home.

Taiwan – Instituting effective policy measures to convert brain 'drain' into 'gain'

In the 1960s and 1970s, some of the brightest young talent from Taiwan went overseas (mostly to the US) for university and advanced studies. Due to the lack of career opportunities back home, they continued to stay abroad. The resultant 'brain drain' was indirectly beneficial for it allowed Taiwan to build a large pool of qualified talent before the economy was ready to absorb them. From 1985, they were offered incentives to return home as entrepreneurs, create start-ups in the science parks or take up research, academic and management positions. The reverse 'brain-gain' allowed overseas Taiwanese to bring back knowledge and expertise acquired in places like Silicon Valley, as well as networks with international companies, giving a strong boost to Taiwan's efforts to develop its ICT industry.

Source: Global information technology report 2006-2007, INSEAD-WEF

PROMOTING A CULTURE OF IP CREATION

A number of high-growth Asian companies have succeeded in creating and leveraging on product platforms based on self-created, innovative intellectual property (IP). As documented in INSEAD research, although there are other competencies apart from innovation such as reverse engineering, logistics and support services that some of these Asian organizations have turned to, the dominant response has been to seek the sustainable advantage in innovation. Companies in Southeast Asia strongly reflect this change – companies in the region now aim to evolve beyond mere provision of products and services to become sources of innovation. A notable trend prevalent amongst the up-and-coming generation of Asian professionals is their drive to build their businesses on self-created IP, not cheap reproductions of products and services from other countries.

Encouraging a culture of IP creation in tandem with IP consumption is essential to spur companies' interest and investment in innovation.

Sydus Mobile – Indigenous solution to accommodate multiple technology standards

Young Indian entrepreneur Saumil Nanavati set up Sydus Mobile (www.sydusmobile.com), a mobile Internet radio in 1999 because his PDA could not store as much music as he wanted. Sydus' music service has been accessed more than 400,000 times in 91 countries. Nanavati designed the software to support live radio feeds across three major mobile standards: GPRS, EDGE and WCDMA.

Compatible with 189 mobile handset models and variants, Sydus sought to partner with large Asian handset manufacturers to co-develop the software and install in up to 30 million new handsets.

With growth in demand for digital and mobile music, Sydus' value proposition – music streamed on demand over mobile phones — can act as a solution to both piracy and limited storage space on handheld devices.

Source: Global information technology report 2006-2007, INSEAD-WEF

Policy-making, especially in developing countries, should harness the potential of rising global innovation, R&D networks and competency transfer, by enabling provision of opportunities for international and domestic companies to compete on an equal footing within the local market. Contrary to concerns that this might handicap local firms, opening up the economy also means the creation of prospects for local companies to reach out to the global markets and partners. *Competition should be encouraged to motivate local companies to develop national products and technologies that are on par with international expectations.*

COLLABORATION AS A BEDROCK OF GLOBAL INNOVATION

Global innovation networks translate into global flows of knowledge.

Forming strategic international alliances in the private sector is one of the critical 'pulse points' that will encourage technological innovation on a broad scale, alongside key measures including: developing a financial and technical infrastructure, institutionalizing a regulatory framework, developing a skilled workforce in ICT, and creating an innovative, creative, and entrepreneurial culture.

Opening up the economy enables local companies to explore whether they can compete against international firms by relying on their indigenously developed products or if they wish to use standards more widely accepted in the global context. Creating a level playing field will help to develop a country's innovative capabilities and technological specialization in the long run.

A cosmopolitan approach to innovation can prevent a global retreat into techno-nationalism, as countries like China, India and Korea can develop and benefit from their own IP. For instance, the founder of Taiwan's Acer, Stan Shih is credited with pioneering a business model that encouraged partners and suppliers to collaborate, which enabled Acer to enhance its technologies and create high-quality products at competitive prices. A TIME magazine tribute to Shih recognized that his business model was a big reason why a "PC costs \$1,000 and not \$10,000."

Much of the recent progress in Asia's ICT development has been achieved under the concurrent policies of liberalization, competition and deregulation, combined with a strong drive to integrate the region into a coherent ICT marketplace and a globally competitive entity. The ultimate goal is to develop vibrant technology ecosystems comprising local enterprises, leading multinational corporations, innovative technopreneurs, and start-ups.

Chapter Two

HARNESSING THE VALUE OF TECHNOLOGY STANDARDS

GOVERNMENTS' ROLE IN SHAPING TECHNOLOGY STANDARDS

Standards ultimately coordinate technical development on a broad scale. Although standards themselves do not ensure innovation, they provide an incentive to produce new innovations that meet the standards more efficiently.

Once governments have established their role in technology innovation, they often expand that role into the area of technology policy innovation. This involves activities such as setting strategic directions; developing policies, standards, codes of practices and advisory guidelines; coordinating with private players, fostering partnerships and alliances; and providing promotion and liaison support.

Government intervention in the market does not guarantee either successful standard-setting or successful innovation. In fact, a *de jure* policy that ignores the market situation (or the *de facto* standard) can be counterproductive to technology innovation – the fact that governments usually apply *ex ante* rather than *ex post* standardization further increases the likelihood of 'betting on the wrong horse.' This was the case, for instance, with second-generation mobile communications, where Japan and Korea opted for CDMA technologies, while the rest of Asia adopted GSM, resulting in difficulties for roaming mobile users until the advent of third-generation solutions.

Government involvement in setting technology standards can indeed be effective, provided the timing and circumstances are carefully observed and selected, such as in the following scenarios:

- If the government possesses more knowledge on a new technology than private actors;
- In the initial "fluid" phase in the evolution of a technology, where the market players have not incurred sunk costs, the government's standard-setting policy may send signals to the market to guarantee, for a limited period of time, a certain technology trajectory.

Flexibility in governments' standard-setting policies, to accommodate changing market conditions, is an important necessity to stimulate technology innovation.

Asian entrepreneurs and technology vendors have proven that they are capable of adapting existing standards, or creating new ones, to meet demands specific to the region or country.

ASIA'S EXPERIENCE IN CREATING *DE FACTO* STANDARDS

In reality, it is not typical that only one standard exists in a given field, especially in ICT. Different standards typically come with different characteristics and different capabilities. Particularly in software, when a better product comes along, it can displace even a dominant product. The key is to build better and more innovative products that can compete with existing products. Many successful technology vendors grew from humble beginnings and in the face of huge competition. Increasingly, Asia's high-growth technology providers are forming new industrial platforms and alliances with research universities to promote *de facto* standards.

INSEAD's research on entrepreneurship in Asia has documented several examples of the novel ways in which upcoming Asian entrepreneurs are carving niche markets for themselves through creation of innovative standards.

Tsinghua Tongfang – Active player in market-driven standard-setting

Tsinghua Tongfang (www.thtf.com.cn), China's leading home connectivity solution provider, has leveraged its extensive linkages with Tsinghua University to secure several patents in broadband communications, network security, home automation, and digital media. Tsinghua Tongfang's major home connectivity application is an intelligent home solution system called "e-Home" which integrates home automation control, home security, digital multimedia, wireless communications and home utility functions.

Technologically, e-Home is based on a basic platform called EZONE developed by Tsinghua Tongfang in 2003. According to China Communications Network, a major advantage of the EZONE platform is that it runs under Windows as well as other operating systems like Linux.

In 2004, Tsinghua Tongfang co-founded a home network standard industrialization alliance called ITopHome.

Source: INSEAD research on entrepreneurship in Asia

In addition, Asia's leading technology players are becoming involved in international industry consortia. These are cooperative arrangements, sometimes organized more loosely than traditional industry associations. They typically share resources and seek to promote standards for the evolution of technology and interoperability by producing specifications and reference software. Although consortia are funded by industrial members, many are vendor-neutral.

Huawei, Lenovo, Samsung, Panasonic among proponents of Digital Living Network Alliance

The Digital Living Network Alliance (DLNA) (www.dlna.org), formerly known as Digital Home Working Group (DHWG), is a cross-industry organization of 220 companies from 20 countries worldwide. DLNA has been active in consumer electronics, computing, mobile devices, and other complementary products and services. Its aim is to provide a wired and wireless network of interoperable consumer electronics, personal computers and mobile devices for the home-user. To this end, DLNA has published a common set of industry design guidelines that allow manufacturers to actively contribute to the market for interoperable devices, which in turn spurs innovation for development of value-added products and services. These guidelines specify the interoperable building blocks that are available as platforms and infrastructure. The guidelines are flexible, and as new technology and standards become available, they are broadened to cover new scenarios.

Source: DLNA White Paper

STANDARDS AND INTEROPERABILITY

The ICT industry and the broader business community have seen growing demand for interoperability. At the same time, a large degree of confusion persists in understanding the goals of interoperability and common ways to achieve them. This is because:

The meaning and importance of interoperability evolves over time in line with the needs of stakeholders and markets. It is important to keep in mind that their ultimate role is to facilitate business, which is also evolving rapidly.

- Good practices in interoperability-related policy-making have gone through substantial maturation since the 1990s.
- The terminology related to interoperability is sometimes used loosely and interchangeably.

It is also important to recognize that interoperability is but one among many requirements that needs to be considered. A balanced approach should be taken towards addressing various important, and sometimes competing, interests such as security, time-to-market, competition, innovation or consumer demand, alongside interoperability. Interoperability should not be perceived as the single overriding interest.

One of the definitions that have been widely adopted by the ICT community was originally put forward in the *European Council Directive of 14 May 1991 on the legal protection of computer programs (91/250/EEC)*.^[3] This document described interoperability as “physical interconnection and interaction is required to permit all elements of software and hardware to work with other software and hardware and with users in all the ways in which they are intended to function; such interoperability can be defined as the ability to exchange information and mutually to use the information which has been exchanged.”

There are different ways to achieve interoperability. This include product design, voluntary industry collaboration, cross-licensing and the use of translators.

A number of factors in both industry and business have contributed to the surge in demand for interoperability. Among them, INSEAD research has pointed out the following:

- ICT is increasingly software-intensive, with the predominance of hardware over the last 40 years significantly reversed.
- The focal point of ICT is shifting from the network to the consumer.
- The new-found emphasis on trust in business has raised questions regarding the cost of compliance in both implementation and opportunity.

At a final meeting of the European Union ICT Task Force in November 2006, INSEAD Professor Soumitra Dutta presented the main conclusions of the Task-Force’s report, which gives a strong priority to improving interoperability on all fronts.^[4] According to the report, interoperability can “eliminate the need for undue restrictions and unnecessary user intervention in the choice of device or software, avoid artificial or unanticipated constraining limits, and offer a reasonable assumption that business will function seamlessly without requiring excessive user knowledge of the underlying technical detail. And it is a self-reinforcing process, since the value of an interoperable network increases exponentially as the number of its users grows.”

Interoperability is one among different requirements to be considered – others include security, time-to-market, competition, innovation or consumer demand.

Customer needs are driving demands for interoperability and standards in the market.

[3] Council Directive 91/250/EEC of 14 May 1991 on the legal protection of computer programs. Source: http://eur-lex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=en&numdoc=31991L0250&model=guichett

[4] *Fostering the Competitiveness of Europe’s ICT Industry*, EU ICT Task Force Report, November 2006. Source: <http://ec.europa.eu/enterprise/ict/taskforce.htm>

The relationship between interoperability and open standards need to be better understood.

The report's conclusions included the following:

- ICT customers have said loud and clear that they want interoperability, choice and innovation.
- In terms of achieving interoperability, broadly, there has been a shift in standardizing interfaces in advance to addressing the interoperability of components as they are developed.
- Interoperability is an enabler of business.
- Interoperability spurs innovation and competition.
- Interoperability issues have a tremendous impact on consumer choice and technological innovation.

Interoperability enables suppliers to develop their own implementations of a technology standard. This not only creates more choice for consumers, but also contributes to learning from development and implementation successes. Ultimately, in today's global economy, interoperability helps foster leadership in international collaboration.

Academic research has shown that although the above 1991 definition of interoperability remains an important anchor for policy-makers, many discussions of effective interoperability policy suffer from ambiguity brought on by insufficient understanding of the concept of open systems. In fact, the need for explicit definitions of the sense in which standards, formats and protocols are open has never been more pressing.

Interoperability has always been central to standardization. In particular, the rise of complex industry value chains has created the need for a new dynamic of open standards that meets all ICT players' needs and gets their support.

Although open standards are one way of achieving widespread interoperability, there are many definitions of open standards. None of the definitions has become dominant, but they all share some key common characteristics, which are typically presented as follows:

- Published without restriction;
- Publicly available at no cost, or for a reasonable fee;
- Patent rights are made available on reasonable and non-discriminatory (RAND) terms;
- Developed by market-driven consensus.

Recent trends in crafting interoperability policy have focused on open standards and formats and common interoperability frameworks. Policies that support the development of open standards will improve interoperability and thus produce benefits for governments and consumers alike.

Nonetheless, the conclusions of the above-mentioned 2006 EU ICT Task Force report have clearly highlighted that the processes or routes towards interoperability are not the crucial consideration. Policy-makers will do well to keep in mind that implementing open standards is only one way of achieving interoperability in the ICT sector. What counts is adoption in products and services. And here, the process can be slowed by the temptation to mandate standards, which will ultimately weaken competition, collaboration and innovation in the ICT sector. Ironically, this outcome would be the precise opposite of the benefits the ICT and business communities associate with interoperability.

Fundamentals of sound policy-making in interoperability

The EU ICT Task Force report summarizes the fundamentals of sound policy-making that affects today's interoperability landscape as follows:

- Most players favor standards. And only widely implemented standards – that can deliver interoperability – are likely to be adopted.
- End-users increasingly adopt open, well-documented standards based on widely accepted technologies.
- Standards-based flexibility is at the heart of today's competitiveness strategies as pursued by businesses as well as governments.
- It is time to eliminate the geographical and other divide, between standards-makers and standard-adopters. Standardization should be driven by usage and practical applications. And in selecting standards, the keyword should be interoperability.
- It is essential to narrow the gap between the theory of standards and standardization as a business tool and e-business interoperability practice by focusing on the practical contribution of standards to meeting business requirements.
- Standards development should be conducted only in response to identified and supported needs: it is vital that standardization is driven by a business and market driven approach.
- Attempts to impose excessive controls on the process of natural selection among the multiple ways to deliver network effects reduce or delay interoperability.

Source: 2006 EU ICT Task Force

In recent months, industry and media discussions worldwide have zoomed in on the accurate meaning of the word 'open,' particularly in the context of 'open standards.' Therefore, it is very timely to dispel any lingering ambiguity in using the term 'open standard' and properly separating it from the concept of 'open source':

- An open standard is just that – a standard, i.e. a technical specification. It is neutral with regard to software development and licensing models.
- Open-source software (OSS) is software that may be used to implement an open standard.
- Crucially, open standards can be implemented by both proprietary and open-source software. The availability of source code is neither necessary nor sufficient to make something a standard, let alone an open standard. ^[5]

Although open standards can facilitate innovation, they alone are not sufficient to create innovation. The other ingredients that have fuelled the past decade of technology innovation have included a number of factors, for instance, access to sufficient venture capital, recognizing the value of protecting IP, using IP systems effectively, and leveraging IP assets.

Finally, effective policy-makers are aware that change and management of change in standardization is critical for success. This is because it is the marketplace that provides the best evidence of the successful adoption of a standard. A constant check is therefore necessary on the relation between interoperability and standards.

Open standards should be clearly distinguished from open source software.

[5] *Road Map for Open ICT Ecosystems*, produced by the Berkman Center for Internet & Society at Harvard Law School, "Open standards are not the same as open source software." pg. 6. Source: <http://cyber.law.harvard.edu/epolicy> (2005)

Appropriate IP policies in standards development play an important role in encouraging leading edge and innovative solutions.

One of the main objectives of developing standards is to bring together the best technology available to solve the problem that the standard is intended to address. This makes IP rights, and IP policies in particular, one of the key aspects of standards. Patent protection encourages innovators to contribute key and leading-edge technologies to standards-setting organizations. Patents enable broad industry use of the technology through licensing.

Major standards organizations such as ANSI, ECMA and ITU allow for the inclusion of patents in their standards and for patent holders to license their essential patents on RAND terms. According to the standard description of elements of open standards as put forward by ITU, IP rights are essential to implement the standard to be licensed to all applicants on a worldwide, non-discriminatory basis, either for free and under other reasonable terms and conditions (which may include monetary compensation).^[6]

While the term “intellectual property” encompasses patent, trademark, and copyright protection, patents form vast majority of standards-related IP rights. From a policy perspective, the role of a patent system is to create incentives for innovation by providing a legal solution to inventors’ appropriability problems. An environment that encourages voluntary participation and contribution is essential, because *patent protection can facilitate the development and adoption of high-quality, broadly available technology standards.*

At present, standards developers face fundamental challenges with respect to IP. The majority of these have to do with, on one hand, patent proliferation, and, on the other hand, the continuing shift towards open innovation. Research by University of Toronto has illustrated that the ongoing shift towards open innovation has been characterized by increasing vertical specialization in technology, development and commercialization. It has led to a proliferation of firms whose business models rely heavily on IP rights because they lack access to the manufacturing and distribution capabilities required to “cooperate on standards and compete on implementation.” As a result, patents play an increasingly important role in promoting vertical specialization in R&D by limiting the hazards faced by specialized technology developers.^[7]

To promote innovation, patent systems need to improve in their functionality. As Asia becomes a global innovation powerhouse, these trends should give further encouragement to Asian policy-makers to approach with an open mind, and study the evolving parameters of collaboration versus competition, and openness versus control. To analyze these parameters, it will be crucial for them to understand the distinction between standards, technology and implementations.

[6] The definition was developed by the IPR Ad Hoc Group and endorsed by Telecommunication Standardization Advisory Group (TSAG) at its meeting on 11 November 2005. Source: <http://www.itu.int/ITU-T/othergroups/ipr-adhoc/openstandards.html>

[7] Tim Simcoe. Open Standards and Intellectual Property Rights, *Open Innovation: Researching a New Paradigm*. Ch. 8. Henry Chesbrough, Wim Vanhaverbeke and Joel West (Eds.). Oxford University Press. 2006.

Chapter Three

GOVERNMENTS' DUAL ROLE IN ICT

GOVERNMENT PROCUREMENT OF TECHNOLOGY PRODUCTS AND SERVICES

Research studies by INSEAD and other institutions conclude that potential productivity gains from the use of ICT will accrue from a combination of factors that includes the following:

- Organizational changes brought about by ICT;
- A skilled workforce in ICT; and
- Technology R&D spending.

The rate at which these gains can be fully realized and extended into the future depends on the speed at which businesses and citizens embrace ICT. Recognizing that the government has the largest client base and that the public sector can serve as a leveraging platform to demonstrate how ICT can meet needs more efficiently, governments can provide a catalytic force by stimulating the demand for ICT applications. Additionally, they will do well by equipping civil servants to become knowledge workers in the knowledge economy.

The *Global Information Technology Report*, published annually since 2001 by INSEAD in partnership with the World Economic Forum, has instituted the Networked Readiness Index (NRI) as a measure of the degree of preparation of a nation or community to participate in and benefit from ICT developments including innovation. Some of the NRI's key metrics include government procurement of advanced technology products, buyer sophistication, and competence of public officials.

Governments' role as customers of ICT implies the need to maintain an open and fair system of purchase that is based on a comparison of the merits and shortcomings of the different products and the value they provide to the end-user. Governments sometimes display a well-meaning inclination to shelter the up-and-coming domestic technology players from the rough and tumble of free competition. Nonetheless, research shows there are many pitfalls that stem from instances of governments articulating preferences for a particular type of vendor, technologies, or operating systems. Over time, such impact tends to distort the institutional framework and affect economic development.

To make ICT products and services more affordable, policy-makers can actively liberalize the industry to enhance competition. Over time, measures that aim to increase competitiveness of market forces in the ICT industry will lead to lower cost of access and make available a greater range of ICT products and services at more affordable prices to the general population.

Alongside its role as the agent for policy creation and implementation, a government must also keep in mind and distinguish its capacity as a customer from that as a policy maker.

Creating a level playing field for technology vendors participating in government tenders creates greater long-term benefits for the whole country, rather than the immediate gains derived from selective provision of opportunities.

The practice of government 'hand-picking' winners is detrimental to the health and competitiveness of local markets, and subsequently, national economies.

South Korea – Competition as a catalyst to spur broadband revolution

In the paper, "Separating early-adopters from the majority: the case of broadband Internet access in Korea" [8], researchers studied the rapid adoption of broadband internet in Korea, and described a technological diffusion model that is applicable to other network products. The authors found that in Korea's broadband explosion success story, market competition and technological factors were the key determinants of the rate of diffusion, while government and socio-cultural factors moderately contributed to the rapid diffusion. Competition among large companies was likely to accelerate the diffusion of new services. Technological innovation then quickly shifted the market dynamics from competition among online service providers to competition among low-speed Internet access services to competition among Broadband Internet services that allowed high-quality and low-cost services.

Source: Science Direct

DISTINGUISHING BETWEEN NURTURING AND HAND-PICKING WINNERS

There is clearly a role for the government in the digital economy, but it is not the traditional role of an economic regulator as under the obsolete science and technology policy of 'picking the winners', but more of a facilitator, enabler, and orchestrator of innovative activities.

"For the integration of Asia, the best way to move forward is to have as much freedom in the movement of goods, services and capital as our economies can bear and allow market forces to decide where the capital will go."

- Singapore's Minister Mentor
Lee Kuan Yew

Having assumed an important role in defining innovation policy and nurturing national R&D and innovation ecosystems, governments sometimes have an understandable tendency to carry their incubation efforts too far. This may result in the practice of hand-picking winners rather than letting the industry and market participants reward the most innovative and market-savvy players. These preferences are typically motivated by the governments' policy-making role rather than their customer role.

Israel – ICT success tied to the government's commitment to market neutrality

Israel is one of the leading digitally advanced countries, with a Networked Readiness index ranking of 19 out of 115 countries. A key reason for the country's success lies in the Israeli government's guiding policy of market neutrality, "with the focus on remedying the market failures inherent in innovation, rather than on 'winner-picking' practices." The market-friendly nature of the Israeli government allowed for specific policies and instruments to evolve in response to pressing needs at different points in time, such as investment in R&D and innovation over the last two decades.

Source: Global Information Technology Report 2005-2006, INSEAD-WEF

[8] Sangmoon Park (Samsung CTO Office), Soo-Hyeon Yoon (Korea Digital Satellite Broadcasting). 2004. Source: Science Direct (www.sciencedirect.com)

Research findings published in the *INSEAD-WEF Global Information Technology Report 2005-2006* [9] have concluded that excessive regulatory pressures have inhibited competitive entry and infrastructure investment. In the telecom sector, as a case example, it was found that “administrative solutions through regulation are less effective than market forces for determining the speed of upgrades, the new services to be offered, or even the technologies to be used.”

Examples abound of Asian technology providers who have thrived on the strength of their innovative ideas, and in a near-total absence of external support. Linked to these developments, and of increasing interest to many seeking broader impact, is the concept of leap-frog disruption. This is particularly evident where existing technologies are being exploited in new ways in the developing world, where there is the ability to use innovation to bridge the opportunities for disruption and the challenges of addressing the needs and changing dynamics. The potential to enable a fundamental shift over a large population and so improve upon the norm in many developing economies is significant. It is noteworthy that new innovations are even enabling local changes to leap-frog over the pace of progress in the developed world.

Globe Telecom, Philippines

The Philippines has successfully tested a number of innovative technology solutions that are rooted in the concept of leapfrogging. In parts of the country where traditional networks such as transport, postal services and banking may be absent or under-developed, ICT has often emerged as the only viable network and a powerful source of the virtuous “network effect.”

In a market where many ordinary consumers lack credit cards and often do not have much cash, Globe Telecom’s G-Cash has created an alternate economy, where one person can buy as little as a single cigarette from another, paying for it by beaming prepaid minutes from one mobile phone to another. The ‘electronic wallet’ feature allows users to send and receive cash and make payments, including bill payments, donations, and online purchases, via texting. Users can top up their G-cash wallets at ATMs and retail outlets throughout the Philippines. Since its inception in October 2004, G-cash has amassed 1.2 million users.

Source: INSEAD research on entrepreneurship in Asia

There are several regional IT initiatives that illustrate the benefits accruing from an environment encouraging decentralized, market-driven innovation. For instance, a great deal of recent ICT development in Southeast Asia has come from bottom-up, regional, and grassroots initiatives. Over the past 10 years, Indonesia in particular has witnessed many e-initiatives that were not spearheaded by the central government or focused on the West Java region as the country’s traditional centre of gravity in terms of population density and business activity. Most recently, regions such as Yogyakarta and Sulawesi that historically have not been on the forefront of technology proliferation are putting forth their own e-campaigns and producing local success stories in areas such as smart schools and telemedicine.

Incubation efforts are not always necessary – many Asian IT players have thrived despite the government’s hands-off approach.

Entrepreneurial companies in Asia are learning to overcome the scarcity of early-stage funding.

[9] An authoritative benchmark of global IT strategies, based on qualitative and quantitative data collected from over 120 nations. (For source details, see footnote 3)

One of the greatest challenges faced by new companies anywhere in the world has been that of finding funds to finance new ventures. This is particularly true in Asia where the development of organized funding routes, notably venture capital, has lagged behind other parts of the world. The region's climate for early-stage investing turned even more cautious following the IT market crash of 2000/2001.

That has not stopped forward-looking entrepreneurs in Asia from capitalizing on bold ideas inspired by a careful analysis of future trends in the region's hyper-growth markets. Participants in a 2005 INSEAD survey of early-stage Asian entrepreneurs ^[10] (the majority of them focusing on technology-based products and solutions) reported that more than 90% of them funded their start-up at least partially, and 50% of them wholly, from their own resources. Some 20% complemented their personal investment with funds provided by "family and friends." 17% reported funding by business angels, 15% venture capital, and 11% strategic partners including government start-up funds. None of the respondents needed more than six months to obtain start-up funding.

Of the 50% of survey respondents who went on to seek second-round financing for their ventures, 26% turned to venture capitalists, compared to 22% who secured funding from government grants (including grants provided by regional government agencies), and 17% who received funding from strategic partners such as technology vendors.

Legend Capital – Powering the growth of China's largest online ticketing company

Beijing-headquartered Pony Media (www.baotoo.com) provides express ticketing services through a nationwide express network (www.ponyex.com.cn). In 2004, Pony Media reported revenues of RMB40 million (USD4.9 million). In early 2005, after three months of negotiations, Legend Capital, the venture capital arm of China's Lenovo, became a major shareholder by investing RMB30 million (USD3.7 million). Pony was the second Internet-based start-up in Legend Capital's portfolio, which has since expanded to include Joyo.com, China's version of Amazon, and a number of other companies.

Source: INSEAD research on entrepreneurship in Asia

[10] Financing profitable growth: How start-up businesses obtain and sustain capital. *Growth Challenges for Asian Entrepreneurs* series, Issue 01, 2005. "Growth Challenges..." An INSEAD publication sponsored by Credit Suisse Private Banking.

Chapter Four

LEGAL FRAMEWORKS OF IP PROTECTION

RECOGNIZING THE IMPORTANCE OF PATENTS AND IP

Protecting IP is essential for innovation. A 2001 report by the German Association for Information Technology, Telecommunications and New Media (BITKOM) ^[11] illustrates the importance of software patents for businesses. Of the 102 enterprises that participated in the survey, 90 developed software as products or part of their products. Of these, the vast majority (76%) said they felt the need to protect their software-related products against imitation. 41% were already using patents for this purpose alone or in combination with other instruments, as follows:

- 82% use contracts for protection;
- 61% use copyright.

Most of the enterprises valued the economic benefit of patents. They believed that:

- Patents strengthen negotiating position – 92%
- Patents increase the value of company – 86%
- Patents facilitate the obtaining of credits – 84%
- Patents provide a lead in competition – 84%.

Contrary to popular perceptions, IP protection is not limited to technology-based companies alone. The benefit arising from *adequate IP protection can also enhance SMEs' ability to act as agents of technology and knowledge collaboration on a global scale*. For example, stating that a curry puff is more than just potatoes and egg wrapped in pastry, 'Old Chang Kee', an established snack chain in Singapore, was one of the first SMEs to take up the "Intellectual Property Management" in January 2007. ^[12]

ENCOURAGING R&D INVESTMENT AND PATENT CREATION

Innovation will be the major engine of future economic growth in Asia. Nevertheless, innovations also contain potential for the misappropriation of IP. Governments can ensure that protection granted to IP holders will allow current and future innovators to build new and improved products or processes from the existing patented products or processes. Similarly, location decisions of MNCs tend to be based on the ability of the host country to provide the skills, infrastructure and institutions, as well as on the robustness of its regulatory regime on IP rights.

Asian countries have been at the forefront of some of the trends in internalizing the value and benefits of patents. In January 2006, the Bureau of Secondary Education of the Department of Education of Philippines approved the proposal of the National Book Development Board to include the analysis of "intellectual property, copyright and intellectual property rights" to the list of standard learning competencies for Economics in Secondary Education, to be implemented beginning school year 2006-2007. Similarly, IP-related curriculum has been incorporated in 2006 into polytechnics' syllabuses in Singapore.

Protection of IP is crucial for all organizations – they help to strengthen a company's competitiveness, negotiating platform and value-added proposition.

[11] BIKTOM, *Microeconomic and Macroeconomic Implications of Patentability of Software*, 2001

[12] Source: SPRING Singapore and Intellectual Property Office of Singapore

Attracting global players to innovate in the local markets can help expand the host country's knowledge base, provided IP practices are consistent with international expectations.

IP protection is necessary to derive tangible and intangible benefits from knowledge transfer.

INSEAD research shows that *adequate IP protection provides IT companies with a competitive edge over other players in the short term and creates incentives for further investment in R&D in the long term.* According to former INSEAD professor and current Dean of Judge Business School, University of Cambridge, Arnoud de Meyer, “innovators need good protection of IP rights and in particular the enforcement of these rights.” However, the incentive for creation is always accompanied by the risk of abuse of knowledge and technology. In many cases, the abuse may be unintentional, but the damage, once caused, is oftentimes irreparable. Hence, companies for their part need to be aware of this threat and position their strategy accordingly so as to minimize the risk of IP abuse.

The new wave of successful multinational companies originating in China and India holds many valuable lessons in the importance of nurturing an R&D culture and protecting IP investments. According to Zhang Xiaoqiang, Vice-Chairman of China's National Development and Reform Commission, “R&D investment allows companies to improve their competitiveness.”^[13]

During the “First Asia-Pacific Conference on Innovation Management-InnovAsia 2005” held in Bangkok, participating member countries, “considering the call made by ASEAN Vision 2020 for a technologically competitive ASEAN competent in strategic and enabling technologies, with an adequate pool of technologically qualified and trained manpower, and strong networks of scientific and technological institutions” agreed to “initiate partnerships among R&D institutions, academic institutions, professional organizations, private sector and other centers of excellence, to forge mutually beneficial arrangements to exchange knowledge.”^[14]

According to a 2006 white paper on innovation published by the European Industry Association for Information Systems, Communication Technologies and Consumer Electronics, “a reliable IPR framework, in particular patent protection, which balances the interests of both developers and users of innovative technology, is a key prerequisite for investment in innovation. Patents promote innovation, encourage the free flow of information about new and emerging technologies, and facilitate licensing ... Patents – which provide the exclusive right to use, sell or license new technology for a limited period of time – underpin technology transfer and enable a reasonable return on R&D investment.”^[15]

Despite the best efforts on part of the government and private players, *differing IP practices in the various countries in Asia threaten to distort market mechanisms* by erecting barriers to the free movement of goods and services. Non-tariff barriers to international trade are often difficulties associated with an inadequate legal framework to protect the ownership, use, transfer or sale of both physical and intangible property, especially IP. Transparent IP frameworks in compliance with international regulations reduce legal uncertainty and promote innovation and economic growth.^[16]

[13] Comment taken from proceedings during the World Economic Forum on East Asia held in Tokyo in June 2006

[14] Quotes and content extracted from: “Bangkok statement on Innovation Management”, *First Asia-Pacific Conference on Innovation Management-InnovAsia 2005*, Bangkok, September 2005.

[15] Source: “Increasing Innovation, Research and Development in Europe for ICT Excellence”, *ICT industry White Paper Addressing the Second Pillar of the i2010 Initiative*, EICTA, Brussels, September 2006.

[16] Contents synthesized from OECD-APEC Keynote Paper, *Removing SME Barriers to Access to International Markets*, November 2006

Haier, China – IP as the cornerstone of innovation

Starting as a refrigerator manufacturer in 1984, Haier (www.haier.com) expanded to a trans-national organization that produces more than 15,100 products including air-conditioners, color televisions, personal computers and washing machines. These products are marketed to more than 160 countries and regions globally, making Haier one of China's best-recognized brands, one of the world's top 100 brands in 2004, and the first Chinese brand to enjoy this distinction.

Innovation is part of Haier's corporate culture. By 2004, Haier had set up 18 R&D centers in Europe, North America, and Asia. The company also formed strategic alliances for joint research with global players within and even outside the household electronics industry, including Sanyo, Ericsson, and Microsoft. Haier also has more than ten scouting offices worldwide to monitor the latest technologies and market trends, and its research expenditure and patent portfolio has been growing steadily each year. The value accrued from its investment in research was reflected in Haier's filing of 682 patents in China, 29 more than the total number of patents filed by research laboratories and universities in Shandong Province in 2003 alone.

Source: INSEAD research on entrepreneurship in Asia

Increasingly, the relationship between IP and competition has come to the attention of Asian regulators. It is widely accepted in Australia, the European Union, Japan, US, Canada and elsewhere that the mere exercise of IP rights does not give rise to a presumption of unlawful anti-competitive conduct. IP laws provide the primary economic incentive for innovation by giving inventors a property right in the fruits of their efforts for a limited period of time, and this is consistent with modern legal trends and with many countries' economic and social goals. If the exercise of these rights is presumed to be a violation of competition law, it would seriously damage efforts to promote a more R&D-focused and innovation-intensive economy.

Leading antitrust authorities today recognize that ownership of an IP right is just one factor in evaluating whether products compete with one another as substitutes in a properly defined relevant antitrust market. Antitrust authorities should evaluate the market power of IP owners using the same rules that apply to other economic actors, rather than the view that IP ownership necessarily or presumptively confers market power. The current view among most leading antitrust authorities is that licensing of IP rights is far more likely to promote rather than diminish competition and consumer welfare.

United States – Same fundamental goals of IP and competition laws

Over the past several decades, antitrust enforcers and the courts have come to recognize that IP laws and antitrust laws share the same fundamental goals of enhancing consumer welfare and promoting innovation. This recognition signaled a significant shift from the view that prevailed earlier in the twentieth century, when the goals of antitrust and IP laws were viewed as incompatible: IP law's grant of exclusivity was seen as creating monopolies that were in tension with antitrust law's attack on monopoly power. Such generalizations are relegated to the past. Modern understanding of these two disciplines is that IP and antitrust laws work in tandem to bring new and better technologies, products, and services to consumers at lower prices.

Source: US Department of Justice and Federal Trade Commission Report

IP is complementary to competition, and in many cases, IP can act as a tool to strengthen a country's competitive edge in the global arena.

Enforcement of international IP protection agreements is strengthening across industry sectors.

Business associations across the world, including those that represent SMEs, have emphasized the following benefits of legal frameworks protecting IP:

- A uniform and transparent legal framework reduces discrepancies among countries;
- Patents provide protection and a financial return on investment through licensing;
- Patents increase SMEs' negotiating leverage against bigger companies, as a patent portfolio can be used as a bargaining chip in case of acquisition. ^[17]

Enforcement of internationally accepted levels of IP protection should not be confined to companies dealing with technology alone, but instituted as a part of every sector, regardless of the product or service in question. This helps to create awareness amongst companies regarding IP issues, and establish their credibility in the global arena.

Even in economies that cannot obtain membership in the Berne Convention or the Universal Copyright Convention, activity is growing. In Taiwan, for example, the legislature passed a law of reciprocity that protects the works of all nations whose laws, in turn, protect Taiwanese works. Taiwanese protection even extends to works from some unprotected countries that have not specifically protected Taiwanese works but have provided protection to a third country that is a favored nation to Taiwan. ^[18]

All these factors point to IP protection as an essential ingredient in fostering a competitive business environment in organizations as well as on a national level. In Asia in particular, the importance of sound IP regimes should not be obscured because of perceived differences in countries' development models, degrees of industrialization, and macroeconomic indicators. On the contrary – Asian policy-making needs to embrace and promote the value of continuously studying and implementing IP protection frameworks and mechanisms.

[17] Contents synthesized from: "Computer implemented innovations: Frequently asked questions", EICTA, November 2004.

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