City Innovation Systems in Southeast Asia: Informality, Intermediaries, and Incentives

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Abstract

This paper presents a set of key elements of city innovation systems, based on the findings from case studies of innovative solutions to urban problems in six Southeast Asian megacities. We first discuss the existing concept of innovation systems as conceived and practiced in the region and its conceptual and practical limitations. We argue 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. We propose a conceptual framework for analyzing city innovations and systems. We contend that 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.

Keywords: City innovation systems; Network governance; Intermediaries; Deliberative innovation processes; Southeast Asia.

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1. INTRODUCTION

The literature on innovation systems in Southeast Asia has increased substantially in recent years. Several regional conferences, notably the annual "Asian Network for Learning, Innovation, and Competence Building Systems" (ASIALICS), have helped to focus the attention of researchers on the theme of innovation systems. The concept's academic recognition is now firmly established. Its influence is also apparent in the policy arena, where policy frameworks are evolving rapidly in an attempt to embrace systemic and structural approaches to promoting innovation. But much of the current literature on innovation systems in this region still pays little attention to the physical and geographical dimension of innovative activities. This omission is surprising, considering most innovative activities occur in urban areas. Among the studies that do pay heed, the attention is usually on the effects of agglomeration economies and related issues such as learning and interactions among the Triple-Helix actors.

The current concept of an innovation system, as academically inquired and professionally practiced in the region, seems too limited to effect developmental outcomes. Arguably, the concept in the context of developing countries here should be adjusted in two ways. First, the analytical framework should be brought down from the national and sectoral levels to the city level. Second, the scope should be broadened beyond business and industrial innovations. Social innovations should be considered, which aim at problems that affect people's livelihoods. Many of these innovations have characteristics of public goods and often occur in informal settings.

The aim of this paper is to elucidate innovations at the city level in the context of developing countries in Southeast Asia. The proposed framework is based on key research findings from the project entitled "Towards Innovative, Liveable, and Prosperous Asian Megacities," in which the author and project counterparts have examined case studies of city innovations in six Southeast Asian megacities, namely Bangkok, Jakarta, Ho Chi Minh City, Kuala Lumpur, and Singapore. The case studies include, for instance, low-income housing projects, urban regeneration initiatives, waste management projects, medical tourism, and creative industry promotion efforts.

The paper is organized as follows. In sections 2, we discuss the limitation of current literature and policies on innovation systems as applied to emerging economies in Southeast Asia. Section 3 details our proposition that the city is the appropriate scale at which innovation systems should be analyzed. Then, we discuss the similarities and differences between the concept of a city innovation system and that of a regional innovation system. We elaborate our proposition that any research on city innovation systems in developing economies need to broaden the definition of city innovations. Lastly, we elaborate the concept of city innovation systems based on the findings from case studies in select Southeast Asian megacities.[1]

Beyond the Rich West model of innovation systems

The concept of a national innovation system (NIS) has become widely known through Chris Freeman's seminal book on Japan (Freeman 1987) and through the work of Freeman and Lundvall (1988). Since then a large volume of studies have examined a variety of topics related to NIS in Asia. More recently, standard references on the transitions of Asian innovation systems at the national and sectoral levels include Nelson (1993) and Lundvall, Intarakumnerd and Vang (2006). Other studies on Asian innovation systems offer comparative pictures on innovation systems in Southeast Asia, for instance Chairatana and Bach (2003), Mani (2004) and Berger and Diez (2006).

Among the literature on national and regional innovation systems, a few studies focus at the city level (e.g., Athey et al. 2007; and Jonhson and Lehman 2006). Another related strand of literature is that of the geography of innovation (e.g., Feldman 1994; Saxenian, 1994; Polenske 2007). Another group of studies focus on case studies of innovative solutions to specific urban problems, such as innovative management of water infrastructure (e.g., de Graaf and Brugge 2010) and transportation (e.g., Goldman and Gorham 2005; Marchau et al. 2008). As these studies are problem-based, the scope of relevant innovation systems tends to be sectoral, even though the locations are urban.

Although such progress is indeed impressive, there are still considerable information gaps that call for further research. First, the European innovation system model is based on its own

[1] The details and analyses of the case studies can be accessed at the project website: www.cisasia.net.

unique socio-economic, institutional and cultural environment. By adopting such a model in framing national innovation policies in Southeast Asia's vastly different political, institutional and cultural contexts, policy-makers may have discounted the significance of such factors as determinants of success.

Second, the levels of analysis are generally at the national and sectoral levels. Thus, the innovative capacities and competitiveness of nations tend to be compared using aggregate national-level data, which can mask wide disparities in development and access to innovation support structures and services between urban and rural areas within each country. The foci of the innovation system policies are usually limited to sectors and innovations that are expected to increase national and industrial competitiveness. Very little attention is given to innovative solutions that aim to solve actual problems that people, particularly the poor, face on a day-to-day basis. People are rarely at the center of the innovation-system literature and policy. Innovation systems as analyzed in the current literature and as conceived by policymakers here are therefore limited to "formal" innovation systems.

The current concepts and practices of innovation systems in several Southeast Asian developing countries neglect important contexts in which innovation systems operate, particularly the dramatic shift in the broad demographic and economic structures. These changes are related to three influential phenomena: urbanization, globalization, and regionalization.

a) Urbanization

Southeast Asia's urban population will rise to more than 500 million by 2030, and has some of the highest rates of urbanization compared with other developing regions. While this will impose enormous pressures on public services, it will at the same time increase market opportunities for innovative solutions. The megacities here continue to be the focus of national economic activities, especially those related to science, technology and innovation. Nowhere else but in their megacities do agglomeration economies promote specialization and knowledge diffusion that drive innovation. Meanwhile, poverty and other problems will continue to plague megacities. The existing and future urban problems constantly call for innovative solutions.

b) Globalization

In addition to the globalization of investment and trade, the information technology revolution is creating individualized, ubiquitously networked economies and societies within and among the Asian megacities. The ongoing transformation from a resource-based production hub into a hub for logistics, services and high quality production and tourism necessitates a new and more complex model of production and service delivery. Such transformation is evident in megacities more than anywhere else in this region.

c) Regionalization

The region continues to make rapid progress towards economic integration. With trade and investment among the Southeast Asian partners showing significant increases over the past two decades, it is anticipated that a regional institutional framework will materialize and render obsolete the current framework of national innovation systems. But the pattern of regionalization will not be evenly dispersed. Megacities are likely to further consolidate their dominance as the loci for regional integration in most critical aspects. The exchanges and flows of knowledge essential to innovation are less likely to be in non-urban areas or in small cities: they will overwhelmingly take place only within and among megacities.

Need for integration between innovation, development and urban policies

Innovation cannot take place in vacuo. Innovation activities require physical space: innovative firms require and prefer physical proximity, creative minds enjoy liveable space, venture capitalists work in financial hubs, knowledge flows require superb infrastructure, etc. Infrastructure and markets as institutions for knowledge creation and diffusion are generally localized in cities. Innovation systems require processes and incentives to develop linkages among the various actors, and the closer the interactions among the many individual players, the more effective the innovation system as a whole.

Despite the obvious connection between innovation and spatial configuration in cities, relatively few cities here have implemented integrated policies combining both innovation and urban development planning. The limitation is evident at the policy-making level. Their innovation policies are primarily sectoral in scope and national in scale. Most agencies appear to

approach the formulation of innovation and urban policies as independent themes. Several countries have established science and innovation parks, but they were developed with little consideration of urban problems and urban policy.

Innovation policies here, even when framed within the innovation system concept, are generally not well integrated with other development policies, particularly those addressing the fundamental problems such as infrastructure, environment and poverty alleviation. Institutions as identified in the current literature and included in the innovation system policies are usually limited to organizations in the areas of science, technology, innovation, and industry. Rarely are agencies related to social and infrastructure development included in the discussion and practice.

Meanwhile, innovations targeted at living environment and poverty alleviation are generally included in urban policies in an ad hoc and piecemeal fashion, with limited reference to the existing knowledge in innovation studies. There is thus a clear imperative to develop a framework for integrating policies for innovation with those for urban development. As long as innovation policies and the implementation mechanisms do not achieve policy coherence with existing contexts, the overall policy outcome will be constrained in terms of overall contribution to economic growth and human development.

These knowledge gaps must be addressed in order to enhance the innovation system concept's practical value under varying implementation environments. A detailed analysis of the experience in implementing innovation systems in Asian developing countries could also provide important lessons for emerging economies in other regions, precisely because they share more similarities with one another than they do with the European innovation systems. Therefore, a new conceptual model that targets these issues seems both justified and imperative, at a time when policy-makers are not yet ready to fully embrace existing models of innovation systems without tailoring them to fit local contexts.

2. CITY INNOVATIONS

A city innovation is simply and broadly defined here 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, liveablity, and social equity. The specific types of value should be determined through participatory and deliberative political processes. Following Perlman (1990), and based on the findings from our case studies, some of the criteria for a city innovation may include:

- Novelty: A solution that is new to the city, which does not have to be first in the world;
- Impacts: A solution that has noticeable impacts on prosperity and livability in the city;
- Intra- and inter-generational equity: A solution that enhances, or does not worsen, social equity. A city innovation should reach a broader base in the urban population, rather than benefitting only the rich. It should not consume resources such that less is left for future generations. This sustainability aspect becomes critical in all megacities;
- Economic and financial feasibility: A solution that is economically and financially feasible. An innovative solution may not be financially feasible from a private investor's perspective, but may still be economically feasible if it benefits the general society;
- Political acceptability: Any solution to be adopted in a mass scale needs political acceptance, which means people whose lives are affected should participate directly in the decision-making process; and
- Transferability: A solution that is socially, culturally, or geographically neutral is more likely to diffuse quickly and widely. However, successful implementation of an innovative idea may rely heavily on social and cultural contexts.

There are a common set of urban problems in megacities in Southeast Asia and there are city innovations that aim to solve them. The city innovations for research on city innovation systems should respond to the existing urban policy arenas. Generally, there are at least ten policy arenas that directly affect prosperity, liveability, and equity in megacities: (1) employment and income generation; (2) housing and built environment; (3) water and sanitation; (4) energy; (5) food; (6) transportation and communication; (7) education and training; (8) recreation and entertainment; (9) public health; and (10) safety and security.

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.

Innovation space: city versus region

In defining a city innovation and its system, a question arises as to whether the concept is the same as that of a regional innovation system. There is already substantial literature on regional innovation systems, which has been influenced by the literature of innovation systems and that of regional science (Doloreux and Parto 2005). The concept has grown out of the observation that industrial and innovative activities tend to cluster geographically at the regional level. Many scholars and policy makers believe that the region is the most appropriate scale at which to sustain innovation-driven learning economies (Asheim and Isaksen 1997). Although there are many ideas about regional innovation systems, in a nutshell, the concept is a descriptive approach to examining how technological development occurs within a geographical territory.

The concept of a city innovation system as proposed here is similar to that of a regional innovation system in many respects. We agree that innovation occurs in institutional, political and social contexts, which tend be geographically bounded. The geographical boundary can either be a region or a city, depending on the definitions of the two terms. Similar to the general concept of a regional innovation system, our assumption is also that an innovative activity is a geographical process and that innovation capabilities are sustained through interaction and communication among actors that share common knowledge bases (Asheim and Isaksen 1997).

While sharing several assumptions with the regional innovation system literature, we argue that the city is more appropriate than the region as the scale for analyzing innovation systems in developing countries in Southeast Asia. In this regard, the main difference is

attributed to the definition of the terms “city” and “region.” A city is a large human settlement. But the detailed definition of a city varies from one country to another. The physical boundary of each city depends on what criteria are used in each country. In many cases, a city, particularly a megacity, covers an area beyond one administrative entity, as in the case of the Bangkok Metropolitan Region and Metro Manila. Although the term “region” is used here to indicate the physical delimitation, the characteristics of the space are urban.

This semantic issue has something to do with the patterns of urbanization and city systems in the country in question. The patterns of population and economic agglomeration in many Asian developing countries are different from those in Northern Europe where the concept of a regional innovation system was originated. Geographical regions as identified by authors working on regional innovation systems, such as Asheim and Isaksen (1997), are in effect urban regions with low population density. In Europe, urbanization has already reached high levels, and the urban population densities are usually much lower than those in Asian countries.

In contrast, developing countries in Asia are experiencing much higher rates of urbanization, even though they are still at much lower urbanization levels. Regions in many Asian countries are characterized by very densely populated cities and their surrounding rural, agricultural areas with limited economic activities in the secondary and tertiary sectors. The national economies are often dominated by “primate” megacities that span beyond administrative boundaries. Although there are megacities with surrounding satellite towns or sub-centers, the economic activities are more concentrated in the urban areas than in Europe.

3. CITY INNOVATION SYSTEMS

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 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 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 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

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 (Kersbergen and Waarden 2004). 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 (Scharpf 1997). Compliance of agreement is ensured through trust and political obligation, which becomes sustained by self-constituted rules and norms (Nielsen and Pedersen 1988).

Several of the city innovations in our study are in "informal settings" in which the activities are not directly 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.

Innovators and intermediaries

Innovations would not be possible without innovators. Many articles in innovation studies have featured a variety of innovators (e.g., Autioa 1995). Firms are usually the unit of analysis that represents innovators in the literature. The advancement of an innovation system is often indicated by the innovativeness of firms in the country or region. Luminary individuals, such as Steve Jobs, are also cited as examples of innovators often in popular business and biography books. 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. These roles include, for instance:

- *Researchers* explore intellectual frontiers and spread knowledge to others;
- *Ideators* think about problems and generate ideas to solve them; their ideas come from past experiences elsewhere and from researchers;
- *Initiators* take initiatives with new things or different ways of doing things;
- *Mentors* support other actors in the process of learning and discovering and implementing new ideas;
- *Facilitators and connectors* bring together different actors and facilitate the flows of capital from those who have to those who have not;
- *Implementers* turn ideas into something concrete and useful; and
- *Demonstrators* show what things are and how they work so the idea and product are adopted and diffused.

The literature of innovation studies has already identified a wide range of innovators. In our study, we identify other types of actors, most of whom are already well known in the literature of urban studies and development studies. 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 (Howells, 2006). They are independent third parties engaged in collaboration between different actors and supporting different steps in the innovation process (Szogs, Cummings and Chaminade, 2009). 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. According to Daziel (2007), 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.

From our research findings, 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.

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.

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, from funding, regulating, marketing and purchasing through public procurement. 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 in the city innovation systems 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. For instance, the Waste Bank initiative in Pasar Minggu, South Jakarta was initiated by the Unilever Indonesia Foundation. Religious groups could also be intermediaries that bring about positive changes to marginalized communities. Some religious groups are able to provide financial and other resources to support innovative initiatives. In many societies in Southeast Asia, religious leaders are still highly revered and respected by the people. In one of our case studies, the Kudeejeen community revitalization project in Bangkok, the local religious leaders have been instrumental in mobilizing not only the local people to contribute their time and resources but also in attracting donations from prominent politicians and outsiders.

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. Such syndicates are social organizations in which individual collectors participate on a voluntary basis. To become a syndicate member, each collector submits the application and pays a monthly fee for the depot use, general administration, and a fee for cost-recovery that is transferred to the public waste agency. The syndicates play an important role in expanding collection services. They actively discuss with the local authority the areas that would need additional services. Once they gain permission from the authority, they quickly mobilize members to cover those areas. The syndicates also handle problems and conflicts in the collection process.

Universities

Universities are already identified in the literature as a key actor in an innovation system. The focus is primarily on its role as a knowledge producer, an educator of researchers and innovators, and sometimes incubators of innovative firms. In the mainstream innovation studies, universities are often treated as part of the Triple Helix of university-industry-government (Etzkowitz, H. and Leydesdorff, L. 2000.; Eun et al. 2006). Although universities in Southeast Asia are still considered mainly as knowledge producers and diffusers, there is now increasing attention to the role of universities in socially inclusive development. The key missions of universities are not limited to teaching and conducting research, but also include community engagement. 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.

From our case studies, universities in Southeast Asian megacities play a variety of roles in national and city innovation systems. In the case of Manila, the University of the Philippines has teamed up Ayala Corporation to establish the UP-Ayala Technology Park to promote the development and commercialization of new technology. The Park offers facilities and assistance in business incubation and processes, while allowing participating enterprises to tap into a network of academic researchers, venture capitalists, and government agencies.

Meanwhile, the case study of community revitalization project in the Kudeejeen neighborhood of Bangkok shows a different role that a university can play to promote a city innovation. The case shows how a team from Chulalongkorn University has used the action-oriented research project to promote social inclusion and public participation in old communities with rich cultural heritage but facing physical and economic decline. The team from the university and a few other partners, including professional associations, experimented with new methods of public participation. One innovative method was to use a large map and a physical model to show the locations of buildings in the community. This would allow the residents to conduct "cultural and heritage mapping" by themselves, promoting awareness and curiosity among the residents about their own neighborhoods. The project has attracted attention of the media and later city politicians, who have subsequently allocated a large budget for scaling up the project.

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 (e.g., Dalziel, 2006; Gabald et al. 2009). 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 (Carlsson and Jacobsson, 1997; Chaminade and Edquist, 2006). 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 indispensible.

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 von Hippel (2005). 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.

4. CONCLUDING REMARKS

In this paper, we have argued that the current literature of innovation systems and its policy application in several developing economies in Southeast Asia is limited. This is not to say that the existing knowledge on innovation system is not useful. Quite the contrary, we have learned greatly from the previous studies and should build on the existing knowledge, while bringing in other ideas already discussed in other strands of literature and disciplines.

The city innovation systems approach to urban and innovation policies provides opportunities to think about urban problems differently, as it pays more attention to demand articulation of the innovation consumers and other actors involved. This means innovation policies need to be broadened to include actors not conventionally included in science, technology, innovation, and business circles. As the current sphere of innovation systems is rather limited, no voices are heard of the people who need innovative urban solutions, as well as the bottom-of-the pyramid innovators who are left out in the existing policy framework of national and sectoral innovation systems. By expanding the analytical scope to include city innovations with public-goods characteristics and innovation systems in informal settings, as well as bringing the unit of analysis down to the city level, we may be able to capture the

dynamic process that may be more innovative than previously considered. A city innovation is not a stand-alone product, process, or service. Rather, it is a combination of different types and aspects of innovative solutions put together. We are hopeful that the communities of scholars and practitioners involving in innovation systems research and policy will broaden the scope of work to include developmental agenda that people in cities are currently facing.

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