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Science Parks' Role in the Transition towards Urban Innovation Districts: Developing the Next Generation Innovation Hubs and Communities

Parallel Session 6

What are the STPs evolving into?

Author:

Jukka Viitanen (jukka.viitanen@hubconcepts.com)

Hubconcepts Inc., Finland

Co-Author:

Chachanat Thebtaranonth – The Siam Cement PLC, Thailand

Science Parks' Role in the Transition towards Urban Innovation Districts: Developing the Next Generation Innovation Hubs and Communities

Executive summary
This paper introduces a validated framework as well as a practical case study material on STPs' changing role in the middle of transition towards broader innovation district development. It is argued that the traditional infrastructure-led development approach in the creation of regional innovation hubs must be complemented with broader socio-economical thinking and special consideration for quality of life, issues for sustainability, communities and work-life balance. This results in a progressive (re)combinationand integrationof innovation activity processes into theregular urban context, future smart cities, innovation districts and regional network of alliances.

It is argued that future innovation systems must be strategically integrated into the modern urban structures and support creative mechanisms for the embedded innovation activities. The next generation innovation hubs are seen as true combinations of first-class urban planning processes, orchestrated STP master planning and value-adding innovation hub concepts, whichtogether layvisionary foundations for advanced urban platforms for inducedinnovation activities.

1. Cities as urban innovation platforms

Urban development challenge in the 21st century

In recent years, the development of urban design, architectures and solutions has been under constant media attention due to rising concerns of urbanization's impact on environment and their potential economic implications. Accordingly, current analyses on related trends and scenarios predict that the 21st century urban structures will look and feel very different to the ones we have today. They transform to function as mutually complementing ecosystems where collaborating actors seek for optimal balance of 1) urban economic activities, 2) comfortable, invigorating and human-scale living environment and 3) complementing innovation processes for continuous renewal.

The future cities are seen as adaptive systems that emerge and develop, imitating processes similar to nature. They combine living and working environments, public and private services, mobility and virtuality, as well as various activities for culture, learning and leisure, in the context of local site conditions. Such complexities promote a view that city developers should plan the urban ecosystems from a holistic perspective, which links land use planning, urban development, real estate business, building and environmental design, urban planning and building services, to mutually complementing ecosystems, which are offered to end-users in the most attractive, innovative and economical way.

World Bank estimates that there will over two billion new urban residents over the next 20 years. This means that urban populations in South Asia and Africa will double during this time frame. Most of the urban growth will take place in small and medium size cities with population under 500.000 inhabitants. At the same time, it is noted that over 70% of the global economic production takes place in cities. These urban production sites will shift their economic activities gradually from manufacturing to R&D and services adding aggregate value to all involved.

Key features of future intelligent cities

The 21st century urban design emphasizes intelligent city structures. At the moment there are hundreds of projects around the world, where developers are planning and building so-called smart cities, eco-cities and intelligent cities. These projects focus on setting up completely new cities or renewing the existing cities to meet the future socio-economic needs. The key features include:

- Alternative energy sources (solar PV, wind, biomass, biofuels, fuel cells)
- Focus on energy efficiency (from CFL to LEDs, smart grids, green buildings)
- Managing water for the future (re-use, recycle, treatment, reduction)
- Meeting energy demand through non-conventional sources (waste to energy, renewable energy, bio-energy)
- Meeting mobility needs (public transportation, shared vehicle services, EV, railways, subways, non-motorized transit)
- Intelligent communication (broadband, Internet, mobile networks, ICT grids)
- Smart service delivery (e-governance, PPP, outsourcing, portals, Internet).

It is argued that in the future, the developers of future urban ecosystems must combine advanced technical solutions (engineering, digital, mobile and processes) and complementary social systems (for innovation, learning and accumulation of knowledge) which will result in competitive business models and concepts for attracting tenants.

The most advanced intelligent cities incorporate all necessary city functions (e.g. housing, offices, mobility, leisure), high quality design elements (e.g. design, architecture, landscaping,), necessary service systems (e.g. health care, logistics, learning, commerce, communities), energizing work-life balance issues (living, working, mobility) as well as modern technology-based solutions (ICT, grids, energy, materials, recycling, water, waste etc.) into mutually complementing urban ecosystem solutions, which can be seenattractive for both industry and academia.

Urban innovation platforms

In this paper, it is argued, however, that it is not enough anymore to talk about smart and/or eco-cities, whenso many regional authorities and city developers have already started their projects years ago. The smart eco-city thinking must be complemented with thelearning city thinking. This means that "Smart city master planning" and "Guidelines for green buildings" must be complemented with functions, structures and processes, which support joint innovation activities.

The "Learning city" thinking promotes planned innovation capacity building. This means that the urban developers should include concrete pro-innovation elements to their original planning processes. These elements should include plans for: innovation/R&D clusters, R&D programs for technology development for the urban development purposes, development of shared R&D and test sites, vocational education centers, virtual learning environments, library master plans and so on.

These pro-innovation, value-adding organizational structures and processes can be bestdeveloped in collaboration with local industrial clusters, universities and researcher communities.

These 3-in-1 future innovation cities (see figure 1. below) are built on advanced, ICT-enabled infrastructures (smart grids, common ICT platform, shared software service structure, ITS=intelligent transportation systems, mobile communication platform, open databases for 'cloud' applications etc.). They combine learning city thinking and concepts with the smart eco-city development. The ultimate goal is to find a right combination of functional public-private partnerships and joint learning platforms, which can boost effective accumulation of intellectual capital and intellectual properties for rapid commercialization.

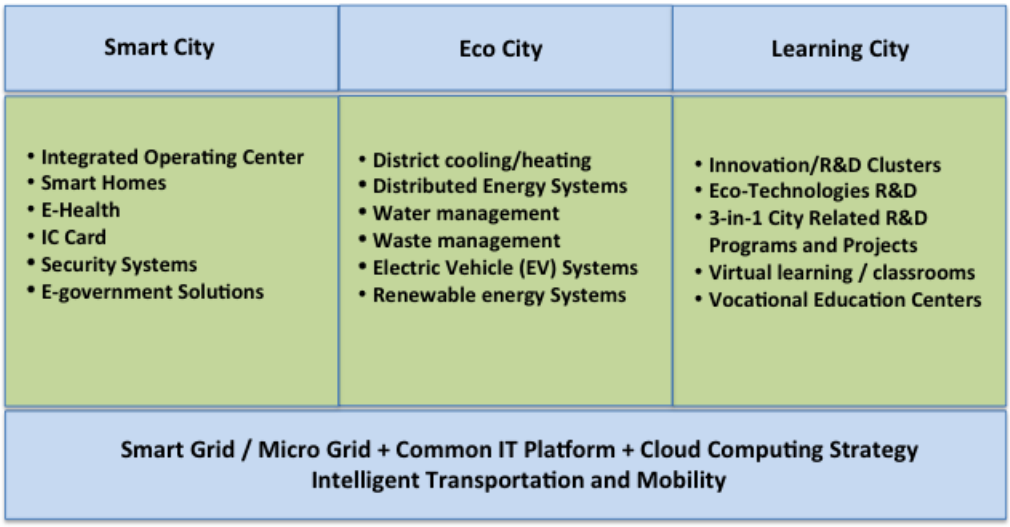

Figure 1. The 3-in-1 future innovation cities

2. Changing expectations and development targets for future innovation hubs

Combining first-class infrastructures with functional innovation processes

The common starting point for the development of any local innovation ecosystem is to create favorable conditions for regional prosperity. The key targets are to support knowledge transfer from academia to industry, growth of the existing industries in the region and, possibly, create the seeds for new clusters through active collaboration between the key stakeholder groups (companies, academia, authorities and local communities). The localinnovation ecosystems are seen as mutually reinforcing platforms for the provision of new technology seeds from academia and/or SMEs to be utilized and developed further by the local industry clusters in both local and global markets. In best cases,they evolve and develop as complete systems creating shared spaces for innovation experimentation and effective commercialization.

These regional innovation activities have typically been organized in some form of geographical agglomeration like a science, technology or research park to create a physical, identifiable place for the shared local innovation generation process. The parks bring concrete focus to the development of shared innovation activities and serve as visible icons for the long-term commitment of regional actors to innovation promotion. They combine fittingly all ecosystem elements intoa core geographical location and provide a joint platform for public-private-academia collaboration and innovation experimentation. In this way, they promote regional agglomeration of institutions, actors, R&D processes and functions and talent, and, thus, create the necessary critical mass for full-scale global engagements.

It is quite natural, then, that the built infrastructure of parks has been the key point of consideration in most projects. It is argued that progressive zoning, commitment to continuous upgrading of communication infrastructure, and flexibility in developing purpose-built solutions for clients improve the ability of any park to maintain its central role in the innovation ecosystem. Hence, the best development principles are based on flexibility, modularity and scalability, which signal the developers' true intention to serve their partners and tenants, by matching the infrastructure and facilities to their changing requirements.

However, it is important to keep in mind that the ultimate target for the park development process should not be the built park premises, but the induced, actual innovation activities that take place within the spheres of the park. The local decision makers should always advocate more comprehensive regional master planning targets, where park and other real-estate development projects would be only a part of the wider community and cluster initiatives, providing "only" the required foundations (e.g. infrastructure) for future changing innovation activities.

Accordingly, recent discussion on innovation ecosystem development makes special reference to future innovation hubs as communities, where innovation ecosystem planning and development extend from relatively fundamental infrastructure and zoning issues to a much wider socio-economical context with special consideration for quality of life (QOL), issues for sustainability, family matters and work-life balance. Consequently, it is argued that the future ecosystems should be planned as good places to live, where people (employees and their families alike) can enjoy their time both at work and in free time. These references indicate an emerging need for arranging the related community development services, which could include: QOL/sustainability SWOT-analysis, inward attraction and outward acceleration programs, and various community networking and marketing services. Outcomes from these analyses and actions bring benefitsto both within the ecosystem (for building community culture) and outside of it (branding and project generation).

Framework for regional innovation activity management

The progressive (re)combinations of first-class master planning and community development create visionary foundations for advanced urban planning and visions, building upa common basis for open living districts for induced innovation activities. This approach connects STP's planning and management processes to the broader regional (or even national) development context and introduces the key concepts needed for creating shared, business-oriented innovation platforms and attractive living districts for inducedinnovation activities.

In this paper, it is advocated that,in the future, every globallyattractive innovation hub requires a core hub organization for taking responsibility of the key management functions in coordination, program planning and management, value network development and maintenance, and securing and upgrading the required human resource (HR) pool for the foreseen innovation activities. In doing so, the hub management team generates an attractive innovation ecosystem to support the hub members in their drive for global actions and reach. The well-functioning innovation hubs weld together the parallel socio-economic targets and private sector's interests in expanding their business opportunities.

It is believed that future success lies ina more comprehensive regional planning, acombination of parallel complementing management processes and real customer-driven benefit analysis in a core ecosystem planning. Moreover, we see a shift to a more comprehensive regional master planning where real-estate development projects constitute only a part of the wider community and cluster initiatives, providing the required infrastructure for the changingfuture inliving/business/ innovation environments. As a consequence, the management requirements within the local hub will change to betterfacilitate the hands-on coordination of the ecosystem activities,stakeholder groupcoordinationand management of the change itself.

Hubconcepts™ Innovation Hub Framework (see figure 2. below)illustratesfittingly the key regional innovation ecosystem elements that are necessary for building up a successful regional innovation hub. It is argued that although each element (layer or driver) represents a significant development task of its own, they can produce a true ecosystem only in combination, which can rise to the globalization challenge and take its place in the value network context. Accordingly, the core management organization should be able to plan, organize, manage and develop the regional ecosystem as a complete set of interconnected elements where interplay and complementarities between the layers gives the ecosystem its soul and strength.

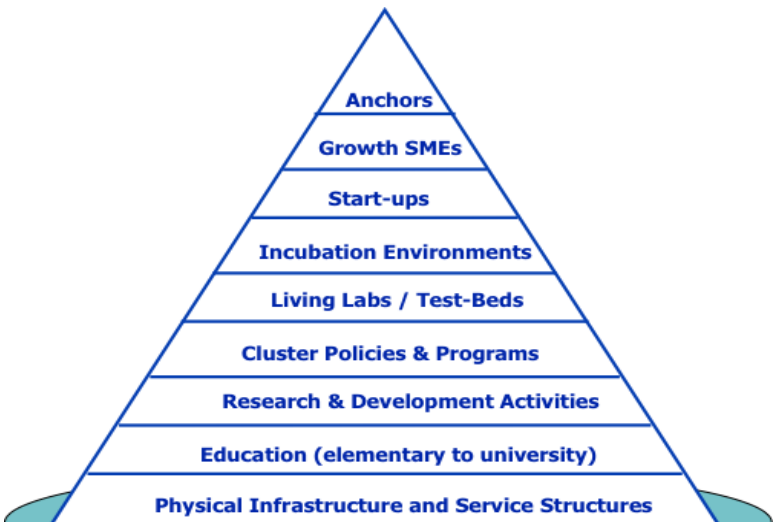

Figure 2. Hubconcepts™ Innovation Hub Framework

Towards functional innovation platforms

Accordingly, it is strongly advocated that regional decision makers should begin to address the innovation ecosystem development challenge in a more holistic manner and start systematic ecosystem-level development processes in close collaboration with key private sector actors. It is recommended that regional actors start a systemic regional master planning process, where all related ecosystem elements are addressed concurrently (as implicated in the above innovation hub framework). This process should embrace an extensive dialogue between key parties to identify real potential for mutually beneficial practices and their implementation inthesetting up ofan attractive environment to facilitatetargetedlong-term innovation creation.

The innovation district master plans should include guidelines and criteria for developing the basic municipal infrastructure (connectivity, transportation, energy, zoning, sewerage etc.), the institutional structures (educational facilities, research facilities, incubation centers, joint development platforms, living labs, co-creation environments etc.) and solutions for true virtual connectivity (Internet/broadband access, telecommunication networks, information systems platforms etc.). It should be noted that these plans must also include the 'softer' ecosystem elements (comprehensive service structures, facilitating mechanisms, coordination functions etc.) to address the parallel ease of use and functionality concerns, which have a direct impact on potential, shared, ecosystem-level activities and ultimate results.

Consequently, the practical innovation district planning and management challenge is in combining the parallel interests of the company driven, the public sector driven and the public-private partnership driven innovation processes. All key decision makers in both the public and private sectors must be brought together to design a shared future vision for regional development in a wider global context. These key parties should, then, agree on their reciprocal roles and responsibilities in implementing that shared vision and in theirjoint policy and targets for therelatednecessary investments. This collaboration would accelerate the respective ecosystem development processes to meet the tough globalization challenge and create complete, locally optimized value systems for swiftly globalizing industry clusters.

Moreover, it is argued that, in most ecosystems, the toughest development challenges seem to be related to the orchestrated, mutually beneficial matching of varying stakeholder interests around the middle layers of the framework. The public investments and services are put in place to induce and advance regional collaboration for the common good and to improve the effective use of specific, combinatory talent and resources throughout the ecosystem (for IPR generation and commercialization), while private interests seek for proprietary competitive advantages and better odds for improved business profitability. On the other hand, it is common that both parties openly acknowledge the potential benefits of coordinated actions and, consequently, seek for partnerships across domains. These practical realities call for a concerted approach in managing the public-private partnerships.

Subsequently, it is highly recommended that ecosystem developers put extra effort into planning and implementing advanced mechanisms for regional networking, communication and joint activities. This translates into setting up open forums for facilitated meetings, planning for flexible service structures for first-class intermediary support (KIBS providers, transfer offices, incubators etc.) and launching open platforms for coordinated actions (co-creation environments, living labs, business labs etc.). These common sites bring together local actors to learn from each other, to exchange specialized information on particular topics, and to set up mutually complementing value systems for practical business endeavor. In themost advanced cases, these partnerships can lead to a completely new system integration business model, where resident anchor companies (or similarly active lead actors) and their networking partners decide to reorganize the entire value system from within and build an intra-ecosystem, integrated business model.

3. Case study

This paper introduces,in brief, a practical case study and analysis on one of the most advanced innovation district development processes in Asia: the Amata Science City (ASC) project in Thailand. The 400-hectareASC site is located 57 km from Bangkok and 42 km from the new international airport, next to AmataNakorn Industrial Estate area, which covers an additional 3,000 hectares of fully developed land for industrial production. AmataNakorn hosts, today,over 500 manufacturing sites of both domestic (18%) and international companies (82%), forming strong industrial clusters in automotive, electronics, consumer goods, rubber and plastics industries. TheAmataNakornsite, adjacent to Amata Science City, provides a core client base, industrial cluster structure and pool of international partnerships, which will be developed, extended and strengthened further in gearing up for the ASC project.

The case study is stimulating in two complementing senses. First, the ASC project is directly linked to the overall development of the STP systemin Thailand, as ASC will be hosting one of the newest STP environments on the Eastern Seaboard Region east of Bangkok from 2013 onwards.And second, the ASC planning team focuses on supporting the advanced manufacturing processes and upgrading the local competencies to meet the intensifying competitive pressures that Thailand's manufacturing base encountersfrom its neighbors.This approach is foreseen to connect all key actors for joint innovation ecosystem development and improve complementing innovation capacities between public and private sectors. Moreover, it is expected that the ASC will create a new platform and pilot site for modern, market-oriented innovation district development, building on existing client base of hundreds of manufacturing companies, which aim at complementing their local operations with advanced R&D&I processes.

Local conditions in Thailand - rising to the challenge to develop innovation districts

Thailand has experienced a strong economical growth for the last 20 years, largely as a result to the policies that enabled Foreign Direct Investment (FDI) to create employment, skills and competitiveness, whilst retaining costs per unit labor at low levels. However until recently, compared toother successful regional economies in Asia, Thailand has shown relatively modest strategic approach for theR&D&I system development. In some senseit lacks a strategy for physical clustering of key resources needed for the concerted development of thelocal innovation system and/or environments to supportjoint innovation creation processes.

The local incentive structures are less developed than in neighboring countries (weak R&D grantsystem, non-competitive co-financing schemes, income tax levels for R&D&I personnel too high etc.). At the same time, the Government is perceived as apassive partner in driving the knowledge economy and lacks the visionary approach in developing the necessary public-private partnerships for innovation system upgrades. Consequently, collaboration among industry, government and universities is comparatively underdeveloped. International reviews have revealed a further weakness in the availability and supply of talented work force. Some companiesalsoreport a high turnover of their staff due to increasing wage competition.

The Thai Government has begun to address these systemic challenges and is working on renewing the national innovation policy portfolio to meet market demands. One of the key policies is promoting the development of Innovation Districts, which aims at bridging knowledge and innovation communities to the industrial actors (typically located in industrial estates). The key measure is to integrate industrial estates and science parks by encouraging the pro-innovation estates to incorporate R&D&I functions onto their manufacturing platforms. This would open up the local innovation processes for cross-sectorial collaboration schemes and innovative co-creation of new products and services for expanding markets. In short, the innovation districts would promote:

- Sustainable creation of knowledge and innovation communities
- Value-added industry-academia collaboration, learning and HR development
- Better access to R&D&I funding programs and joint R&D projects
- Development of advanced (3-in-1 city) infrastructure and services
- Integrated model of mixed-use Industrial estate ecosystems
- Rapid adoption of sustainable performance indicators (R&D intensity, energy water and materials use targets, CO2 targets, talent creation etc.).

Vision for Amata Science City development

The recent developmentin governmental policy and global innovation ecosystem trends support very timely the Amata Science City (ASC) planning process. It is evident that boththe Thai government and thekey actorsinthe regional manufacturing clusters are seeking new opportunities to boost Thailand's innovation capacity. At the same time, they are lookingfor advanced PPP models to bring

all the key innovation actors together under some kind of orchestrated management structure, which could guide all parties to join resources, know-how and value systems on amutually beneficial R&D&I platforms.

It is commonly argued that Thailand needs to find new structural mechanisms to boost advanced infrastructure development. Local actors need to find a suitable way to start experimenting with regional 3-in-1 innovation city projects, togradually transferlocal manufacturing sites into green technology show-rooms and totransform the industrial estates into advanced R&D platforms in orderto support the shift intheir key clients' business focus (support manufacturing-driven R&D). Consequently, it is expected that the ASCproject will demonstrate in practice the best mechanisms to combine the following characteristics of the next-generation innovation district development:

1. Build on the existing base of strong industrial clusters
2. Focus on supporting the market-oriented, manufacturing-driven R&D processes
3. Grow to meet the global R&D&I platform criteriato beat the competition, and
4. Build programs to support local and regional HR and innovation capacity development.

It is argued that finding a balanced solution to the above criteria will leadto a successful transition of theoverall industrial structureexpanding from the existing stronghold and increasing the number of fully-functional sub-clusters. These sub-clustersfromAmata sites, in turn,can grow over time to strengthen the overall industrial structure of Thailand.

Conclusions

Thepresented case material outlines the current state of affairs and key characteristics at the ASC site, describing its internal as well as inter-domain relationsthat are relevant to the functional development of amodern innovation district. Moreover, it reveals the core critical success factors in attracting, keeping and developing the necessary resources, talent and capacities for continuous innovation activities in both AmataandThailand. It is believedthat the ASC profile can highlight the underlying characteristics of Asian urban development strategies and guide the next generation of STP managers, innovation policy makers and agents in their efforts to identify the right path to the future.

Finally, it is concluded that the selected framework and case site analyses demonstrate that although the task of building and maintaining a truly global innovation districts requires skilled and thoughtful planning, and competent and visionary management of a sizeable number of moving pieces, the task is not insurmountable;on the contrary, the results frommeticulous researchand analyses show that this task can, in fact, be broken down into a definite and manageable framework. With foresight, careful planning and a professional management approach, each and every individual regional hub has the potential to succeed and excel in the modern day world.