Final Technical Report

Towards Innovative, Liveable and Prosperous Asian Megacities

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1. Executive Summary

The first phase of the project assesses the current status of innovation systems in six countries in the Association of Southeast Asian Nations (ASEAN). It is found that the policy frameworks and instruments are still dominated by the linear model of innovation, i.e., public-sector driven and supply push. The policy focus and targets are at the national level with limited efforts in developing regional and local innovation systems.

Moreover, most countries have attempted to foster linkages among universities/research institutes and the industry. But the linkages are not strong and effective enough to help private firms enhance technology and innovation capabilities. The general setup and elements in innovation systems indicate that the overarching goal is to foster competitiveness of firms and the scope of policy framework it is still limited to industrial and business innovations. Innovation policies here are not well integrated with other critical development policies.

The second phase of the project examines case studies of innovative solutions to urban problems in six Southeast Asian megacities. We find that city innovations, broadly defined, are not stand-alone products, processes, or services. Rather, they are a combination of different types and aspects of innovative solutions put together. City innovations in developing-country contexts often occur in the mixture of formal and informal settings. They are often inclusive, in that the users and/or innovators themselves are people who have been previously excluded from the goods or services they demand and deserve. Meanwhile, city innovation systems are networks of informal and formal actors whose interactions are governed by a thicket of formal and informal institutions. This form of network governance involves intermediaries infrequently mentioned in the existing innovation literature, such as local governments, non-governmental organizations, political groups and the media.

Deliberative and participatory involvement of stakeholders is crucial to the success of city innovations. The incentives that drive city innovators are not limited to monetary benefits and competition, but include passion, self-esteem, social recognition and respect by others,

and community awareness. These incentives are rarely mentioned in the innovation-system literature. Based on the findings, we contend that the communities of scholars and practitioners involving in innovation systems research and policy should broaden the scope of work to include developmental agenda that urban residents are facing, and include actors not conventionally included in technology, innovation and business circles.

The third phase of the project focused on the futures of megacities in Southeast Asia and their innovation systems. A foresight policy-oriented toolbox was designed by the Bangkok research team. As a result, eight major issues were raised by the six megacities, i.e., (1) climate change and natural disaster (2) city governance (3) physical infrastructure (4) social structure (5) transportation (6) education, especially in the digital era; (7) consumption culture among the new generations; and (8) livelihoods issues. The top-ten regional drivers for changes in megacities here include: climate change, governance, migration, ASEAN integration, ICT breakthrough, trade globalization, ageing society, competition with other regions, young and new generations, and regional trade.

By integrating city-level scenarios, three regional scenarios for megacities in Southeast Asia were identified, namely: (1) “Resilient SEA”, in which adaptation and mitigation could protect urban residents in Southeast Asia from the potential impact of climate change; (2) “ASEANization”, in which regional cohesion of ASEAN countries is materialized not only economically, politically but also culturally; and (3) “Governance by Urban Citizenry”, in which city governance is led by active citizenship at the local, national and regional levels.

Combining these results with those from the online Dephi Survey, three groups of city innovations can be projected: (1) system innovations, which trigger large-scale transformation in the ways cities function and perform, such as transportation, communication, and housing; (2) service innovations, which modify how personal preferences are fulfilled and augmented; and (3) architectural innovations, which transform the configuration of physical space in terms of density, diversity and distance.

2. Background

2.1 Rationale

As rural to urban migration has increased rapidly in Southeast Asia over the last 20 years, so has the proportion of poor people living in cities. The majority of these people live in marginalized households and communities where they are excluded from basic services such as transport, water, sanitation and housing, and depend mostly on "informal" activities and the informal economy for their livelihood. Innovative solutions to urban problems are direly needed.

Innovation in poor countries occurs mostly in informal settings and is less dependent on formal firms as well as on research and development (R&D). Despite this, innovation studies have paid scant attention to informal settings and the informal economy. Moreover, the levels of analysis of innovation as well as policy interventions are limited to sectoral or national scales even though cities provide an ideal locus for interactions among actors. Additionally, the fields of urban development studies and innovation studies have so far evolved independently. This disjunction creates policy challenges since innovative activities in both formal and informal settings require physical space where interaction and learning among various actors can occur.

The project "Towards Innovative, Liveable and Prosperous Asian Megacities" has responded to these challenges by developing a new conceptual framework known as "city innovation system" (CIS) for understanding the reasons and drivers of innovation and innovative capacity in cities. This framework was used to analyze innovations in services such as housing and waste management within six megacities in Southeast Asia, many of which occur in informal settings. Foresight methods were also utilized to elucidate future city scenarios and to identify city innovations that support such scenarios.

2.2 Objectives

General Objective: The ultimate goal of this research is to help six ASEAN megacities foster their innovativeness, productivity and competitiveness in various sectors of the economy,

while identifying solutions to address the undesirable consequences associated with rapid urbanization. The immediate goal is identify development pathways that are responsive to the needs and interests of local stakeholders especially the poor in these cities.

The project made a reasonable contribution to the general objective. It highlighted the need for integrating innovation policy and urban development policies and identified the scopes and goals for innovation policies that would correspond to actual developmental issues and contexts in megacities in this region.

Specific Objective 1: To conduct a comparative analysis of the innovative capacities in six megacities in Southeast Asia to identify the drivers of creativity and innovation, as well as the specific strengths and weaknesses of each city's innovation system, and to develop a framework for integrating innovation and urban development policies.

The project developed a new conceptual framework known as "city innovation system" for identifying the drivers of creativity and innovation, as well as the specific strengths and weaknesses in 6 megacities. The analysis focused on the key actors/communities/agencies (both informal and formal), interactions and linkages among them, systemic learning, and policies and implementation procedures.

Specific Objective 2: To propose policy options, guidelines and

A very active regional network of scholars in the fields of science, technology, and innovation studies, urban studies and planning, and foresight studies was established. The project has also expanded its research and policy networks. In the case of Thailand and Bangkok, the project collaborated with two key local organizations involved in science, technology, and innovation policy and urban policy, which have used the research findings to inform actual policy development.

Specific Objective 4: To build the capacities for research of the project team members, their partners and young researchers on innovation, role of cities in economic growth and urban poverty.

Project team members were introduced to various methodologies such as city foresight techniques and Delphi surveys. The research capacity of young STI researchers (including doctoral students) was built through active involvement in the project alongside the more senior project researchers. Through formal and informal interactions with project team members, policy-makers in various countries were sensitized about the need to link innovation policy to urban development policies.

Specific Objective 5: To facilitate sharing of information, knowledge, and learning among partners involved in the megacity project and Urban Poverty and Environment (UPE) project on 'Healthy Places, Prosperous People' (Jakarta Focus City).

Project researchers who had never collaborated before are now working and learning together. However, the project was not able to connect with the Jakarta Focus City group.

3. Research Findings

The research findings can be divided into three parts, according to the phases of the project.

3.1 Phase 1: Innovation Systems and Policies

The key findings from each of the six countries in this study are as follows:

Still the traditional paradigm and usual suspects

All the six countries have adopted some sort of system approach to devising and implementing innovation policies. The state has continued to play a leading role in developing national innovation systems. Specifically, the central STI agencies are the key actors that devise the policy framework and implement policies and programs for developing innovation systems.

Continuing the linear model of innovation: public-sector driven and supply push

Innovation policies in most countries, except Singapore, still have not parted ways with the traditional model of innovation. They still equate innovation with R&D and attach priorities to public R&D institutions and universities. The usual policy measures, such as R&D funding and human capital development, focus mainly on R&D capabilities and outputs within public R&D institutions, which are regarded as the main producers and suppliers of technological knowledge. Private firms are considered the users and consumers of such knowledge, and have to wait until useful knowledge spills over from or are commercialized by public R&D institutes. According to this paradigm, private firms have limited role in generating cutting-edge technologies, let alone in shaping the directions of STI policies.

Science and technology remain the strong focus of the STI policy context. As most development concepts, the NIS concept was not adopted as the leading concept of STI policies but is rather mixed with other concepts in industrial and economic development, notably catch-up, triple-helix, and cluster development.

National focus, limited efforts in developing regional and local innovation systems

For the most part, the STI policies of ASEAN countries aim at developing innovation systems at the national level, and do not attach high priorities to regional and local innovation systems. Even after one decade of decentralization efforts, there is little evidence for the emergence of regional and local innovation systems in Indonesia. Such is also the case with Malaysia and Thailand. These governments may have adopted the cluster approach to industrial development in specific regions. But such policies do not adopt the innovation-system approach, often resulting in piecemeal support for specific products or industrial sectors. As such, the main actors in the innovation systems continue to be the national, not regional or local, entities.

More efforts to create linkages, though still weak

In virtually all countries in this region have set up some types of programs to foster linkages among universities/research institutes and the industry. But the linkages are not yet strong and effective enough to help private firms enhance their technology and innovation capabilities. Associations and other bridging organizations still play limited roles in promoting linkages that aim at building up internal technological capabilities. The common sentiment among our contributors is that the priority in innovation policies should be given to developing strategic linkages that foster private firms' technology and innovation capabilities. Such linkages should serve as the channel for public R&D institutes to gain information to ensure their research programs respond to actual industry needs.

Mixed roles of multinational firms in innovation systems

Multinational corporations (MNCs) could potentially play critical roles in the development of innovation systems in Southeast Asia, as they are the sources of not only technological knowledge and know-how but also investment capital. But only with the exception of Singapore, it seems that multinational firms have not contributed much in developing national innovation systems in Southeast Asia.

Institutional framework is taking shape

In all countries in this project, the governments have implemented a variety of institutional changes to accommodate the efforts to build up national innovation systems. These include organizational changes, new regulations and laws, and programs that foster entrepreneurship. A few generalized features are worth mentioning here.

Expanding organizational boundaries to include innovation, instead of setting up a new agency

It was the existing S&T agencies, not industrial and economic development agencies, that first adopted the NIS concept and led efforts in setting up and enhancing national innovation systems in each country. In most cases, the governments expanded the work scope of existing S&T agencies, rather than setting up a new agency, to deal with innovation policies. This is not surprising, as most governments in Southeast Asia have adopted, to various degrees, the 'new public management' model of public administration. For the idea is to have a smaller and more efficient government, the governments are not keen on setting up a new government agency unless they feel absolutely necessary. They would rather allow the existing S&T agencies to expand their scope of responsibilities. This pattern of institutional evolution indicates the overarching paradigm that dominates the academic and policy circles in Southeast Asia, that is, innovation is an extension of science and technology.

Lack of financial institutions that support private R&D

All countries recognize the importance of financial intermediaries in innovation systems, but private firms still face financial obstacles that prevent them from engaging in innovative activities. In the case of Thailand, for instance, the financial sector may be characterized by their conservation risk policies, which make it difficult for firms to take out loans for risky R&D initiatives. In most Southeast Asian countries, the domestic venture capital markets are still lagging behind other Asian economies, such as Taiwan and South Korea.

Focus on competitiveness of firms, little integration with other development policies

The general setup and elements in innovation systems in Southeast Asia indicate that the overarching goal is to foster competitiveness of firms, which eventually leads to economic growth of the nations. The scope of policy framework is still limited to industrial and business innovations. Innovation policies in Southeast Asia, even when framed within the innovation system concept, are generally not well integrated with other critical development policies, such as those addressing basic infrastructure services, healthcare, and poverty alleviation. Considering that these emerging economies still face with such basic developmental issues, as well as emerging crises such as environmental degradation, global warming and climate change, the current scope of innovation policies is certainly too narrow. Because current innovation policies and their implementation mechanisms do not achieve policy coherence with existing policy contexts and mandates, the overall impact is constrained in terms of their overall impacts on development efforts.

Virtually absent from the current STI policies in Southeast Asia is the effort to tackle social and economic equity. The concentration of innovation capacity in a small number of firms affects the distribution of benefits within countries. Because the targets and outcome of the current innovation policies are only competitiveness, corporate expansion, and economic growth, many other policy challenges are missing under the STI radar.

We can say that at the moment the current innovation systems in Southeast Asia and the innovation policies are too narrowly focused. This is perhaps why the usefulness of the concept is still limited to a group of scholars and policy makers, who are interested and trained in this field. If this concept were to have more impact, the scope of analysis and the policy framework would have be expanded. Actors in an innovation system would have to include non-state, non-firm entities that contribute to the process of knowledge creation and diffusion. Some STI agencies have started to explore innovations beyond the S&T realms, such as Thailand's National Science, Technology, and Innovation Policy Office.

Lack of spatial dimensions in innovation systems literature and policy making

Despite the obvious connection between innovation and physical/spatial configuration in cities, the overall innovation policies in most Southeast Asian countries have not integrated innovation policies with those for urban and infrastructure development. The present conceptual limitation is evident at the policy-making level. The current innovation policies are primarily sectoral in scope and national in scale. Most policy-makers in Southeast Asian countries appear to approach the formulation of innovation and urban policies as independent themes. Virtually all Southeast Asian countries examined have established science, technology, and innovation parks, but they were developed with little consideration of the urban environment as a whole. There is therefore a clear imperative to develop policy frameworks and processes for integrating innovation-system policies with those for urban and infrastructural development.

The lack of specific policies for developing regional/local innovation systems reflects these countries' ineffective regional policies, if any, for reducing regional disparities by way of industrial and economic development. The utter dominance of megacities in Southeast Asian countries, both economically and politically, makes it difficult for the governments to devise development policies that favor less developed regions. Even when they are able to do so, the intervention often focuses on industrial development for employment generation, and rarely takes the innovation-system approach to increase technological capabilities and competiveness. As regional disparities will remain one of the most serious issues facing several Southeast Asian countries, it seems imperative that innovation-system policies have to pay more attention to developing regional/local innovation systems. The goal is to create 'innovation ecosystems' at all levels with greater openness, flexibility, impact and relevance to firm-level needs.

Summary

Many issues still need to be resolved, but the innovation systems in Southeast Asia are certainly developing, albeit at the slower rates than many would have liked. There are several emerging trends in the global and regional socio-economic terrain that are likely to shape innovation policies and innovation systems here. One is the convergence of the

concept of sustainability and that of innovation systems. Increasing urbanization, climate change, low-carbon society, energy and food security are among the many sustainability issues that STI policies and innovation systems will have to answer to.

Another aspect is the wider perspective on the elements of innovation systems, particularly the role of city, the new super and creative class, the intangibility of innovation, the role of the service sector, and the role of non-corporate institutions in formulating and strengthening innovation systems. The wider scope of an innovation system makes it even more challenging for scholars and policymakers.

Economic integration of the ASEAN region is also another context within which STI policies have to operate and consider. The main focus of the current discussion on innovation policies and systems is mainly at the national and regional levels. With the ASEAN Economic Community looming in 2015, more attention should be given to the possibility of an ASEAN-wide innovation policy and system.

Less explored in the field of innovation studies in Southeast Asia is the role of politics in determining the directions of STI policies in this region. STI policies are only a fraction of many other public policies that require political support, which necessarily involves competition among different interest groups and political maneuvering. Without recognizing these fundamental aspects of public policy, the concept of innovation systems will remain within the small circles of die-hard advocates and will have limited impact on overall development efforts. For most of the ASEAN countries, the immediate issue for STI scholars and policymakers is how to make innovation policies and innovation systems become more responsive to actual needs of the society as a whole, and not just for the STI and business communities.

3.2 Phase 2: City innovations and systems

The project developed a new framework and methodology for city innovation system (CIS), which aimed to broaden the existing realm of innovation studies and policies by including knowledge and experiences from urban studies and planning and future studies. The city

case studies provided new empirical results to the literature on innovation systems, city innovations and creative cities in the context of developing countries.

The entry point for conducting research on city innovations and systems in six Southeast Asian megacities is that the existing concept of innovation systems as conceived and practiced in the region has serious limitations. We contend that the framework for analyzing innovation systems should be brought down from the national level to the city level. The scope should also be broadened beyond business innovations and include socially and sustainability-oriented innovations.

Definitions of City Innovations and City Innovation Systems

In order to capture a broader concept of innovation, a city innovation is simply and broadly defined in our study as a new solution that creates additional value to urban residents. A city innovation is not just a new idea, but also the articulation, transformation and successful implementation of such an idea into a new product, process, service or way of doing things. It can either be technological, institutional and organizational, political and administrative, economic and financial, or social and cultural, so long as it creates additional value to the city by addressing urban challenges. City innovations thus include both commercial and social innovations. They can be exchanged through market transactions or other ways that do not involve monetary compensation and competition.

What types of value does a new solution need to create to qualify as a city innovation? It is probably easier to define value for commercial innovations, as the real test is whether the product sells in the market. Non-commercial city innovations are more difficult to test. People may want different things in their city as they value things differently. There is thus a larger set of criteria for a city innovation than the conventional definition of commercial innovation. We propose that the goals of city innovations should aim for economic prosperity, livability, and social equity. The specific types of value should be determined through participatory and deliberative political processes. Based on the findings from our case studies, some of the criteria for a city innovation may include: novelty, impacts, intra-

and inter-generational equity, economic and financial feasibility, political acceptability, and transferability.

A commercial innovation generally goes through a cycle from idea conception, to trial and error by an innovator, early adoption by lead users, and finally widespread diffusion and implementation to the general public. As an innovation becomes a standard routine and/or product, other new ideas and innovations emerge to compete and aspire to become even better. Such a life cycle is also applicable to city innovations.

From our case studies, we find that for an idea to become an innovative solution that adds value to the people in the city, several conditions have to be in place or improved from the status quo. In other words, several aspects have to be "innovative" at the same time for an idea to become a city innovation. For instance, the core idea of an innovative solution may be a product innovation, but other aspects have to be innovative as well such that the idea can be adopted and successfully implemented at a larger scale. These aspects include an innovative way to produce the product (process innovation), to deliver the product to the consumers (service innovation), to have new organizational and institutional structures (organizational and institutional innovations), to change the ways of thinking and doing things (paradigm innovation), or to change the position of the innovation in the market (positioning innovation).

Public goods and city innovations

Many city innovations that affect urban livability and sustainability are in public services and infrastructure, and thus have public-goods characteristics with large positive externalities. Their investment and incentive structures are different from those of stand-alone innovations of private-goods characteristics. Their initial investment is often larger and it usually takes a long time to recoup the investment. The facilities and infrastructure components also tend to have long life spans.

These features make it even more difficult for potential innovators to invest and appropriate the benefits from successful implementation and diffusion of innovations. Such innovations face even larger systemic failures not only in terms of preventing actors to

learn from one another but also innovation financing. Innovations with strong public-goods characteristics, particularly those with long-term environmental sustainability benefits, face a daunting task of surviving the "valleys of death" at different altitudes. From the stage of ideation, experimentation, creation of prototype, to implementation, scaling up, and diffusion, these innovations require a big push from various actors. Intermediaries would have to play crucial roles in facilitating the flow of capital while helping solve coordination problems among actors.

Following the general definition of an innovation system, a city innovation system is defined as a set of actors and their dynamic interactions within formal and informal institutional arrangements that foster the creation, adoption, and diffusion of city innovations. The existing literature regarding innovation systems in Southeast Asia focuses primarily on "formal" innovation systems, which include actors that form the Triple Helix concept, namely the government, research institutes, and firms. We find that the actors and institutions involved in innovative solutions to urban problems are more diverse and not limited to those identified by the current literature.

Escaping the exclusion trap: leveraging limited capital through linking and learning

Innovations in informal settings are often inclusive, in that the users and/or innovators themselves are people who have been previously excluded from the goods or services they demand and deserve. Informal city innovations are often solutions that allow people to escape the state of being excluded. The poor who cannot afford private cars and are not served by public transit find their way around by using informal paratransit modes, such as Jeepneys in Manila and van services in Bangkok. Informal, inclusive innovations provide the poor with opportunities and access to goods and services.

As innovators attempt to create, implement, scale up, and diffuse innovative solutions, they are faced with limited resources or capital. This is particularly true in informal settings where resources are even more limited. As such, the fundamental tenet of an informal city innovation is that innovators have to find ways to leverage the limitations. There are two key mechanisms to overcome such a challenge: linking and learning. Innovators have to

link with other individuals or organizations that would help them secure the lacking resources. At the same time, they need to learn how to make the best use out of whatever limited resources they have and how to adapt and use the new resources that they may acquire. Linkages can be formal or informal. This is where intermediaries play important roles.

The process of innovation requires a variety of resources or "capital." Although categorization of capital can be done in many different ways, five types are significantly required throughout the process of innovative urban solutions: Natural capital: water, air and other natural artifacts; Financial capital: money and other forms of financial instruments; Intellectual capital: information and knowledge; Social capital: connections and networks of individuals and organizations; and Political capital: power to influence decision making processes and outcomes.

The five types of capital are required throughout the process of innovation, from generating ideas, experimenting and testing the prototypes (not just in terms of products but also services, processes, and other forms of innovations), deploying and demonstrating in the field, scaling up and diffusing the innovation. Any innovation requires all of the five types of capital, albeit in different combinations and at different stages of innovation processes. Cities are a key node of innovations because they offer the proximity, density, and variety of the necessary capital.

Informality, incentives, and network governance in city innovation systems

City innovation systems that we find in our city case studies indicate that innovation systems are not limited to formal actors and institutions as usually described in the mainstream literature. Rather, they include both formal and informal actors and institutions. The innovation systems hence are a mixture of "formal" and "informal" innovation systems, which are governed by networks of relationships among "formal" and "informal" innovators and intermediaries. Such "network governance" constitutes a distinct form of coordination that is neither the hierarchical control of the state nor the competitive regulation of the market.

In terms of the relationship between the actors, governance networks are a pluricentric governance system as opposed to the unicentric system of state rule and the multi-centric system of market competition, involving a large number of interdependent actors who interact in order to produce public purposes. Decisions in networks are made, based on negotiation rationality as opposed to the substantial rationality that governs state rule and the procedural rationality that governs market competition. Compliance of agreement is ensured through trust and political obligation, which becomes sustained by self-constituted rules and norms.

Several of the city innovations in our study are in informal settings in which the activities are not directly initiated, taxed and monitored by the government. Most of the case studies that our research partners examined involve some informal activities and actors that have not yet been analyzed in the mainstream innovation literature. We know even less about what and how intermediaries are involved in the process of innovation in these settings. They can act as intermediaries linking people in the informal and formal settings. In the absence of formal mechanisms, these actors can play an important role in the provision of social protection to marginalized households and communities.

In the academic realm, there may be a dichotomy between formal and informal activities. But in reality, it is more like a spectrum of informal and formal activities. Not everything in "informal" innovation systems is informal. The real picture is rather a mixture of informal and formal elements, both in terms of institutional settings and the actors involved in the process of innovation. City innovations are often situated in such a long spectrum. For instance, government agencies are involved in informal innovation systems in one way or another. The networks that govern city innovation systems are therefore a combination of formal and informal actors and institutions.

In terms of incentives, city innovation systems that are socially and sustainability-oriented seem to operate differently from profit and competition-driven innovation systems. While monetary rewards may not be the only incentive for innovations to be created, commercialized, and diffused in the market, they are the key driver for commercial innovations. This logic may not always be applicable to the case of innovations that have

public goods characteristics, as innovators cannot effectively appropriate all the benefits generated by the innovations. This means that for socially inclusive and beneficial innovations to be created, adopted and diffused, non-market mechanisms and non-monetary incentives have to be in place. Even though there is growing interest and recognition in the potential of social enterprises in harnessing market incentives and mechanisms for social innovations, non-market incentives remain critical in the process of innovation. Examples of non-monetary incentives are self-esteem, social recognition and respect by others, and community awareness. In several case studies that we have examined, leaders and other people who are involved in innovative initiatives are often driven by these non-monetary incentives. In fact, many of them are passionately involved precisely because of the non-monetary aspects of the innovations.

Innovators and intermediaries

Innovations would not be possible without innovators. Many articles in innovation studies have featured a variety of innovators. Firms are usually the unit of analysis that represents innovators in the literature. However, if we wish to shed light on innovators and the systems in the context of developing economies, we need to move beyond focusing on firms and famous individuals. Many individual innovators and communities of innovators make it happen on the ground. In order to capture the systemic and dynamic nature of innovators and their roles in innovative solutions, we need to learn more about how these actors in the innovation systems actually do in order to create, adopt, and implement innovative solutions. In any research on city innovation systems broadly defined, innovators are not limited to private firms but include other actors. Based on our research findings, there are many different types of people involved in the innovative process. While collectively they are innovators, they play different roles in the process.

In our study, we identify additional types of actors. In addition to the government agencies, educational and research institutions, and private firms, i.e., the usual actors in the Triple Helix, we have identified actors and types of institutions beyond the mainstream innovation literature. In examining city innovations in Southeast Asian megacities, we

identify additional actors that play crucial roles in initiating, exploring, implementing and diffusing innovative solutions.

A specific group of actors that we find essential in innovation processes in our case studies is intermediaries. An innovation intermediary can be broadly defined as an agent or broker in any aspect of the innovation process between two or more parties. They are independent third parties engaged in collaboration between different actors and supporting different steps in the innovation process. These are individuals and organizations who perform a wide variety of tasks in the innovation process, bridging innovators with funders, knowledge experts, and other actors, such that innovators can experiment, commercialize, scale up and diffuse innovations. Innovation intermediaries enable innovation by directly enabling the innovativeness of one or more firms, or indirectly by enhancing the innovative capacity of regions, nations, or sectors. The current knowledge gap, however, is about the roles of these actors in "informal" city innovation systems. We know little as to how these actors facilitate the flows of resources and learning such that informal enterprises and individuals can innovate.

Intermediaries in city innovation systems also act as change agents who create and/or promote linkages between individuals and/or entities with certain capital and those without. They facilitate the flows of capital from one stock to another. As capital is stored in stock, it is the role of intermediaries to facilitate the flow of the specific capital that is required in the process of innovation.

The case studies identified several examples of intermediaries linking actors in informal and formal settings. In Ho Chi Minh City, Vietnam Women Union (intermediary actor) worked with the local Solid Waste Management Authority (formal actor) and Urban Community Groups (informal actor) to develop a new way of managing waste in poor urban areas of the city. In Manila, Gowad Kalinga Volunteers and Couples for Christ (intermediaries) worked with large firms (who donated land as part of their Corporate Social Responsibility) and poor urban slum dwellers (informal actors) to provide affordable housing and build sustainable community. In Jakarta's "Waste Bank" project, Unilever Indonesia Foundation (intermediary actor) worked with local communities in

Pasar Minggu (informal actors) and a local university (formal actor) to develop a new way of turning solid household waste into organic material.

It should be emphasized that there are never just one intermediary in a process of innovation, although some intermediaries play more active roles than others. In many cases, intermediaries are networks of individuals and organizations that are involved deeply in the innovation process, such that the boundaries between innovators and intermediaries are blurred. We also find that intermediaries often play more than one role, facilitating the flows of various types of resources and capital at the same time. They are also part of the network governance structure that helps coordinate and regulate market and non-market transactions. Some of the key actors and intermediaries that we find in our study include the following.

Local governments

The innovation system literature has long acknowledged the role of government in the process of innovation in various capacities. But this usually refers to a national government, which includes national agencies of which official mandates are related to science, technology, and innovation. But in the case of city innovations in our study, the local government is an entity that is distinct from the national government. Especially in countries where political and administrative decentralization has progressed to some extent, such as Thailand, the Philippines, and Indonesia, local governments play a critical role in the innovation process. Even in the case of Viet Nam, where administrative and political functions are comparatively centralized, the local government of Ho Chi Minh City is distinctly considered a key actor in its city innovation system. Local governments for megacities in Southeast Asia are an indispensible actor in the process of innovation, particularly in scaling up and diffusing new solutions to urban problems.

Non-governmental organizations

Another important group of actors is non-governmental organizations, which include a very wide range of non-profit and voluntary organizations from religious and philanthropy organizations to activists groups. Non-governmental organizations play a variety of roles as

intermediaries for actors in the innovation process. As innovators in the developing country context, especially those in informal settings, are faced with resource constraints, non-governmental organizations often help the potential innovators find additional resources, be they financial, intellectual, or political.

Aid donors and sponsors are also important intermediaries, not only because they bring in money but also intellectual capital in the form of technical assistance that provides information and knowledge. Aid donors are not limited to international ones, but include large domestic foundations, which are sometimes established by successful business conglomerates. In many societies in Southeast Asia, religious leaders are still highly revered and respected by the people, and they could be important actors in city innovation processes.

Co-operatives and community groups

Because each individual innovator has limited capital and capabilities, collective action is often required for individuals to amass financial, intellectual, political and other capital. Collective action is an effective way to leverage their limited capital. Co-operatives and community groups are examples of ways in which individual innovators can increase their collective power. In Ho Chi Minh City, syndicates of individual collectors play critical roles in managing the informal system of waste collection.

The city case studies showed that success of innovations was intimately linked with strong collaboration and partnerships among various actors. Collaborative partnerships facilitated the flows of capitals and resources that were required in innovative activities, particularly in the cases where trust and long-term commitment were crucial.

Universities

From our case studies, universities in Southeast Asian megacities play a variety of roles in national and city innovation systems beyond teaching and conducting research. Although they are still considered mainly as knowledge producers and diffusers, there is now increasing attention to the role of universities in socially inclusive development. While universities are recognized as important intermediaries, it is also clear that they often play

this social role only indirectly by collaborating with the more conventional actors such as non-governmental organizations, community-based organizations, and social enterprises. Because universities are often considered politically neutral, equipped with knowledge and expertise, and without monetary incentives, they have the potential to bring in required resources for experimentation of new solutions to urban problems.

Political groups

Political groups, such as political parties, informal alliances, and trade and labor unions, have been under the radar in the literature of innovation studies. But they cannot be ignored if one wishes to discuss informal systems of innovation. Implementing, scaling up, and diffusing innovative solutions often require support from politicians, who can direct additional resources for such purposes.

Meanwhile, innovations in informal settings are often created because of resource constraints that people face in their daily lives. Inadequate and unaffordable provision of basic services could also be the motivation behind innovations in informal settings. People who live and work in informal settings often have to struggle to find resources to create and diffuse innovative solutions. Such resource constraints may be induced by regulatory and policy frameworks that are biased against them.

This means innovations in informal settings often require some level of redistribution of existing resources, which were previously distributed to more privileged people in society. This is particularly the case if one wishes to scale up and diffuse such innovations. The process of implementing and diffusing innovations in the informal settings would require political support and action. This often can be done collectively through political groups. Innovations that also aim to enhance social equity and justice need deliberative political processes that progressively include disadvantaged stakeholders. Intermediaries such as political groups play crucial roles in such processes by helping disadvantaged people leverage their limited political capital.

Trade and professional associations

Trade and professional associations have already been identified as an important group of actors in the innovation literature on industrial and business innovations. Our research findings suggest that trade and professional associations could play important roles in facilitating both "formal" and "informal" city innovations that are not necessarily lead directly to monetary profits.

The media

The mainstream innovation-system literature often points to systemic failures that prevent interactive learning among innovation actors. Such problems include infrastructure inadequacy, transition and lock-in problems, institutional and organizational problems, network problems, information and coordination problems. In the case of informal innovation systems in developing countries, such failures are even more pronounced. In this regards, the roles of intermediaries go beyond facilitating knowledge transfer and storage.

One key intermediary that is little mentioned in the literature of innovation studies is the media. From our case studies of city innovations in Southeast Asia, the media plays an important role. Not only do media outlets facilitate the flows of knowledge and information, but they also play a key role in prompting decision makers, particularly politicians, to take action in new initiatives. In several cases, innovative solutions would not be implemented without the push from the media. Indeed, in order for the process of creating, implementing, and diffusing city innovations to become more participatory and deliberative, the role of the media is indispensable.

Deliberative, participatory innovation process

In the literature of innovation management, there is now firm recognition of the roles of users in innovation processes, such as the concept of democratizing innovation by Eric von Hippel. From our case studies, we learn that participation of key users of innovative solutions is indeed a success factor. The level of participation goes beyond information provision. It is the process of deliberation among the innovation creators, implementers

and users that facilitates the flows of vital information and knowledge, which at the same time builds the trust and long-term relationship among partners. Because socially and sustainability-oriented innovations often require trade-offs and redistribution of resources among stakeholders involved, the processes of creating, implementing and diffusing innovations are often political. Furthermore, as city innovations require experimentation and uncertainties, a deliberative process that builds mutual trust and acceptance is critical to the success of a new solution. Such deliberative processes also lead to establishing new rules and norms that govern the evolving innovation systems.

Summary

Based on the findings from case studies, city innovations in developing-country contexts often occur in informal settings, involving networks of actors whose interactions are governed by a thicket of formal and informal institutions. This form of network governance involves intermediaries infrequently mentioned in the existing innovation literature, such as local governments, non-governmental organizations, political groups and the media. Deliberative and participatory involvement of stakeholders is crucial to the success of city innovations. The incentives that drive city innovators are not limited to monetary benefits and competition, but include self-esteem, social recognition and respect by others, and community awareness.

3.3 Phase 3: City Foresight

The city foresight techniques were useful in attracting attention of key stakeholders, so they would think more in terms of future scenarios and innovative solutions, instead of focusing only on existing problems. The techniques were useful for mobilizing city residents and policy makers to build a process of collaborative and deliberative planning. While the project covered a series of policy advocacy and knowledge diffusion activities targeting at relevant policy and planning agencies, it is unclear yet how the results from city foresight exercises would be taken up and implemented by them.

The third phase of the project focused on the futures of megacities in Southeast Asia and their innovation systems. A foresight policy-oriented toolbox was designed by the Bangkok research team, which included three major steps.

- Searching and scanning for early indicators, drivers and barriers in each megacities;
- Developing scenarios for megacities through a series of foresight and visualization workshops. Each city has three scenarios base on their social, technological, environmental, economic and political (STEEP) settings; and
- Integrating megacities scenarios by conducting Delphi survey on common issues, and developing city scenarios in a regional level.

As a result, eight major issues were raised by the six megacities, i.e., (1) climate change and natural disaster, particularly flooding; (2) city governance, in which corruption seems rampant everywhere (3) physical infrastructure, which requires major transformation and planning to accommodate constant migration; (4) social structure, due to demographic and identity changes (5) transportation, especially congestion and mobility of the poor (6) education, especially in the digital era; (7) consumption culture among the new generations; and (8) livelihoods issues, particularly of the urban poor. Among these, the first three issues are the most commonly shared among the six megacities

The top-ten regional drivers for mega-cities foresight in Southeast Asia that were identified are: climate change, governance, migration, ASEAN integration, ICT breakthrough, trade globalization, ageing society, competition with other regions, young and new generations, and regional trade. Regional inhibitors are political instability, low-profile community leader/shortages of effective change agents, and extreme capitalism.

The drivers and some of the above indicators were discussed and developed into city scenarios. There were 18 scenarios from six megacities, which can be categorized into four groups, as shown in the table below.

Megacities	Socio-environmental scenarios	Demographic and livelihoods scenarios	Networks scenarios	Social rights and justice scenarios
Bangkok	Green	Grey	Google	-
Ho Chi Minh City	Inundation	Insecurity	Integration	-
Jakarta	Green	Competitive & Efficient	-	Justice
Kuala Lumpur	Environment	Social security	-	Social rights
Manila	Nature	Nurture	Network	-
Singapore	Green	Grey	Smart	-

Two regional workshops were conducted to develop a set of regional scenarios for ASEAN megacities. Three major themes were developed, namely, climate-change resilience, regional cohesion, and urban governance and citizenship. Technological innovation and geo-politics act as general linkages for transcended knowledge exchange and flow within the three scenarios.

Scenario 1 - Resilient Southeast Asia: Adaptation and mitigation strategies adopted in megacities could protect people from the impact of climate change. Innovations in city planning and management have to be in place so as to address growing concerns regarding energy and food security and environmental sustainability.

Scenario 2 - ASEANization: The regional economic integration in 2015 would facilitate free movements of goods, services, and people. This would bring about a dramatic demographic change within the ASEAN community, as well as institutional changes at the local, national and regional levels. In addition to standardization and harmonization of regulations, other social aspects such as norms, ways of life, cultures, and the identities of the ASEAN people will also change. Collaboration in every level is needed for efficient and beneficial integration.

Scenario 3 – Urban Governance and Citizenship: In order to cope with the driving forces that would change megacities to attain livability, sustainability and equity, urban governance structure and institutional settings will have to change. New governance models, such as a regional urban council and a regional network of city society actors, could play more role in creating active urban citizenship among urban residents in Southeast

Asia. A new generation of urban leadership will become necessary to initiate and implement new ideas and policy innovations.

Research Reports and publications

The project has generated the following research outputs.

Book

"National Innovation Systems in Southeast Asia" to be published in November 2012 by Chulalongkorn University Press with a preface by Bengt-Åke Lundvall of Aalborg University.

Academic papers

- Wong, C-Y. (2011) "Rent-seeking, Industrial Policies and National Innovation Systems in Southeast Asian Economies". Technology in Society, 33, pp. 231-243 http://irims.idrc.ca/getDocument.asp?documentNumber=372338;
- Pun-Arj Chairatana (2009) "Knowledge, Innovation, and Service System in Latecoming Southeast Asia, 17-1, Asian Journal of Technology Innovation" http://irims.idrc.ca/getDocument.asp?documentNumber=315569;
- Apiwat Ratanawaraha (2012) ""City Innovation Systems in Southeast Asia" (a synthesis paper submitted to the 10th GLOBELICS International Conference in China);
- Apiwat Ratanawaraha and Sarit Tiyawongsuwan (2010) "Spatial Distribution of Creative Industries in Bangkok". Paper presented at the 7th ASIALICS Conference in Taiwan http://irims.idrc.ca/getDocument.asp?documentNumber=268990;
- Pun-Arj Chairatana, Kittipong Chantaraskul, Apiwat Ratanawaraha and Duanghathai Pentrakoon presented a paper on "Knowledge-intensive Business Service within Creative Industries in Thailand" at the 7th ASIALICS Conference in Taiwan (15-17 April, 2010) http://irims.idrc.ca/getDocument.asp?documentNumber=373057;
- Apiwat Ratanawaraha and Pun-Arj Chairatana presented a paper on "City Innovation Systems: The Next Horizon in Innovation Studies for Southeast Asia" at

the 8th GLOBELICS Conference in Malaysia (November 2010) http://irims.idrc.ca/getDocument.asp?documentNumber=373054;

- Aida Velasco presented a paper on "City innovation systems: the Metro Manila experience" at the 8th GLOBELICS conference in Kuala Lumpur. The paper will be published in the June 2012 issue of DLSU's Business and Economics Review http://irims.idrc.ca/getDocument.asp?documentNumber=373182;
- Apiwat Ratanawaraha (2012) "Socialization of solid waste management in Ho Chi Minh City", a report based on case study report: "Innovation in Social Transition Stage in Housing for the Low Income and Solid Waste Collection Service in Ho Chi Minh City, Vietnam," Nguyen Minh Hoa and Dr. Pham Gia Tran. The report will be published by the International Resource Panel of the United Nations Environment Programme (UNEP) http://irims.idrc.ca/getDocument.asp?documentNumber=374431;
- Winarso, H., Tubagus Furqon S., Niken Prilandita & Lativa S. "Criteria for Analyzing City Innovation-System in Metropolitan Area", TWP no 13 tahun 2010, Urban Planning and Design Research Group: ISBN: 978-602-8763-00-4. http://www.sappk.itb.ac.id/ppk/index.php?option=com_content&task=view&id=327&lang=en&Itemid=80.

Policy Briefs/Case Study Briefs

City Innovation Case Study Briefs have been produced for each of the six megacities examined in Phase 2 of the project.

Manila (4 articles)

- City Innovation Systems: The Metro Manila Experience http://www.cisasia.net/index.php?option=com_lyftenbloggie&view=entry&year=2012&month=07&day=11&id=18%3Acity-innovation-systems-the-metro-manila-experience&Itemid=77
- Privatization of Business Incubation: Initiatives to Achieve Sustainability and Success

http://www.cisasia.net/index.php?option=com_lyftenbloggie&view=entry&year=2012&month=07&day=11&id=17%3Aprivatization-of-business-incubation-initiatives-to-achieve-sustainability-and-success&Itemid=77

- More than Just a Housing Problem: Learning from Gawad Kalinga's Experience http://www.cisasia.net/index.php?option=com_lyftenbloggie&view=entry&year=2012&month=07&day=11&id=21%3Amore-than-just-a-housing-problem-learning-from-gawad-kalingas-experience&Itemid=77
- Towards Innovative, Liveable, and Prosperous Asian Megacities: Medical Tourism http://www.cisasia.net/index.php?option=com_lyftenbloggie&view=entry&year=2012&month=07&day=11&id=20%3Atowards-innovative-liveable-and-prosperous-asian-megacities-medical-tourism&Itemid=77

Kuala Lumpur (3 articles)

- Dealing with Urban Resettlement: The Case of Kampung Abdullah Hukum, Kuala Lumpur http://www.cisasia.net/index.php?option=com_lyftenbloggie&view=entry&year=2012&month=07&day=11&id=22%3Adealing-with-urban-resettlement-the-case-of-kampung-abdullah-hukum-kuala-lumpur&Itemid=77
- Privatisation of Urban Space: The Kuala Lumpur City Centre (KLCC) http://www.cisasia.net/index.php?option=com_lyftenbloggie&view=entry&year=2012&month=07&day=11&id=23%3Aprivatisation-of-urban-space-the-kuala-lumpur-city-centre-klcc&Itemid=77
- Innovation Initiative in City Governance - Establishment of One Stop Centre (OSC) for Expediting Property Approvals by City Hall of Kuala Lumpur http://www.cisasia.net/index.php?option=com_lyftenbloggie&view=entry&year=2012&month=07&day=11&id=24%3Ainnovation-initiative-in-city-governance-establishment-of-one-stop-centre-osc-for-expediting-property-approvals-by-city-hall-of-kuala-lumpur&Itemid=77

Jakarta (4 articles)

- Information-Sharing in Government
  http://www.cisasia.net/index.php?option=com_lyftenbloggie&view=entry&year=2012&month=07&day=11&id=27%3Ainformation-sharing-in-government&Itemid=77
- Green Village Program, Kampung Banjarsari, Cilandak, Jakarta
  http://www.cisasia.net/index.php?option=com_lyftenbloggie&view=entry&year=2012&month=07&day=11&id=28%3Agreen-village-program-kampung-banjarsari-cilandak-jakarta&Itemid=77
- Tackling urban housing in Prumpung, East Jakarta
  http://www.cisasia.net/index.php?option=com_lyftenbloggie&view=entry&year=2012&month=07&day=11&id=29%3Atackling-urban-housing-in-prumpung-east-jakarta&Itemid=77
- Sendu Waste Management Project, Pasar Minggu, Jakarta
  http://www.cisasia.net/index.php?option=com_lyftenbloggie&view=entry&year=2012&month=07&day=11&id=30%3Asendu-waste-management-project-pasar-minggu-jakarta&Itemid=77

Ho Chi Minh City (2 articles)

- Domestic Waste Collection Service
  http://www.cisasia.net/index.php?option=com_lyftenbloggie&view=entry&year=2012&month=07&day=11&id=25%3Adomestic-waste-collection-service&Itemid=77
- Renovation in Housing for Low Income Earners in HCMC
  http://www.cisasia.net/index.php?option=com_lyftenbloggie&view=entry&year=2012&month=07&day=11&id=26%3Arenovation-in-housing-for-low-income-earners-in-hcmc&Itemid=77

Singapore (3 articles)

- The Marina Barrage
  http://www.cisasia.net/index.php?option=com_lyftenbloggie&view=entry&year=2012&month=07&day=25&id=31%3Athe-marina-barrage&Itemid=77
- The Park Connector Network (PCN)
  http://www.cisasia.net/index.php?option=com_lyftenbloggie&view=entry&year=2012&month=07&day=25&id=32%3Athe-park-connector-network-pcn&Itemid=77
- The Post-Musuem

http://www.cisasia.net/index.php?option=com_lyftenbloggie&view=entry&year=2012&month=07&day=25&id=33%3Athe-post-museum&Itemid=77

Bangkok (4 articles)

- Spatial Distribution of Creative Industries in Bangkok
  http://www.cisasia.net/index.php?option=com_lyftenbloggie&view=entry&year=2012&month=07&day=26&id=34%3Aspatial-distribution-of-creative-industries-in-bangkok&Itemid=77
- Knowledge-Intensive Business Service Within Creative Industry in Thailand
  http://www.cisasia.net/index.php?option=com_lyftenbloggie&view=entry&year=2012&month=07&day=27&id=35%3Aknowledge-intensive-business-service-within-creative-industry-in-thailand&Itemid=77
- Temporal Intervention City Innovation for Public Art in Bangkok
  http://www.cisasia.net/index.php?option=com_lyftenbloggie&view=entry&year=2012&month=07&day=27&id=36%3Atemporal-intervention-city-innovation-for-public-art-in-bangkok&Itemid=77
- Culture-driven Urban Regeneration: A Case Study of the Kadeejeen Neighborhood, Bangkok
  http://cisasia.net/index.php?option=com_lyftenbloggie&view=entry&year=2012&month=09&day=22&id=37%3Aculture-driven-urban-regeneration-a-case-study-of-the-kadeejeen-neighbourhood-bangkok&Itemid=77

The project outputs were intended for the scientific community (STI scholars), urban planners, intermediary actors such as local municipalities, non-governmental organizations (NGOs), community-based organizations (CBOs), and collectives, policy and decision making agencies, etc. The paper and policy brief on the case of the Kadeejeen neighborhood revitalization have been translated into Thai and distributed among key governmental and non-governmental stakeholders related to urban revitalization and development in Bangkok, including the Bangkok Metropolitan Administration, Bangkok Big Trees Group, Department of Fine Arts, etc.

In Thailand, the outputs contributed to the country's 10-year National STI Master Plan. Other uses of the research are mentioned under outcomes. Dissemination of research findings was done through the project website and various publications such as books,

policy briefs, journal articles, seminars and presentations at workshops and conferences. This corresponds to Objective 3 of the project.

4. Project Outcomes

The project contributed to four main program level outcomes: field building; capacity building; building of partnerships and a regional network of researchers and policy-makers; and policy traction.

4.1 Field building

One of main objectives of the project was to broaden the analytical scope of STI studies in Southeast Asia by proposing the concept of a city innovation system. To this end, the project was able to achieve the objective through a series of publications and presentations in academic conferences in Southeast Asia and beyond. The preliminary outputs of the project contributed to the establishment of IDRC program on Innovation for Inclusive Development. The academic circle for innovation-system studies has become more interested in the concept of city innovation systems as distinct from those of national and regional systems. This was evident during the GLOBELICS 2010 Conference in Kuala Lumpur in which the research team organized a special session on city innovation systems in which 3 country teams presented their research results.

In addition, the project coordinator, Dr. Ratanawaraha, attended the GLOBELCS 2011 Conference in Buenos Aires, as well as the GRIID workshop and the launch of IDRC's program on Innovation for Inclusive Development (IID). Through his response remark in a panel and informal conversations with other conference participants, it was quite clear that the field of innovation systems was ready to embrace broader perspective on innovation and innovation systems.

The field-building outcome will continue even after the project. Dr. Ratanawaraha will present his paper on city innovation systems, which synthesizes the lessons learned from

the city innovation case studies during Phase 2 of the project, at the GLOBELICS 2012 in Hangzhou, China in November 2012.

The project also contributed to field building in the application of foresight techniques in thinking about futures of cities and the innovations that could support those futures. The project pioneered the application of foresight techniques in thinking about innovations at the city level. A number of scholars and practitioners who have been involved in the city foresight processes of the project have acknowledged the ideas and techniques. The research team held a special panel during ASIALICS 2012 in Manila, focusing on the research results from city scenario studies.

Dr. Ratanawaraha was invited to present the project during the International Forum of Research Donors (IFORD) held in Bogor, Indonesia (29 June to 1 July 2011). The meeting brought together research-for-development donors like IDRC to discuss the broad trends in the field. The presentation was made during the "learning session" on the theme: "Knowledge and innovation systems".

Idea diffusion and outreach beyond the project

The Bangkok coordinating team also linked the megacities project with other projects they were working on, including the Searchlight project that monitored trends and innovative ideas in Southeast Asia, which has been funded by the Rockefeller Foundation. As part of Phase 3 of the project, scenario-building and visualization workshops were organized in Bangkok, in which future city innovations for the megacity have been identified. The innovative ideas were featured in one of Searchlight newsletters, which were distributed among Searchlight networks of the Rockefeller Foundation.

Dr. Chairatana and Dr. Ratanawaraha were invited to participate in a workshop on "Trend Monitoring and Horizon Scanning" organized by the Rockefeller Foundation in Bellagio, Italy (26-30 April 2010). During a session on "Resilience: Livelihoods, Urban innovations", Dr. Ratanawaraha introduced the Megacities innovation project, and discussed the City Innovation System concept in his presentation entitled "City innovations and systems in Southeast Asia".

Dr. Chairatana was also invited to give a talk on "From Knowledge Economy to Creative Economy: Dilemma of Innovation System in Thailand" in a seminar on "Business in Asia: A Global Shift in the Knowledge Economy" organized by Institute for Management of Innovation and Technology (IMIT), University of Gothenburg in Gothenburg, Sweden (9-10 December 2009). This presentation was partially a reflection of the first phase of the Megacities project. This included a public lecture on city innovations at the Institute of Southeast Asian Studies (ISEAS) and an interview with Channel News Asia on city innovations and economic review in Southeast Asia in February 2010.

4.2 Capacity building

Capacity was built by matching of young scholars with the more senior and experienced faculty. Research capacity was built by involving a group of young STI and urban planning scholars in various aspects of the project. It has been reported that a number of the researchers attached to the individual projects under various research teams have been given their first crack at doing research on innovation issues as well as on urban and regional planning. In this regard, these researchers have been given the opportunity to do state-of-the-art research. Also, given the young age of some of the projects team members, this gives them the chance to apply the various methodologies and theories, which they have learned from university. This project also enables the researchers to be become well acquainted with various research methods.

The project has also established a regional network of researchers in merging innovation studies and urban planning. For example, young scholars such as Dr. Wong Chan Yuan and Dr. Zeeda Mohamad from the Department of Science and Technology Studies, Faculty of Science (University of Malaya); Ph.D. students Mr. Kittipong Chantaraskul and Mr. Sarit Tiyawongsuwan from the Department of Urban and Regional Planning (Chulalongkorn University) and Dr. Nguyen LuuBao Doan from the Department of Urban Studies and Management (Vietnam National University, Ho Chi Minh City) and Ms. Niken Prilandita (Bandung Institute of Technology, Bandung) were deliberately paired with the more senior and experienced project researchers.

Dr. Wong spent a 2-month research sabbatical at Chulalongkorn University working with the project coordinators. This collaboration enabled him to publish a paper on "Rent-seeking, Industrial Policies and National Innovation Systems in Southeast Asian Economies." Building on the conversation that they had during Dr. Wong's stay in Bangkok, Dr. Wong and Dr. Ratanawaraha have been collaborating to compare experiences of Thailand and Malaysia in developing technological and innovation capabilities in the rail sector.

The project outcomes related to capacity building is not limited to young scholars. Before this project, Dr. Ratanawaraha had not been familiarized with foresight techniques, such as scenario building and on-line, real-time Dephi techniques. Throughout Phase 3 of the project, he had learned greatly about the techniques from other researchers in the team, especially those at the APEC Center for Technology Foresight, who had more experiences in conducting foresight exercises. Based on the learning and experiences, he has been able to conduct foresight activities for other projects.

The project built the capacity of policy and decision makers to appreciate the need to link innovation policy to urban development policies.

The capacity of Chulalongkorn and De La Salle Universities' to manage a regional project has been greatly enhanced. As relatively younger researchers, Dr. Ratanawaraha and Dr. Chairatana learned a great deal from other more senior researchers in the team. The experiences in coordinating this multi-year regional project allowed them to manage other subsequent projects both domestically and internationally.

4.3 Regional networks of scholars and practitioners

Cross-disciplinary, regional academic collaboration

The project enabled the research team to catalyze collaborative links among scholars who had never worked together before. First, the project facilitated the formation of a regional network known as CISASIA. This network already established links with other networks and research groups interested in STI and development, such as the Global Network for the

Economics of Learning, Innovation, and Competence Building Systems (GLOBELICS), Group on Innovation for Inclusive Development (GRIID), the Asian Network for the Economics of Learning, Innovation and Competence-Building Systems (ASIALICS), as well as other IDRC-supported projects such as "Universities and Research Councils Network on Innovation for Inclusive Development" or UNIID-SEA. Dr. Ratanawaraha and Dr. Thiruchelvam now serve in the UNIID-SEA's project advisory committee.

Second, a multidisciplinary research group (STI, economics, urban studies and development, architecture, and foresight studies) was formed. In the Philippines for example, scholars from the School of Economics, College of Business and the College of Engineering of De La Salle University (Manila) are collaborating for the first time. Multidisciplinary research has given them new perspectives about the problems confronting growing large metropolis such as Manila. The learning experience has also broadened the mindset of the researchers involved in the project. This has become a model for multidisciplinary research in the university. In fact, this kind of cross-disciplinary research collaboration was achieved in other country teams as well.

Academia-Policy networks

The project successfully created links between the academic and policy worlds in the fields of STI and urban planning. The coordinating team in Bangkok worked closely with Thailand's STI Office throughout the project, creating a strong network between the academic and policy makers at the domestic level. Similar networks have been created through the project in Malaysia, Indonesia, and Viet Nam.

Such a network has also been established at the regional level. A project team member, Dr. Chairatana, was invited by the Horizon Scanning Unit, the Singapore Prime Minister Office, to attend the 4th International Risk Assessment and Horizon Scanning Symposium organized by Singapore's Prime Minister's Office (16-19 October 2011).The invitation was extended to the project coordinators by the Unit's director, who met our core team members in previous other meetings on foresight and horizon scanning.

Curriculum development

The Bangkok coordinators were invited by Dr. Supawan Tantayanon, Director of the Technopreneurship and Innovation Management Program (CU-TIP), Chulalongkorn University, in the planning of a new international graduate-level course curriculum on "Innovation and Development". The curriculum is currently being reviewed by the Graduate School of Chulalongkorn University.

Several researchers in the academic network that was developed through the project have participated in the curriculum development activities of the project "Universities and Research Councils Network on Innovation for Inclusive Development" (UNIID-SEA), including Dr. Wong, Dr. Thiruchelvam, and Dr. Ratanawaraha. In addition, Dr. Chairatana and other researchers at Noviscape Consulting Group helped establish the conceptual framework for the UNIID-SEA project.

Continuing collaboration beyond the project

The academic collaboration continues beyond the research activities of this project. Representatives from urban planning schools at Chulalongkorn University, the University of Malaya, and the Vietnam National University (VNU) at Ho Chi Minh City are partnering to develop international workshops and course materials related to city development and innovations in Southeast Asia. The idea is to have a workshop in Ho Chi Minh City in March 2013, followed by exchanges of students and faculty members in the fall, and then hopefully a joint ASEAN degree. This network is developed through the Megacities project. A group of undergraduate and graduate students in urban planning from the University of Malaya visited Ho Chi Minh City in 2011 with the VNU as the host. Similarly, VNU students are expected to visit Bangkok and Chulalongkorn University in 2013.

Dr. Aida Velasco of Manila team organized the 9th ASIALICS International Conference on 4-5 October 2012 in Manila, the Philippines with the theme of "Innovation and Appropriate Technology for the Development and Inclusive Growth of ASIAN SMEs." Many of the project partners participated in the event, which was followed by a meeting of the UNIID-SEA project. In addition, Dr. Aida Velasco of De la Salle University is organizing the Regional

Conference on Asian Transport and Megacities to be held on December 14, 2012, to which Dr. Ratanawaraha, Dr. Thiruchelvam, and Dr. Minh Hoa are invited to give presentations on city innovations in their respective cities.

Dr. Ratanawaraha received another grant from the Rockefeller Foundation to examine formal and informal mobility in Bangkok. The focus is on the poor and innovative ways to make transportation becomes more "inclusive." The proposal was based on one of the research findings from the Megacities project.

4.4 Policy Traction

Through formal and informal interactions with project team members, policy makers in various countries became aware about the need to link innovation policy to urban development policies. For example, during the coordinating team's visit to Indonesia for a city foresight workshop in October 2011, Dr. Pun-Arj Chairatana (PAC), together with Dr. Tubagus Furqon Sofhani (ITB, Bandung Institute of Technology) and Mr. Derry Pantjadarma (BPPT) had a meeting with Dr. Tatang A. Taufik, the Deputy Director of the Agency for the Assessment and Application of Technology (BPPT). From the conversation, it seemed clear that the agency was interested in applying the city innovation concept to the current policy framework of regional innovation system, which had been implemented across the country. In fact, Mr. Pantjadarma confirmed to the project coordinators during the last workshop in Jakarta that they had actually experimented with the concept of city innovation system in two secondary cities in Indonesia.

- In Thailand, the project outputs contributed to the country's 10-year National STI Master Plan. Indeed, the research group was specifically requested by Dr. Pichet Durongkaveroj (the Secretary General of the National STI Policy Office) to fast track the Dephi surveys and other foresight activities so that the results could be used in drafting the Master Plan. This is how Dr. Nares Damrongchai, a senior official of the APEC Center for Technology Foresight (under the National Science, Technology and Innovation Policy Office) puts it:

"the project findings contributed to the formulation of policy framework and some ideas within the draft National STI Policy of Thailand (2012-2021). In particular, it supported the general concept of 'green innovation', which is at the heart of the Plan, with some concrete examples and ideas to improve the design and process of city innovation systems. The project enlarged the scope of players within the future city innovation system and their roles, where passive players in the past could become active players in the future, with appropriate policy incentives. The picture of community-driven innovation system has become clearer which leads to some new challenges in terms of policy thinking at the city level".

Therefore, the project findings have contributed to Thailand's 10-year National STI Plan, resulting in a paradigm shift towards social orientation. This is partly due to the fact that the project has worked closely with the APEC Center for Technology Foresight, which is now part of Thailand's STI Office. Dr. Ratanawaraha has been invited by the Division of Social Innovations of Thailand's STI Policy Office to give advice on the agency's new program on inclusive innovations.

The Bangkok research team also worked with the Urban Green Development Institute (UGDI) of the Bangkok Metropolitan Administration through the Director, Dr. Banasopit Mekvichai). The Kudeejeen urban revitalization project, which was an action-based city case study for Bangkok, attracted more than 60 local and international partners towards the 2nd year of the project. Dr. Niramon Kulsrisombat, the case leader, has been invited to France, Italy, China, Japan and several other countries to present the case study.

Several policy briefs based on the project findings have been shared with government agencies, policy-makers, non-government organizations, members of the academe and other stakeholders in the Philippines.

At the city level, research teams in Thailand and Malaysia were particularly successfully in establishing links with local governments and key policy makers in Bangkok and Kuala Lumpur, respectively. Coinciding with the increasing interest in creative economy and creative cities in Thailand, the project supported a national conference on urban and

regional planning known as “Innovative City & City Innovations” (December 18, 2009) which attracted about 200 participants. The keynote speaker was a former Governor of Bangkok, who has been a major force behind the Thai government’s push for creative-economy related policies and programs. The Bangkok team also provided input to the Thailand Creative and Design Centre during their event on “Bangkok: Creative City” held in November 2009.

Foresight techniques used in the Megacities project have been adopted and applied in other projects in which the project team members have been involved. These include horizon scanning and scenario building techniques, which were used in a city-development policy campaign, organized jointly by Siam Intelligence Unit (SIU) with technical support from Noviscape Consulting Group. The aim was to identity a set of new and robust policy recommendations for the forthcoming Bangkok Governor Election in 2012. The Bangkok coordinating team facilitated this initiative by providing a horizon scanning process for SIU.

Similarly, Dr. Ratanawaraha was commissioned by Thailand’s Office of Natural Resources and Environmental Policy and Planning to conduct a policy research project on future land use patterns of Thailand. He utilized the foresight techniques that he had learned during Phase 3 of the Megacities project. He also organized a series of foresight workshops for Chulalongkorn University for its 15-year long range planning, adopting a similar set of foresight techniques.

As an extension of their work on the project, Dr. Chairatana and Dr. Ratanawaraha have been commissioned by Thailand’s STI Office to map and explore the existing institutional eco-systems of STI agencies and individuals whose work are in line with the Krabi initiative, which is an ASEAN-wide regional agenda for STI policies. The project output will be used by Thailand’s STI Office to develop a regional portal for STI collaboration in Southeast Asia. It is expected that the academic and policy networks developed through the Megacities project will be invited to join this regional project as well.

5. Project Implementation and Management

The following is a rundown of pertinent issues on project implementation and management for the Manila Coordinating Center.

A. Phase 1

Various payments were made to researchers between 01 February 2010 and 31 January 2011. The amounts and dates can be seen in the table below

Table 1: Key Dates of Payments Made from 01 February 2010 and 31 January 2011 (Phase 1)

Team	*3rd Tranche (25% of Total Contract Fee)*	
	Payment	*Release Date*
Manila, Philippines	P2,250.00 P2,250.00	January 2010 January 2010
Ho Chi Minh, Vietnam	-	
Jakarta, Indonesia	P69,605.54 (USD 1,472.40)	June 2010
Kuala Lumpur, Malaysia	-	-

B. Phase 2

Payments

Various payments were made to researchers between 01 February 2010 and 31 January 2011. The amounts and dates can be seen in the table below.

Table 2. Key Dates of Payments Made from 01 February 2010 and 31 January 2011

Team	*2nd Tranch (20% of Total Contract Fee)*		*3rd Tranche (25% of Total Contract Fee)*	
	Payment	*Release Date*	*Payment*	*Release Date*
Manila, Philippines	P 273,000.00	February 2010	PHP 341,250	January 2011
Ho Chi Minh, Vietnam	P 255,860.10 (USD 5,685.78)	July 2010		
Jakarta, Indonesia	P 256,926.60 (USD 5,709.48)	July 2010	-	-
Kuala Lumpur, Malaysia	P299,747.70 (USD 6,661.06)	July 2010	-	-

C. Phase 3

Payments

Various payments were made to the respective city team leaders to conduct the Scenario Building Workshops while the Manila and Jakarta team were also paid to facilitate the Multi-Stakeholder Workshop and All-Stakeholder Workshop, respectively.

Table 3. Key Dates of Payments Made from 01 February 2011 and 15 January 2012

Team	*Cost of Workshop*	
	Payment	*Release Date*
Manila, Philippines (Scenario Building Workshop)	PHP171,465.33	August 2011
Manila, Philippines (Multi-Stakeholders Workshop)	PHP1,001,415.62	November 2011
Ho Chi Minh, Vietnam (Scenario Building Workshop)	PHP191,450.22 USD4,494.72	September 2011
Jakarta, Indonesia (Scenario Building Workshop)	PHP218,323.61 USD4,993.87	October 2011
Jakarta, Indonesia (All-Stakeholders Workshop)	PHP1,000,000.00 CAD 23,381.72	March 2012
Kuala Lumpur, Malaysia (Scenario Building Workshop)	PHP221,679.05 USD5,213.27	September 2011

6. Strategic Lessons and Conclusions

The project set out to review the national, sectoral and regional innovation systems of six Southeast Asian countries. This review provided the background for the development of a new conceptual framework known as "City innovation system" (CIS) for conducting a comparative analysis of the innovative capacities in six megacities to identify the drivers of creativity and innovation, as well as the specific strengths and weaknesses of each city's innovation system. These activities were accompanied by an agenda of research capacity building for young STI scholars, and a deliberate effort to draw the attention of policy and decision makers to the need for integrating innovation policy and urban development policies.

The following strategic lessons from this project may be useful in implementing similar projects in future.

- Choosing partners with the right skills set and experience is critical to the smooth implementation and success of a project. This project partners had the right mix of expertise;
- For a project that involved researchers in different countries, it was imperative that a sense of ownership be built among project members right at the beginning. Although the planning workshop was organized early on, more partners could have involved actively from the stage of proposal development;
- The project had two coordinating centers, one in Bangkok and the other in Manila. Although this approach facilitated certain administrative procedures, such as financial transactions, research activities were sometimes delayed because decisions regarding research methodologies and content were mostly done by the Bangkok team;
- A few researchers and assistants had to leave the project due to various professional and personal reasons, which affected the dynamics and continuity of some research activities. The key lesson learned in this regard was to prepare contingency plans.
- Team members who had close connection with STI and other relevant agencies were able to gain policy traction more than those with little connection. A key lesson

is that any policy research should have relevant policy makers in the team, so that the research findings are more relevant and useful.

- This was network project coordinated jointly by two universities. The original plan was to have one coordinating entity at Chulalongkorn University but this was later dropped after it became clear that this organization could not make sub-grants to partners outside Thailand. For this reason, De La Salle University was asked to manage the funds on behalf of other partners in Indonesia, Vietnam, Malaysia and Singapore. This arrangement worked very well with regards to transfer of funds. However, there were challenges with regards intellectual coordination of the project.
- One of the key factors for the city foresight process to be successful is that the invited participants should be from diverse professional and academic backgrounds, so that the process is truly participatory and deliberative. This principle is applicable to any research project that aims to obtain concrete outcomes in terms of policy traction and implementation.

7. Recommendations

Based on the findings and project outcomes identified above, we can recommend a number of issues for further research and action.

A virtual community of practice

The project was the first step for scholars, practitioners, and policy makers in Southeast Asia to integrate different fields of disciplines and practices in response to the problems emerging from the ever changing and dynamic characteristics of urban human settlements in this region. It was an experimental and novel effort to draw together the knowledge generated by people in three distinct fields of urban planning and development, technology and innovation studies, and future studies. In order to sustain this cross-disciplinary network, a virtual learning platform should be established to further promote the concept of a "city innovation system" and the city foresight policy toolbox that we have developed. Such a virtual platform could be linked to and supported by exiting STI agencies, and could

focus on strategic and emerging issues that are shared by countries in the region, such as the Krabi Initiatives of the ASEAN Secretariat.

The project has developed a website www.cisasia.net to facilitate information and knowledge exchanges among project partners, and to disseminate research results to the public. This website should be maintained and developed even further even after the project ending to sustain the existing network.

Going beyond megacities

The project focused only on city innovations in megacities in Southeast Asia. But many secondary cities and small towns throughout the region are also faced with a wide range of urban problems that require innovative solutions. It is recommended that more research should be conducted to examine how innovative solutions can be adopted, implemented and scaled up in smaller cities. The research approach should be experimental and action-oriented, in which a variety of actual stakeholders at the local level are actively involved right from the beginning. However, it is important to make sure that an action-oriented research project is not done in a piecemeal fashion, but rather as an element of a larger innovation system.

City innovation indicators

The project did not develop a set of indicators that could be used to evaluate city innovations and systems. It might be useful to have such indicators for the purposes of project assessment, evaluation, and monitoring. It is possible to develop city innovation indicators that are based on the framework and methodologies adopted in Community Innovation Surveys. The city innovation indicators could be used in best-practice and process benchmarking exercises that are often used by policymakers in initiating and managing urban projects.

Action-oriented research

Given the cadre of researchers that the project has established within the region it may be useful to utilize this working network to undertake possible studies on the applications of innovation studies in other aspects of society. One approach is to conduct action-oriented

research, in which informal and formal stakeholders are involved in deliberative processes to identify, initiate, and develop prototypes of innovative solutions to real problems that poor and vulnerable populations are currently facing. Based on the findings in this study, the action-oriented research must be cross-sectoral and inter-disciplinary.