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Rethinking the Strategic Dimensions of Smart Cities in China's Industrial Park Developments: the Experience of Suzhou Industrial Park, Suzhou, China

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1 ABSTRACT

Although smart cities have been widely recognised as a new tool to transform the industrial parks in China, planners have faced the complex challenge of how to translate the concept of smart cities into reality. While great emphasis has been put on the applicability of information and communication technologies (ICT) to smart city projects, there has been little analysis or evaluation in such planning process of smart cities. This is mainly because smart cities employ rather unclear definition and work scope. This research draws attention to the 'strategic dimensions' of smart cities in planning practice, which need to be considered in the transformation of industrial parks in China. The research uses a case study of smart city development in Suzhou Industrial Park (SIP), Suzhou, China, which is widely acknowledged as one of the successful industrial park developments in China. SIP is in transition, and accommodating manufacturing industries is no longer the primary function of SIP. The research found that it is necessary to redirect the smart city strategy of SIP by mirroring the needs of the workers and local residents in SIP. It requires a transformation of traditional compartmentalised planning practices and the engagement of a wider range of players including those who were not previously involved in traditional practice.

2 INDUSTRIAL PARK DEVELOPMENTS IN CHINA

Since the 1970s, the development model of industrial park has become a major feature of urban development in China. This may be closely associated with planning activities driven by the public sector that has seen this as a 'new hope' for their cities to boost local economy by attracting foreign investment. The Chinese government has established many preferential policies to embrace foreign companies and attract foreign investments. With state-led development strategies and its cheap labour, China National Bureau of Statistics (2011) reported that over 7,000 industrial parks were established in China by 2004, and they have been accounted for 11.1% of China's GDP and 29.8% of China's exports. Industrial parks in China were initially started as a development tool to organise manufacturing industries more effectively, then become a popular method of accelerating urbanisation in China. Consequently, the function of industrial parks has been no longer limited in accommodating industrial uses, and rather they have been developed as a fully functioning urban area. Living environments of local residents in industrial parks have become more significant, as the industrial parks were needed to serve its population. These good and newly-built living environments have also attracted the middle to high income-households to move into the industrial parks from the city's existing urban areas. Industrial parks in China, however, have faced a challenge to transform the nature of their industrial parks economically, socially and spatially. This became more significant to the earlier industrial parks that were based on manufacturing industries as market competitiveness has been diminishing due to decreasing tax benefits from governments and increasing labour costs. This doubtful investment climate has raised issues on the need of rethinking development strategy for industrial parks in China. There are many prior studies on the transformation strategic models for the industrial park development not only in China but also throughout the world. These models were primarily twofold.

The first transformation strategic model aims to change the industrial structure of the industrial parks from manufacturing to service industries. This is to encourage the manufacturing-based enterprises, which have originally been located in the industrial parks, to extend their business scope to the service sector industry with the supports from local governments. It is also described as the 'circular economy' approach by means of reorganising economic activities in the notion of loop-closing process in using resources, consuming energy, and managing supply chains (Yuan et al., 2006). This transformation strategy engages a more sustainable approach in developing and operating industrial parks. Suzhou Industrial Park (SIP) has employed this transformation approach. The second transformation model is to apply the concept of the 'eco-industrial park'. This developing model is to combine manufacturing and service industries with the consideration of environmental, economic and social issues with an emphasis on the environmental friendly

approach in its development and operation (Tudor et al., 2007). However, ironically, it had been criticised that a lack of attention on environmental issues and guidelines had caused the operational problems of eco-industrial parks in China (Geng et al., 2007).

3 SMART CITIES AS TRANSFORMATION STRATEGIES

The changing social-political environments have forced industrial parks to reform their industrial structure to be more knowledge-based and eco-friendly. In this context, the concept of smart cities has been increasingly emphasised, as it is obvious that smart cities are connected to industries related to information communication technologies (ICT) that can act as a catalyst to transform economic and social environments of the industrial parks. Additionally, the language of 'smart' and 'intelligent' was also appealing to politicians and developers to promote the economic and political values of the industrial parks with positive images of the technology-led innovation. This research, therefore, aims to investigate the 'strategic dimensions' of smart cities in the transformation process of industrial parks in China by focusing on different views between service provider (public sector), industrial users (enterprises), and end-users (workers and residents) of the smart city. The research draws on the results of the questionnaire survey with 120 workers and local residents and five structured email interviews with enterprises located in a particular industrial park in China.

3.1 Development Strategies of Smart Cities in China

A smart city is a new urban form integrating between urban development and ICT to make urban infrastructure and living environment more intelligent, efficient, safe, and interactive. This approach enables an innovative city management by improving the efficiency of city operations, the quality of urban public services and promotes the integrated development of industrialisation and urbanisation of cities (Feng, 2011). Wang and Gu (2012) argue that the development of smart city has improved the city's competitiveness potentially, and at the same time, affected China's economy in relation to issues of labour, social and environment. There are five core strategies in the development of smart cities in China: (1) improving the city's creative capability; (2) developing smart industries; (3) promoting smart management and service; (4) applying smart technologies and facilities; and, (5) spreading smart life. While the China's smart city strategies are rather similar to those applied around the world, the practice of smart cities in China has developed their own empirical ways to apply the concept of smart cities to the practice of urban development in order to reflect the city's economic, political, cultural environments. Some cities like Nanjing and Shenzhen have integrated their smart city strategies with the overall urban development in the city to promote the innovative and creative images of the city. Other cities have preferred a piecemeal approach by developing individual intelligent systems targeting certain urban issues.

3.2 Smart City Transformation Strategies for Industrial Parks in China

The change in market conditions has brought major economic and political concerns in the development of industrial parks in China. Transformation strategies of industrial parks must be established in line with the changes in political, economic and social environments in China. As discussed earlier, the fundamental changes that are apparent in relation to transformation strategies of industrial parks are the industrial network restructure and the creation of eco-friendly environments. Bearing this in mind, transformation strategies of industrial parks by applying the concept of smart cities can be summarised in two aspects.

Firstly, the development of smart cities in industrial parks should consider restructuring of industrial network by attracting diverse types of industries. A considerable number of industrial parks in China are willing to attract high-tech and knowledge-based industrial sectors to facilitate the transformation of the industrial structure. This is because there is a widespread acknowledgement that 'high-tech' and 'service-based' industries may increase the competitiveness of the industrial park by enabling high value-added economic activities. Additionally, high-tech industrials are seen as environmentally friendly industries comparing with traditional manufacturing industries. As the leadership of local government wants to change the industrial structure of industrial parks gradually, the development of smart cities has been considered as a marketing tool to promote the innovative image of industrial parks to attract technology-led industries to their parks. Secondly, with the concept of the ecologically friendly development, smart cities should be able to add the sustainable values to urban environments and improve the quality of living environment for their inhabitants.



The changes of industrial structure have also forced to improve the quality of living environments in the industrial parks. As the industrial structure changes from manufacturing industries to high-tech industries, the industrial parks are needed to accommodate higher-income entrepreneurs who require better living environments than lower-income labour workers in a manufacturing factories. From the above two perspectives, the smart city approach, bringing together urban planning and ICT, needs to consider a transformation process of both industrial structure and residential settlements in the practice of industrial park development.

4 CASE STUDY: SUZHOU INDUSTRIAL PARK, CHINA

Although the smart city approach has been emphasised in the field of urban development in China, little is known about its implementation in a real-life context. It is evident that there is a need of investigating the development strategies of smart cities in a concrete example to identify operational difficulties and to make recommendations that will ultimately lead to better strategic dimensions of smart cities in the transformation process of industrial parks in China. The case study in this research, the Suzhou Industrial Park, Suzhou, China, has been selected to illustrate this point.

4.1 Development of the Suzhou Industrial Park

The Suzhou Industrial Park (SIP) is the most well-known project in the Chinese history of the industrial park development and often described as a 'premium' industrial estate in China (Pereira, 2007). SIP is located in the east of Suzhou and has been developed as new industrial, commercial and residential centres of the Suzhou city (Figure 1). SIP was implemented by a joint venture between the Chinese and Singaporean governments starting from 1994. It was recognised as the largest and most ambitious development project of regional industrial parks that had been implemented by Singapore government, and it was designed to cover 70 square kilometres by 2014 with the estimated development cost of 30 million USD (Tan, 1994). In 2013, SIP's GDP has reached to 31.35 billion USD, and 1.96 billion USD of the foreign capital and the 80.46 billion USD of import and export have been reported (SIPAC, 2014). The development strategy of SIP is based on three pillar industries and five creative industries. Those can be categorised as follows:

- three pillar industries including electronic information industry, machinery manufacturing industry and service industry; and,
- five creative industries including biomedical industry, animation industry, eco- protection industry, communication convergence industry, and nanotechnology industry.

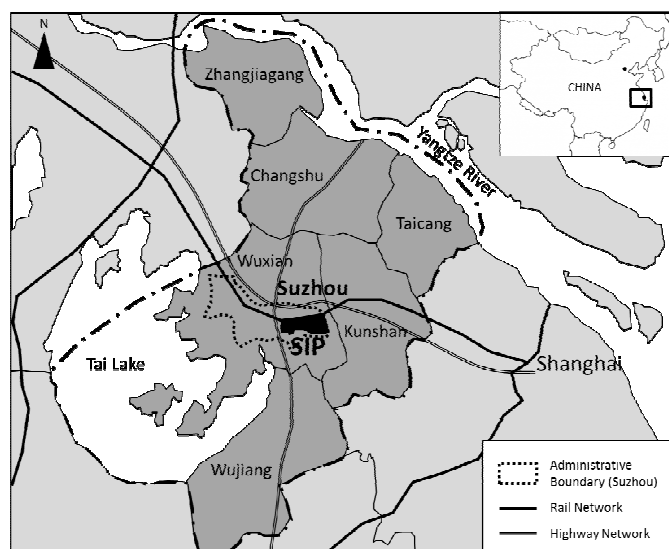


Fig. 1: Location of the Suzhou Industrial Park.

Apart from the above industries, industries related to property development have also played a significant role in the development process of SIP. Delivering high-quality housing to the property market, in particular, has led demographic and social changes in the Park. Since 2006, SIP has gradually reformed its industrial structure, and a transformation strategy called the 'Ecological Optimisation' programme was introduced in 2009. This strategic programme outlines a shift in focus from traditional manufacturing industries to high

technology-based industries, and reflects the importance of the industrial structure transformation. Under this transformation strategy, IBM has invested in constructing Suzhou National Science Data Centre located in SIP. This data centre was a kind of flagship development to attract other ICT-related industries to the Park. Moreover, it was expected to provide a basis for the future development of the smart city in SIP.

4.2 Smart City Approach of the Suzhou Industrial Park

In 2013, the Ministry of Housing and Urban-Rural Development announced that SIP has been chosen as one of the first pilot smart cities in China. Under the umbrella of smart city development, SIP has developed: GIS data with 660 layers of geospatial information; intelligent transportation system including traffic signal control and bus information systems; e-administration system for demographic and medical records; and, smart public bicycle system (Z. H. Studio, 2013). Recently, SIP signed a memorandum of understanding for the strategic collaboration on the smart city development with Singaporean government.

The importance of collaboration between ICT and urban development has been emphasised over last decade in the China's planning legislation based on its five-year plans. The 11th Five Year Plan (2006-2010) raised issues of developing ICT infrastructure to improve the quality of public services in the fields of government administration, public facilities, social welfare and enterprise supporting services. The following 12th Five Year Plan (2011-2015) has also stressed a holistic approach between ICT and urbanisation, and to become a foundation of establishing urban and industrial development strategies of the Suzhou city in association with the ICT industries. Mirroring this, the Suzhou Industrial Park has developed a smart city strategy: (1) to implement smart solutions integrating diverse databases; (2) to operate intelligent management of the industrial park; and, (3) to transform the industrial structure with ICT industries (Department of Information for SIPAC, 2013). Yang Zhiping (quoted in Li, 2013), the Chairperson of SIP Administrative Committee, explains the '3-3-4-9' smart city strategy of SIP. This includes the development of three service portals, three databases, four dimensions of the strategy, and nine information hubs (Figure 2).

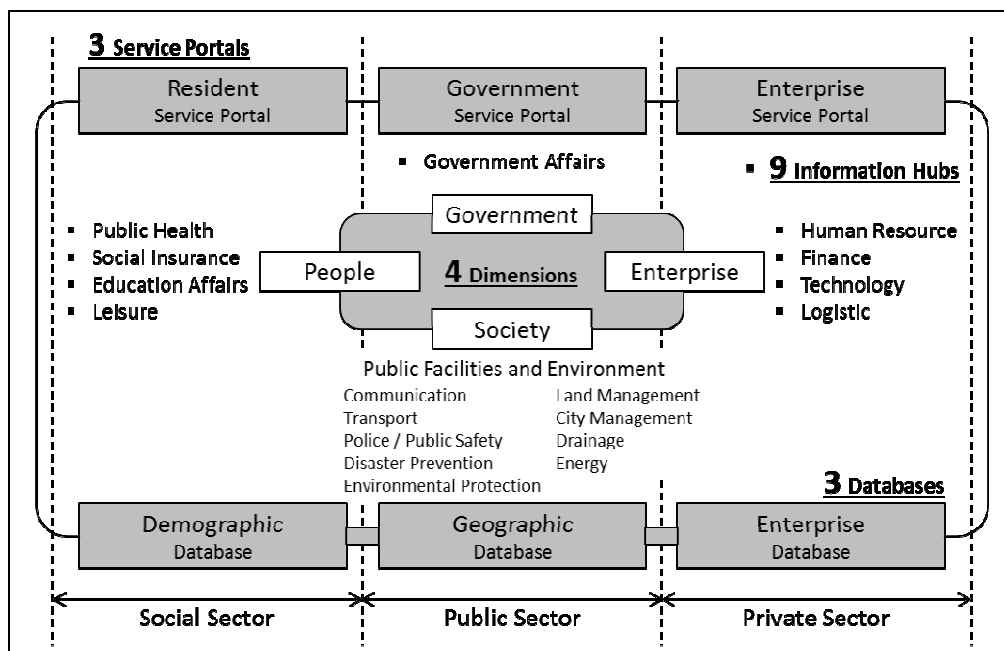


Fig. 2: Smart City Development Strategy of the Suzhou Industrial Park. (Source: modified from Department of Information for SIPAC, 2013)

Three services portals are to establish citizen-centric government by integrating three services portals for residents, government and enterprises. Three databases refer to geographic information, demographic information, and enterprise information as a foundation of the smart city development. It took nineteen years to develop a full set of geographic information as the primary database. Four dimensions represent the four key elements of the smart city strategy reflecting society, people, government and enterprise. Although the development of smart cities in SIP is government-led, the holistic approach among the four elements has been emphasised to create innovative public services and urban environments. Nine information hubs are to provide terminal platforms to share information in particular areas, such as government affairs, public health, social insurance, educational affairs, leisure, human resource, finance, technology, and logistics.

As illustrated in Figure 2, the key feature of the SIP's development strategy on smart cities could be seen in three categories representing public, private and social sectors. While the smart city projects widely practiced around the world have emphasised on issues of the urban infrastructure and public services of the city that governments provide for inhabitants (Bélissent, 2010), the development strategy of SIP is unique in its focus on private sector development. This shows that the smart city strategy of SIP echoes a notion of the industrial park where there is the need of providing better business environments for industries. Although credit could be given to the development of the strategy by engaging local issues, it is still arguable how a role of ICT could contribute to 'real' solutions in supplying suitable workforce, providing financial supports, and reducing the cost of logistics. It is also a challenge how the smart city strategy can serve the 'real' demands of local communities, and can be delivered in practice.

5 ANALYSING SMART CITY DEVELOPMENT OF THE SUZHOU INDUSTRIAL PARK

Viewed from the two common transformation strategies of China's industrial parks, industrial restructure and eco-friendly environments, the smart city approach is needed to cope with issues arising from transformation processes. In carrying out the case study, email interviews and questionnaire survey were the two methods used to investigate the views and needs from different stakeholders in SIP. As ARUP (2013a) argues, smart cities are no longer deliverable from a top-down approach by the public sector alone. The development of smart cities should represent the needs and capabilities of diverse stakeholders in the area including local communities and enterprises. Considering the fact that the current smart city strategies of SIP were mainly provided by public sectors, the results of two analytical methods may lead to an evaluation of the strategies from the wider views of stakeholders (enterprises, local residents, and workers) in the Park.

Email interviews were undertaken by two authors with five senior executives in a various range of corporations in SIP. The interviews were semi-structured to investigate the entrepreneurial benefits and limitations of industries located in SIP. In parallel with email interviews, the questionnaire survey targeting local residents and workers in SIP was conducted by five field surveyors who were trained professionally for this research. The questionnaire survey was conducted with 120 responders in order to identify the issues and applicability of the smart city approach in urban environments of SIP. From 120 questionnaires collected in 2012, 108 were valid for the analysis. Considering the age groups, 96.2% of the responders are the economically active population. 75.9% of the participants both live and work in SIP while 13.9% of them only either live or work in SIP. These indicate that the questionnaire survey represents the view of local communities in SIP. The questionnaire design was twofold. Firstly, respondents were asked to evaluate current living environments of SIP in seven categories of education, transportation, retail, healthcare, public safety, environment, and energy and water. Secondly, the survey participants were asked to mark the degrees of their preferences in the proposed smart solutions in each category that may apply to SIP in the near future. The seven categories and proposed smart solutions were chosen based on the author's 7-year experience as a practitioner¹ in the development of smart cities, and considered as most common areas that the smart city approach has been applied in the urban development practice.

In general, among the seven categories, the result of the questionnaire survey indicates that importance of three issues including retail, healthcare, and energy/water is particularly emphasised in relation to living environments of SIP from the perspective of local communities (Figure 3). Respondents have selected those three issues as the areas that needed to be improved and were less satisfied in SIP. While the result has indicated the local needs from various aspects, they can also be considered as the prioritised areas for the smart city development in SIP. Taking into account that the development of smart cities employs a considerable amount of time, efforts and resources, it needs to address what matters most in a particular practice with considerations of the political priorities and resource allocation (Kim, 2013). In the case of SIP, it seems that the 'healthcare' issue is the most significant area that needs attentions among the seven categories. Either intentionally or accidentally, the local government of SIP has initiated a project to develop an integrated system to improve healthcare services in SIP under the development strategy of smart cities. This 'Digital Livelihood Programme' is an online e-administration system to allow citizens to access all public information available with a single login by integrating information of citizen card, medical insurance, provident fund, bank account, and so on (Suzhou Daily, 2011). With this system, in an ideal scenario,

¹ Joon Sik Kim had been a principle consultant in a global ICT company working on a considerable number of the strategic consultancy and development projects of smart cities in Korea, UAE and China.

patients can make online appointments for outpatient service, doctors can access the digital medical records of the patients, the pharmacy can access to the prescriptions through a digital hospital system, and the provident fund managers can deal with integrative medical insurance information. Then, another question needs to be asked. What if the actual need of local communities in healthcare is not about the information system integration, but local residents need more numbers of clinics and hospitals in the area? In approaching the development of smart cities, therefore, there is the need of a concerted effort to develop a holistic strategy with considerations from diverse areas related to urban planning and development.

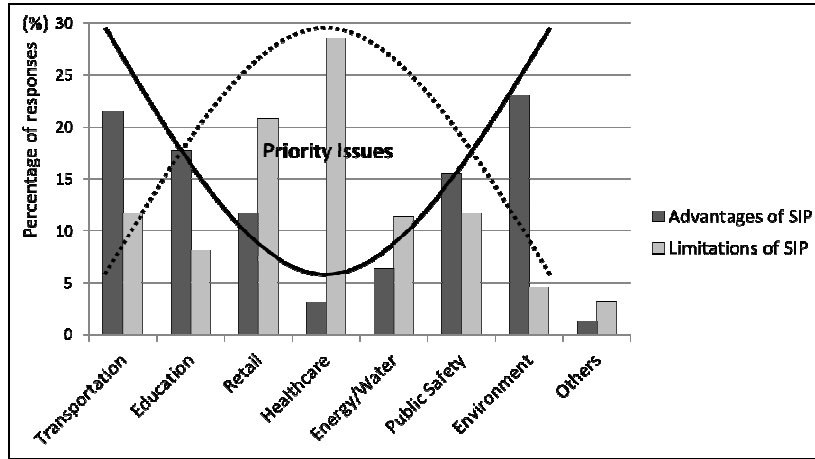


Fig. 3: Advantages and Limitations of SIP from the View of Local Communities. (Source: Author)

6 STRATEGIC DIMENSIONS OF SMART CITIES

The concept of smart cities is now firmly on the agenda of the transformation strategy of industrial parks in China. The practice of smart cities requires a collaborative strategic approach involving not only the ICT perspective but also political, economic and social aspects. The research findings could be summarised in three dimensions of the smart city strategy: (1) developing smart city strategies under the changing physical and economic environments; (2) recognising the need of local communities in the development of smart cities; and (3) delivering the integration of smart city services. These three dimensions demonstrate how an empirical framework can be developed in order to apply the ICT concept of smart cities to planning practice of the industrial park transformation in China.

6.1 Developing smart city strategies under the changing physical and economic environments

The Suzhou Industrial Park as elsewhere in China faces a challenge of coping with the changing economic, social, and political environments. Enterprises in SIP have reported that there are benefits and supports from the local government of the area. The results of email interviews have suggested that policies on tax reduction settlement and subsidised rent agreement are primary advantages of being located in SIP. This was the view from several senior managers of multinational corporations located in SIP. One of interviewees in a foreign enterprise in manufacturing industries pointed out that:

“[In SIP] there is a tax-free period for two years since the first day of profit-making, then fifty percentage of tax reduction for further three years. Those tax benefits and cheaper rents are certainly one of the advantages when we consider the factory development in SIP. Additionally, SIP is a fully functioning city and the local government offers a ‘one-stop’ service to the corporations. It [one-stop service] makes the administrative works easier comparing with other industrial parks in China. ... There is still no problem in terms of the labour supply, but there is an issue about the labour cost as it increases every year continuously. Moreover, the tax benefits will finish soon. These are the main reasons why we cannot make a plan for further extension of factories in SIP.”

Throughout the interviews, it is clear that the critical concerns of enterprises located in SIP are about more direct benefits such as tax and rent reductions. However, speaking from the smart city aspects, the development of the one-stop service centre with the integration of administrative information may be helpful to attract industries, especially in China where administrative process is relevantly complicated for foreign firms. This argument has also suggested that the development of smart solutions for industries such as the one-stop service centre should be seen as a value-added approach, as it cannot stimulate a primary

motivation in determining the location of their corporations in a particular industrial park. From a long-term perspective, it seems that SIP is needed to prepare an exit strategy from the notion of industrial park in accordance with the changes of surrounding environments. The urban environment of SIP is transforming as a new urban area of the Suzhou city, and the characteristics of industrial parks are fading away. There is a need of consideration on how SIP can be restructured after the major manufacturing industries move out.

At the initial stage of the development of industrial parks, it was necessary to emphasise the aspects of the private sector in the development of smart cities. This might facilitate the integration of the administrative information in relation to industrial activities to provide effective governmental supports and services to the enterprises located in the industrial park. As SIP's smart city strategy states, smart transport solution for a better logistics system could also be another added-value for supporting local enterprises. However, industrial parks are moving forward to industrial restructure focusing on technology and service-based industries from manufacturing ones. The smart city development is also needed to refocus on living environments of the industrial parks. High-tech industries require highly educated professionals as main resources of the industries, while manufacturing industries at the initial stage of the development needed the cheap labour force. To attract technology-based industries to the industrial park during the transition period, the quality of living environments in surrounding areas should also be transformed to meet the need for the professional employees for those industries. The development of the smart city for the industrial parks should consider not only the local needs of public, private and social sectors at the development stage but also the transformation in a long-term perspective. In the development of smart cities for industrial parks, it is important to identify the critical elements that are needed in both short-term and long-term strategies. This is particularly important to the design of ICT infrastructure in the industrial parks, which is a long-lasting element in the city development. The ICT infrastructure should be developed in consideration of the uses to support both industries in short-term and local residents in longer-term.

6.2 Recognising the need of local communities in the development of smart cities

In order to investigate the need and preference of smart solutions in SIP, two sets of questions were asked in the questionnaire survey. The first question was to investigate the need of local communities in details, and the second one was about the people's preference on proposed smart solutions. Respondents were required to express their satisfactions and preferences in the five-ranking scale (Figure 4 and 5). From the previous analysis, the three aspects of retails, healthcare, and energy/water are the most significant in relation to the improvement of living environments of SIP. These three categories are reviewed and discussed in this section.

Firstly, for issues related to retails in SIP, people strongly agreed in the satisfaction of physical environments in the retail areas, despite the fact that they are less satisfied in a variety of goods and shopping experiences (Figure 4). This has influenced the question on their preference of smart solutions in the retail category, although the differences were less significant. It seemed that intelligent car park systems and way-finding solutions are desirable for the development of smart cities in SIP (Figure 5).

Secondly, in the healthcare category in Figure 4, the results have shown that local communities were not satisfied in both quantity and quality of healthcare services in SIP. They demanded the increased number of healthcare facilities and better quality of healthcare services in SIP. Analysing their preference of smart solutions, respondents demanded more to have intelligent medical services in hospital to reduce waiting time and improve administrative process. This was also the issue which the SIP government identified, and an integrated information system for medical services is currently under development. However, respondents preferred less in the remote monitoring system for home healthcare services.

Thirdly, for the energy/water category, Figure 4 indicates that local communities are generally satisfied in the water and energy supply services in SIP, although they are less satisfied in the cost of energy. This might lead to a conclusion that the development of smart cities in SIP should focus on effective use of energy to save energy consumption and the cost of energy uses, and the current intelligent energy and water management systems of SIP operate in a reasonable level. However, Figure 5 shows the opposite result. The preference of an underground facility management system was slightly higher than a smart home solution for energy monitoring. This might be because people tend to consider the development of smart cities is the responsibility of the government, especially, if it is related to public services.

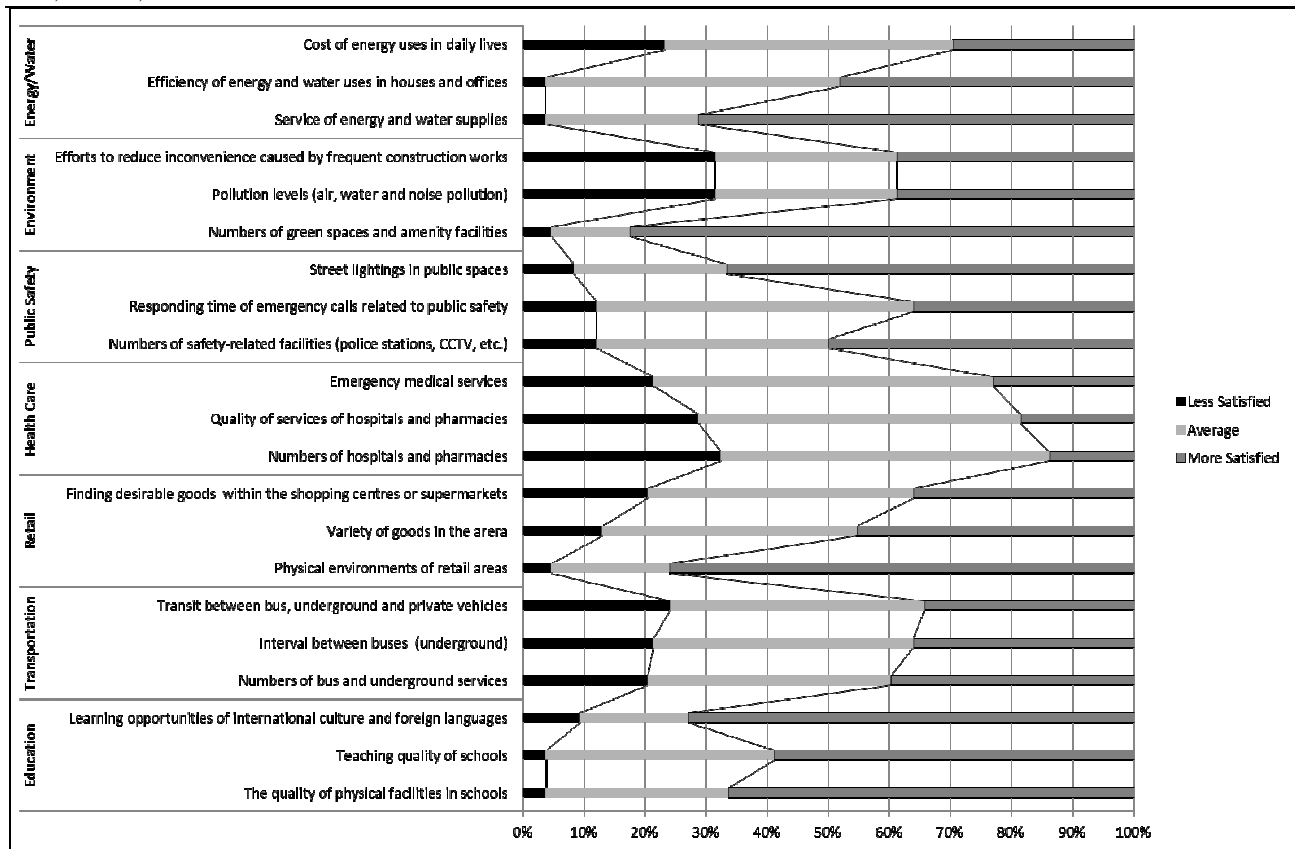


Fig. 4: Satisfaction on Living Environments in SIP. (Source: Author)

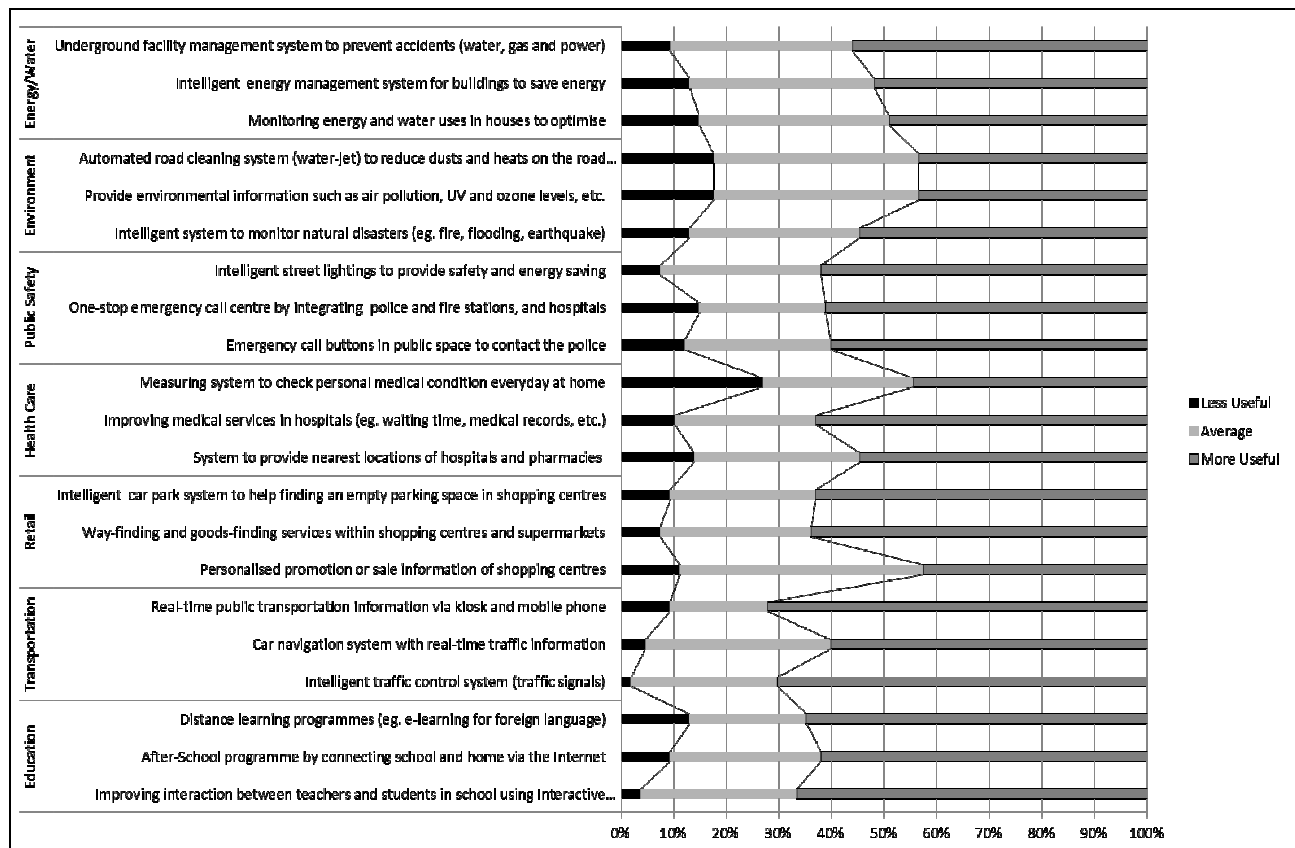


Fig. 5: Preferences on the Proposed Smart Solutions in SIP. (Source: Author)

The results of the questionnaire survey has also indicated that local communities demanded the most of all proposed smart solutions in the questionnaire survey with a perception of 'more is better'. This argument suggested that the development of the smart city strategy should not be decided by a single interest group,

neither the government nor the local community. It should be a result of collaborative actions between various stakeholders including experts in the field of smart cities. Another lesson from this survey is that the development of smart cities should not be isolated in the ICT development. The need of local communities should be investigated in diverse interests in association with the urban planning practice.

6.3 Delivering the integration of smart city services

The development of smart cities should take a holistic approach by integrating different sectors and organisations in cities. One of the most significant barriers of the collaborative actions in smart cities is because public resources including those described in the above seven categories have traditionally considered and managed separately without much interaction between them (ARUP, 2013b). This partial approach exists in the development of smart cities in SIP. There is a realisation that public administrative information needs to be integrated for efficient, effective and accountable services for citizens in the case of 'Digital Livelihood Programme', discussed before. However, this is initiated from a top-down approach and limited to integration of governmental systems. There are less cross-sectoral attentions in developing other smart solutions in SIP such as intelligent transport systems and smart public bicycle services.

The fragmental approach was also seen in the evaluation framework of the smart city development. There are twelve indicators in measuring the level of the ICT development in Suzhou that become a guideline to the development of smart cities in SIP (Table 1). The indicator framework plays an important role by evaluating effectiveness of the development outcomes and guiding the future plans and development strategies. The twelve indicators, however, represent measurements on either the development of ICT infrastructure such as the Internet diffusion rate and speed, or the system integration within the single sector rather than across public, private and social sectors. It is understandable that the indicators were originally developed to measure the levels of information and communication services in the city, particularly targeting government-led projects. In considering the development of smart cities can yield the most benefit when it makes synergies from the interactions between various stakeholders, the system of smart cities in SIP is required be 'more' interconnected and interactive. As Kim (2013) argues, integration of smart solutions has operational difficulties and requires the changing of existing working process. In this context, the development of evaluation indicators reflecting integrations between diverse parties may facilitate them to work together to make collaborative efforts in the development of smart cities. The certain geographical boundary of the industrial park is also an advantage in this perspective because there are fewer stakeholders and less conflicts comparing with larger administrative areas.

Twelve Indicators of Suzhou's Informationisation		2010 status	2015 targets
Indicator 1	access rate of the administrative system on database platform	60%	90%
Indicator 2	reporting rate of the online open approval enterprises	50%	70%
Indicator 3	visit records of the government websites	3,800,000	10,000,000
Indicator 4	number of WIFI hotspots in public spaces	450	2000
Indicator 5	number of Internet users per thousand residents	950	1500
Indicator 6	average Internet bandwidth	4M	20M
Indicator 7	coverage of the digitalised health records of local residents	0	80%
Indicator 8	percentage of computerised operations in community services	80%	100%
Indicator 9	online rate of government public services	40%	90%
Indicator 10	number of enterprises using cloud-computing platform	1,000	2,000
Indicator 11	number of public service platforms for enterprises	6	10 or above
Indicator 12	number of people receiving ICT-related training courses	10,000	15,000

Table 1: Twelve Indicators of the Suzhou's Informationisation (Source: SIPAC, 2012).

7 CONCLUSION

The development of smart cities in China's industrial parks faces challenges due to the change of economic, political and social environments. It is evident that the smart city development of industrial parks should be closely associated with the process of urban planning practice in its transformations. This research is not an attempt to solve all the problems that smart cities face in practice. It has provided a framework for more

manageable approach in developing the smart city strategy for industrial parks in China. This paper explored the three strategic dimensions of smart cities to investigate how smart cities could be delivered to cope with the transformation process of the industrial parks. The research shows that the smart city strategy should be a part of the transformation plan for the industrial park. The development of smart cities is needed to echo the needs of the local residents and enterprises before and after the transformation of the industrial park. This is especially true in relation to the development of urban infrastructure. Smart cities are also required to reflect local needs from various aspects and involve multiple actors in its value chain. This is because smart cities cannot be isolated from political, economic, environmental and social aspects of urbanisation. As the integration of systems and services is critical in the development of smart cities, a measuring framework on smart service integrations could act as a catalyst to motivate collaborative actions from a wider range of players including those who were not previously involved in traditional practice.

8 ACKNOWLEDGEMENT

The e-mail interviews and questionnaire survey conducted in this research are supported by the SURF 2012 research fund (project code 201218) of Xi'an Jiaotong-Liverpool University, China.

9 REFERENCES

- ARUP: Global Innovators: International Case Studies on Smart Cities. BIS Research Paper 135. London: Department for Business, Innovation and Skills. 2013a.
- ARUP: The Smart City Market: Opportunities for the UK. BIS Research Paper 136. London: Department for Business, Innovation and Skills. 2013b.
- BÉLISSANT, J.: Getting clever about smart cities: new opportunities require new business models, For Vendor Strategy Professionals. Forrester Research Inc. 2010.
- CHINA NATIONAL BUREAU OF STATISTICS: China statistical yearbook. China Statistics Press. 2011.
- TAN, T. H.: 14 investors sign up for Suzhou township. Singapore Straits Times, 15 September, p. 1. 1994.
- DEPARTMENT OF INFORMATION FOR SIPAC: The Extraordinary City, Smart Suzhou Industrial Park. Report on the development of smart cities in SIP. 2013. [online] Available at: <<http://www.cadz.org.cn/Upload/20130827105444562.pdf>> [Accessed 20 February 2014]
- FENG, J.: Seven Thousand Industrial Parks Contribute to China's Pollution Problem. In: Southern Weekly, 1 October, 2011.
- GENG, Y., HAIGHT, M., ZHU, Q.: Empirical analysis of eco-industrial development in China. In: Sustainable Development, Vol. 15, No. 2, pp. 121-133. 2007.
- KIM, J. S.: Making smart cities work in the face of conflicts: lessons from practitioners of South Korea's U-City projects. In: AESOP-ACSP Joint Congress, Dublin, Ireland, 15-19 July. 2013.
- LI, J. L.: A Precisely Designed Smart City. Economic Daily. 17th September. 2013. [online] Available at: <http://stdc.sipac.gov.cn/?do=News_AscxNewsView_MTUwMw> [Accessed 20 February 2014]
- PEREIRA, A. A.: Transnational state entrepreneurship? Assessing Singapore's Suzhou Industrial Park project (1994–2004). In: Asia Pacific Viewpoint, Vol. 48, No. 3, pp. 287–298. 2007.
- SIPAC: 12th Five Year Plan of SIP Informationisation Development, SIP Working and Management Committee, Suzhou Industrial Park Administration Committee, 2012. [online] Available at <http://public.sipac.gov.cn/gkml/gbm/gwgwh/201201/t20120116_184656.htm> [Accessed 24 February 2014]
- SIPAC: SIP Reviews Achievements in 2013. Suzhou Industrial Park Administrative Committee. 2014. [online] Available at: <http://www.sipac.gov.cn/english/categoryreport/AuthoritiesAndPolicies/201402/t20140210_255173.htm> [Accessed 11 February 2014]
- SUZHOU DAILY: Mapping the Digital Life in Smart SIP, Suzhou Daily, 24 June, 2011.
- TUDOR, T., ADAM, E., BATES, M.: Drivers and limitations for the successful development and functioning of EIPs (eco-industrial parks): A literature review. In: Ecological Economics, Vol. 61, No. 2, pp. 199-207. 2007.
- YUAN, Z., BI, J., MORIGUICHI, Y.: The circular economy: A new development strategy in China. In: Journal of Industrial Ecology, Vol. 10, Issue 1-2, pp. 4-8. 2006.
- WANG, M., GU S.: Theory and strategies of smart city development in China. In: China Population resources and Environment, Vol. 22, Issue 5. 2012.
- Z. H. STUDIO: Suzhou Industrial Park: The Smart Path for Intelligent Cities. Business Wire. 2013. [online] Available at: <<http://www.businesswire.com/news/home/20130918005051/en/Suzhou-Industrial-Park-Smart-Path-Intelligent-Cities>> [Accessed 20 February 2014]