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Examining knowledge management factors in the creation of new city

Empirical evidence from Zhengdong New District, Zhengzhou, China

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Abstract

Purpose – This paper seeks to address issues of sustainability in the rapid urbanization in China with examination of knowledge management factors in the creation of new Chinese cities.

Design/methodology/approach – A case study was undertaken at Zhengdong New District along with semi-structured interview mixed with evaluation and content analyses of successful knowledge management factors as the analytical approach.

Findings – This study explores the ongoing revolution of building new cities and towns in China, and highlights the importance of knowledge-based development in achieving sustainable development. Following the establishment of the theory and model of the knowledge city, it explores the features of knowledge city in practice. Focusing on the case study of Zhengdong New District, Zhengzhou, Henan Province, it examines the factors of knowledge management in the creation of the new city. However, it is believed that the strategic development plan was made following the principles of sustainability. Furthermore, it has been accepted that the strategic plan reflexes the framework and sustains various features of the knowledge city, which could be seen as the embryo of knowledge city in China. In the meantime, it has to be recognised that the outcome of the evaluation of Zhengdong New District, which has been discussed in this paper, is merely the audit of what is currently happening in the first phase of the project and reflexes the current issues, and might give impact to the implementation of municipal government strategy in the future.

Originality/value – This paper concludes that, while the local authority is endeavouring to build a physically modern city, it might have overlooked the importance of using knowledge management principles as a tool to promote social, cultural, and environmental sustainability. Yet the analysis in this paper demonstrates that it is not impossible to use knowledge management framework as a tool to assist policy makers governing the creation of a new city in a sustainable way. The discussion in this paper is expected to be thought-provoking in a holistic understanding of the theoretical perspective of knowledge city and further research into this field in the Chinese context.

Keywords China, Sustainable development, Urban areas, Knowledge management

Paper type Research paper

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1. Introduction

The unprecedented economic growth has led to the rapid urbanisation in China, which has in turn resulted in the massive creation of new cities and towns throughout the country. More than 400 new cities and towns have been created since the economic reform began in the early 1980s, and another 400 with populations averaging 600,000 people are planned to be built in the next two decades (Girardet, 2004). Meanwhile, urban expansion has also been an impressive phenomenon over the last two decades (Fan, 1999). This includes the urban sprawl and the so-called "new economic development zones." According to China Association of Development Zones, so far there are 54 national level development zones and 125 provincial ones. In fact, these development zones, which are usually built separately from the existing urban areas, are actually industrial centres or towns, but without statistically independent.

Politically, in response to the needs of social development, the municipalities, who used to be functioned to implement development plans made by central government, have now been given the authority to make decisions in their local development plans, implementation, and management. This together with the fiscal system reform, which allows local governments to share tax revenue resources with central government, has lead to local governments to act as the key players in urban development and in the economy with the objective of promoting GDP increase (Yu, 2006). Consequently, attracting inward investment and seeking the various financial resources, which include land leasing and real estate development projects (Logan, 2002), for urban development and increasing of GDP, have, therefore, been the local governments' priority. Vice versa, investment into urban construction and industrial development zones, which hold a significant share both in budgetary and extra-budgetary expenditures of local governments and improvement of urban infrastructure, for attracting inward investment, have become the most important job that local governments are willing to do. As a result, the country has become a huge construction site, and in turn, the largest consumer of building materials in the world. Without surprise, this, of course, with some other reasons, has led to the negative impact on environmental sustainability.

Nonetheless, in the age of globalisation and the emerging knowledge economy, China has become an important part of the global economy and society. China's urban development should, therefore, be concerned with the global context if it is to develop in a sustainable way. Many western developed cities are now endeavouring to regenerate their cities in accordance with development principles which are both socially and environmentally sustainable (Ovalle *et al.*, 2004). Meanwhile, academic work has made mighty advance in using knowledge management theory at social level, such as the "knowledge based development" approach (Knight, 1995), and the "knowledge city" model (Baqir and Kathawala, 2004; Ergazakis *et al.*, 2004; Garcia, 2004) have been developed. Under such circumstances, it is important to have the awareness that China's urbanisation cannot follow the path taken by either the developed or other developing countries, where negative consequences for the society and environment have been suffered (Pivo, 1996), but that it is crucial that an innovative new pattern has to be developed. Therefore, the research problems of the cuccrent study are:

> How could China manage the process of urbanisation in a more sustainable way? Could knowledge management frameworks be incorporated into the practice of managing the creation of massive new cities and towns during the process of China's urbanisation?

This study explores the ongoing revolution of building new cities and towns in China, and highlights the importance of knowledge-based development in achieving sustainable development. Following the establishment of the theory and model of the knowledge city, it explores the features of knowledge city in practice. Focusing on the case study of Zhengdong New District, Zhengzhou, Henan Province, it examines the factors of knowledge management in the creation of the new city. Firstly, the paper discusses the theoretical issues involving knowledge management at social level development. Secondly, the paper analyses the common characteristics and conceptual framework of China's urban growth. Thirdly, the paper attempts to analysis Zhengdong New District and audit Zhengdoing New District to test how many features of the knowledge city are evident there. And finally, a conclusion is drawn upon the findings.

2. Theoretical perspective related to sustainable urban development

Sustainable development has become one of most concerning issues that human society has to be facing in recent years. Many definitions have been presented among which the most commonly cited one is probably that of the World Commission on Environment and Development (WCED, WCoEad, 1987). Sustainable development is defined as that which "meets the needs of the present without compromising the ability of future generations to meet their own needs." Beatley (1995) argues that it emphasizes on "living within the ecological carrying capacities of the planet, living off the ecological interest, and protecting future generations." On the other hand, in this definition, sustainable development is indeed generally treated in temporal rather than geographical terms and is concerned with inter generation effects. In understanding and analysis of sustainable development, Hagan (2001) claims that there are two main approaches exist, i.e. the rational and the arcadian. While the arcadian approach calls for returning to a pre-industrial or pre-urban lifestyle for living in harmony with nature, the rationalist believes in technological innovation as well as in the logic and economics of modern society as a solution to the current problem of environmental degradation and deteriorating quality of life in many parts of the world (Chi, 2004). This involves expanding the traditional concept of development as to include issues of social and environmental sustainability through the creation of human and social capital. In this case, human capital is a representation of the knowledge, skills and health that embodied in individuals, while social capital is referred to the norms and networks facilitating co-operation either within or between groups (OECD, 2001). In recent years, research indicates that knowledge management has brought these together to make development in a more sustainable way. Laszlo and Laszlo, 2002 point out that knowledge management can make significant contributions for the creation of human and social capital required for evolutionary development. Similarly, Carrillo (2002) claims that knowledge management at social level, which is labelled as knowledge-based development, can collaborate in a multidisciplinary effort to unleash the development potential of individuals, organisations and societies, and promote sustainable development.

2.1 Knowledge based development

The knowledge-based development approach, which was introduced by Knight (1995) for the regeneration of industrial cities both in America and Europe, is concerned

primarily with upgrading human and organisational capacities and creating environments which are conducive to innovation, learning, creativity and change. Development here is defined not only takes account of economic growth but also of all those parameters that reflect quality of life and sustainability within the international context, and therefore, differ significantly from traditional commodity-based activities. Knowledge-based development emphasizes on the so-called "soft factors", software, orgware and amenities, and calls for different strategies. According to Knight (1995), in order to conducive to knowledge-based development, at least ten generic conditions are required as shown in Table I.

The approach was broadened more recently so as to take into account different types of knowledge resources and requirements (OECD, 2001; Laszlo and Laszlo, 2002), and it has become more and more comprehensive and so more widely applicable to different classifications and sizes of cities. Based on these frameworks, many other researchers working from a number of different standpoints have arrived at a very similar concept (Carrillo, 2002; Simmie and Lever, 2002; Baqir and Kathawala, 2004; Ergazakis *et al.*, 2004; Garcia, 2004; Ovalle *et al.*, 2004). That is, the new concept of a "knowledge city" has come to the fore.

2.2 The knowledge city

The concept of knowledge city is a new member of scientific community. Having developed from the practices of knowledge management and knowledge-based development, it has now become a goal that drives urban development towards the direction of sustainability. Literature review revealed that there are various views about what a knowledge city is (SGS Economics and the Eureka Project, 2002; Henley Management College, 2003). However, all appears to be highly depend on the main strategic objectives that such a city has, though, the definition by Ergazakis *et al.* (2004) seems to be believed the most representative one. According to them:

> A knowledge city is a city that aims at a knowledge-based development, by encouraging the continuous creation, sharing, evaluation, renewal, and update of knowledge. This can be achieved through the continuous interaction between its citizens themselves and at the same time between them and other cities' citizens. The citizens' knowledge-sharing culture as well as the city's appropriate design, IT networks and infrastructures support these interactions.

1	Knowledge is defined, perceived, and valued as a form of wealth by the community at large
2	The importance and contribution of knowledge workers is explicitly acknowledged
3	The nature and role of knowledge resources are understood by the general public
4	Knowledge resources are thought of in regional terms and regional linkages among similar and complementary resources are articulated
5	Priority is given to improving the knowledge infrastructure.
6	All members of society have access to careers in knowledge-based activities
7	The city promotes its "centres of excellence"
8	There are incentives and mechanisms which favour investing in locally based knowledge resources and that there are possibilities to invest in the city's future through philanthropic organizations, alumni associations, etc.
9	Scenarios and plans explicitly account for the increasing role of knowledge and immaterial factors and that the civic vision and strategic thinking about the future role of the city is not restricted by present capacities, powers, and administrative boundaries
10	Civic leadership is consciously developed

Table I.
Conditions conducive to knowledge-based development

It has been recognised that this definition presents a broad connotation of the concept, which refers to some or all of the aspects of social, economic, and cultural life of a city. It requires a coherent strategy, which must be derived from the city's strengths, local government's political will, regulatory environment, resources and ability of the population to develop a knowledge-sharing culture, and calls for more participations and interactions from the entire society, i.e. local government, citizens, public sector, private sector, NGO, universities, R&D institutions, etc.

2.3 Success factors in determining a knowledge city

Based on the literature review, a set of criteria in determining a knowledge city are illustrated in Table II. It is important to be aware that knowledge city refers to many different aspects of life in a city, and the process of the development has to be first of all well managed as a whole. Both first and second level factors listed in Table IV are based on these preconditions and are, therefore, subject to additions and changes due to the specific situation such a city is in.

3. The characteristics of China's urban growth since the economic reform

Being functioned as both economic and administrative entities, the growth and distribution of cities in China are shaped not only by market forces such as agglomeration economies, but also ideological commitments, political convictions, managerial considerations, and institutional as well as administrative settings (Lin, 2002). Thus, urban growth in China appears to have its unique characteristics.

3.1 Becoming a city

Under the Chinese political system, establishing a city is required to be officially designated and fiscal committed by the government. Once become a designated city, it is automatically included in state budgetary allocation, and thus receives the privilege to enjoy state capital investment in the urban economy and resources allocated by the government for the development and maintenance of urban facilities (Lin, 2002). It is for this reason, designating new cities or demoting the existing ones are often used as a means for the state to either speed up or slow down the pace of urban development in response to political considerations and economic situations. This has been clearly evidenced by the growth and category changes over the past quarter century as shown in Table III, which has been derived from China Statistics Yearbook.

In general, the change of designated cities during the analytical period of 1978-2003 suggests that the total number of cities has had a rapid surge in which the increase of number of small sized cities[1] has been the decisive factor. This can be seen in the first two administrative resetting periods[2] where both total number of cities and small sized cities have a significant increase. The number of small sized cities increased by 76 from 92 in 1978 to 168 in 1983, accounting for 78 percent of total increase of city numbers in the period, and 164 in 1984 to 393 in 1996, contributed 61 per cent to the total increase. The decline of the number of cities from 1997 was mainly due to the administrative resetting and statistical re-regulation[3] through which many small cities have been merged into mega and large sized cities.

Table II.
Categories of key success factors for knowledge city

Goal	Preconditions	First-level factors	Second-level factors
Knowledge city	The city's human environment facilitates knowledge-based development conditions identified by Knight (1995) (Table III)	Strategic plan	A clear strategic vision, which incorporates and takes into account the entirety of in-depth knowledge concerning the city status
			A set of specific objectives
			A series of measures
			Political will
		Institutional environment	An appropriate legislative framework
			A leadership committed with the sustainable wellbeing of its community
			Appropriate funding of the initiatives are ensured
		Finical capacity	Invest significantly more of income in knowledge infrastructure
			Having high level information and communications technology infrastructure
		Technological infrastructure	Providing the platform for new knowledge-based goods and services
			Citizens are familiar with new technologies
			Making knowledge accessible to citizens, in a systematic, efficient, and effective way
			A high level of education
		Human and cultural environment	High standard of living
			A knowledge-sharing culture
			Fostering intercultural symbiosis

(*continued*)

Goal	Preconditions	First-level factors	Second-level factors
		Social environment	Generating, attracting and retaining highly skilled citizens in different domains
			Private sector and non-government organisations commitment to the strategic plan and their active support to the implementation of projects help towards the goal
			An international network of relationships with leading entities in knowledge-based innovation
		Urban infrastructure	An urban design and architecture that incorporate the new technologies
			Using and exploiting its monumental, architectural and natural heritage as one of its main factors of attractiveness
			Improving capacity to improve and repair the environment, and greater community commitment to pro-environment decision making

Table II.

Table III.
Number of cities in different categories and their percentage, 1978-2003

Year	Total		Over 1 million		0.5-1.0 million		0.2-0.5 million		Less 0.2 million	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
1978	192	100	13	6.80	27	14.10	60	31.20	92	47.90
1979	216	100	16	7.40	27	12.50	67	31.00	106	49.10
1980	223	100	15	6.70	30	13.50	70	31.40	108	48.40
1981	233	100	18	7.70	28	12.00	70	30.10	117	50.20
1982	245	100	19	7.80	29	11.80	70	28.60	127	51.80
1983	289	100	19	6.60	29	10.00	73	25.30	168	58.10
1984	295	100	19	6.40	31	10.50	81	27.50	164	55.60
1985	324	100	21	6.50	31	9.60	94	29.00	178	54.90
1986	353	100	23	6.50	31	8.80	95	26.90	204	57.80
1987	382	100	25	6.50	30	7.90	103	27.00	224	58.60
1988	434	100	28	6.50	30	6.90	110	25.30	266	61.30
1989	450	100	30	6.70	28	6.20	116	25.80	276	61.30
1990	467	100	31	6.60	28	6.00	117	25.10	291	62.30
1991	479	100	31	6.50	30	6.30	121	25.20	297	62.00
1992	517	100	32	6.20	31	6.00	141	27.30	313	60.50
1993	570	100	32	5.60	36	6.30	160	28.10	342	60.00
1994	622	100	32	5.20	41	6.60	175	28.10	374	60.10
1995	640	100	32	5.00	43	6.70	191	29.90	374	58.40
1996	666	100	34	5.10	44	6.60	195	29.30	393	59.00
1997	668	100	34	5.10	47	7.00	205	30.70	382	57.20
1998	668	100	37	5.50	49	7.30	205	30.70	377	56.40
1999	667	100	37	5.50	49	7.30	216	32.40	365	54.70
2000	663	100	40	6.00	53	8.00	218	32.90	352	53.10
2001	662	100	166	25.08	279	42.15	180	27.19	37	5.59
2002	660	100	171	25.91	279	42.27	171	25.91	39	5.91
2003	660	100	174	26.36	274	41.52	172	26.06	40	6.06

3.2 City expansion

As has been mentioned above, the growth of cities can be characterised as the designation of new cities and the expansion of existing ones. The designation of new cities has been the result of the creation of new cities, while the latter can be described by the increase of mega, large and medium sized cities both in the growth of number and the expansion of built-up area in city proper. Table IV presents an overview of the growth of city expansion for the years 1978-2000. Over the 22 years, the structure of cities by size has had a considerable change which characterized by the proportional increase of small cities, and relative decline of large and mega cities. Meanwhile, the built-up area of cities has been more than trebled as shown in Table IV, which has been derived from China Statistics Yearbook.

3.3 Urban population

Urban population has been one of most deceptive definitions in the context of current Chinese political system. Statistically, it includes all populations who live in an urban area more than half a year (NBSC, 2000). Administratively, it refers to those who have been classified as permanent urban residents in accordance with the Chinese Household Registration System (*Hu-kou*). There usually exists a considerable difference between these two definitions of urban population due to the fact that China's control over the Household Registration System has not been completely abolished, becoming an officially classified permanent urban residents are still difficult and costly (Knight *et al.*, 1999). This is especially the case in mega and large sized cities, for instance, Shenzhen has urban population 5.98 million with only 1.65 million permanent urban residents by 2004 (Shenzhen Statistics Bureau, 2004). Majority of settled migrants known as temporary urban residents and all of unsettled migrants – floating population – still remain rural household registration status (Zhang *et al.*, 2002). The differences between classified permanent urban residents and unclassified ones are that the former have access to pension system, unemployment insurance, housing subsidies, health care insurance, and compulsory education, while the latter cannot (Knight and Song, 1999, 2005; Shen *et al.*, 2006). It is for this reason, most of the temporary urban residents and floating population live either in urban rural villages[4] or dormitories provided by their employers (Liu and Liang, 1997).

3.4 Soft infrastructure

In contrast, to the physically urban booming, urban management in many newly developed Chinese cities appears to be of major problems. First, urban management is still following a government-led model in which the importance of public participation has not been acknowledged yet. The public do not have a channel to get involved in the decision-making process (You and Chen, 2004). This gives rooms to the government

	1978	2000	Annual growth (average per cent)
Number of mega cities	13	40	9.44
Number of large cities	27	53	4.38
Number of medium cities	60	218	11.97
Number of small sized cities	92	352	12.85
Built-up area	6,000 km^2	22,439 km^2	13.70

Table IV.
Comparison of number of cities and built-up area, 1978-2000

officials making decision based on being responsible for their line managers. Some officials even use it as a means to enhance their personal ambitions and career performance (Wong *et al.*, in press). Second, due to the lack of public involvement and the limited institutional capacity, strategic plan in urban management in many cities tended to be changed or redirected frequently. As a result, newly developed infrastructures or buildings may soon be demolished. Third, investment in soft infrastructure such as improving neighbourhood services, strengthening management capability, and public education cannot match the investment in hard infrastructure (Zhu and Zhou, 2004). This can be well evidenced by the government web sites, which is characterised as a means of informing the public rather than one of important tools in public problems solving.

Given the unique characteristics listed above, it has been noted that there is a great deal of misunderstanding about the substance of creating sustainable cities in China. However, under today's circumstances, for the benefit of future generations, it is important that any attempts at development have to be accordant with the principles of sustainability. Therefore, a holistic and systematic understanding of the concept of sustainability, principles and approach of sustainable development by urban policy makers as well as the general public is thought to be essential. Based upon the premises, the rest of this paper will focus on a case study of Zhengdong New District, which is believed to be developed in harmonising with sustainable principles. With a thorough examination of various feature of Zhengdoing New District, the selected categories of key success factors for knowledge city presented in the previous section will be used as evaluative criteria to analysis its performance.

4. A case study of Zhengdong New District, China

The explosive urban growth in China took place in a circumstance of globalisation and the emerging knowledge economy, where environmental degradation and deteriorating quality of life in many parts of the world has become the increasingly prominent contemporary issues, and many international organisations (United Nations Development Programme and Natural Resources, 1992; World Bank, 1994; UNDP, 2002) and countries are endeavouring to make development in a more sustainable way. In this respect, the Chinese Government has also decided to make attempts on scientific and harmonious development (CCPC, 2002). Some of the newly developed Chinese city authorities claim that they are managing their development in accordance with the principles of knowledge-based development. Zhengdong New District, has been chosen as the case study because this is not only the typical Chinese experience but also this is the most representative one of many new cities/districts which are under construction.

4.1 The background of Zhengdong New District

Zhengzhou is the provincial capital city of Henan, a province with the largest population of about 100 million and the top fifth GDP entity in China. It is one of the oldest central cities, which has a history of more than 3,600 years. Located in the middle reaches of Yellow River as shown in Figure 1, being an area of both the cradle of the Chinese people and the heart of the culture of China, it has developed as an important city at the intersections of both the country's most important railway and motorway lines; one of which links Beijing from north with Guangzhou and Hong Kong

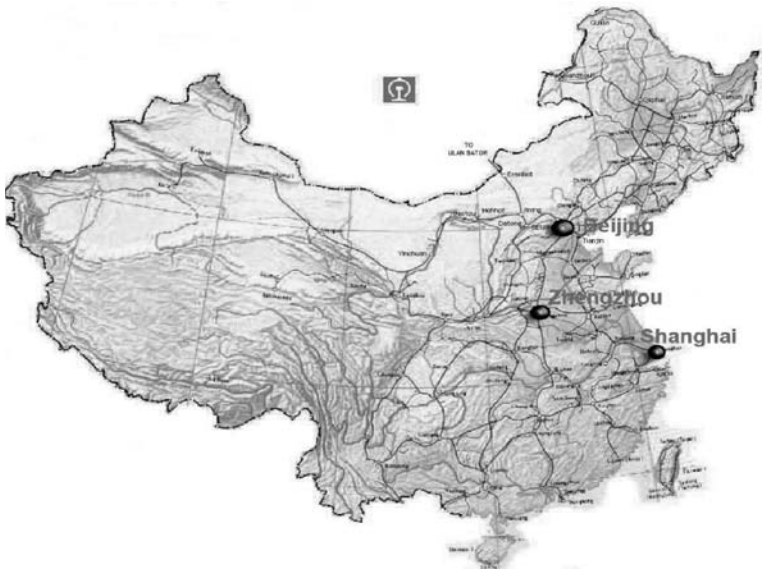

Figure 1.
The location of Zhengzhou in PRC

in the south, and another connects east with west from Shanghai to Urumchi. Having the spatial advantages, the city also has an international airport and the biggest inland international container port in the country. Compared with its spatial and economic position, the size of the city, which currently has central built-up area 147.7 square kilometres, homes about 2 million populations, is obviously unfit for fostering competitive advantages. This, to a certain extent, has given negative impact to the strategic development of the city in the future. In 1997, the State Council granted that Zhengzhou would be developed as the central China's urban agglomeration, financial, commercial, and communication centre in leading the central region to grow up in a much faster pace so that it can develop itself in parallel with coastal regions and take a leading role in strategic significant of Middle and West regions in China. It is for this reason, a new strategic development plan for Zhengzhou was made, and several huge projects around the city were launched thereafter.

4.2 The planning of Zhengdong New District

Under the guidelines of its strategic plan and master plan for the first 20 years of twenty-first century, the built-up area of the city will be expanded to 500 square kilometres with 6 millions of people. The ongoing project of Zhengdong New District, sitting on the eastern site of the present city as shown in Figure 2, is a part of the strategic plan. The new district will develop 150 km^2 built-up area, and is expected to be able to accommodate 1.5 millions of population. It consists of one 3.45 km^2 central business area, a 23 km^2 sub-central business and residential area, a 22 km^2 high-education zone, a 18 km^2 high technology and science park, and a 40 km^2 eco-park includes a 6.08 km^2 artificial lake as shown in Figure 3. These, combined with the existing 50 km^2 Zhengzhou Economic Development Zone and other projects through out the city, will lead the city joining in the top cities in the country.

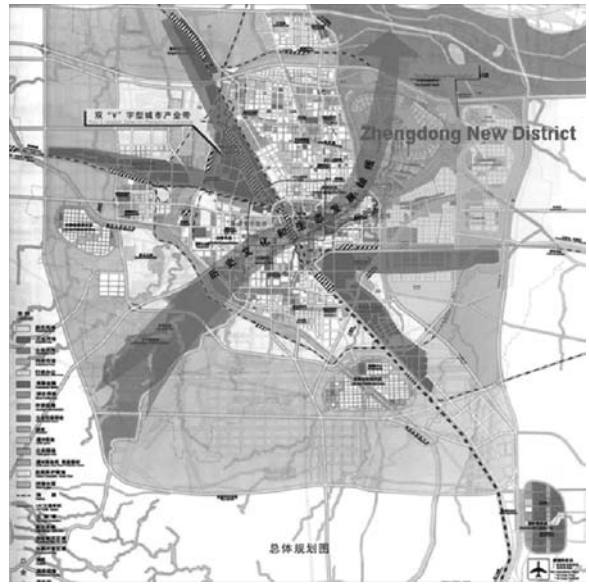

Figure 2.
The location of Zhengdong New District, Zhengzhou, PRC

Figure 3.
The master plan of Zhengdong New District, Zhengzhou, PRC

The municipal government claims that the strategic plan is characterised as being:

- an eco-city, connecting the mountain forests to the south-west with the Yellow River to the north-east, and creating river parks by planting vegetation on the west sides of the 34 rivers to form an eco-corridor network;
- symbiosis with nature, constructing an 800 hectare artificial lake (Dragon Lake) in the north-east part of the new district, and forming a city of water channels by linking it to canals and rivers;
- symbiosis of history with the present, connecting the core of the old city to the new city centre by linear axis, restoring and rejuvenating Chinese urban traditions: the narrow streets (Hutong) and the four-section compounds (Siheyuan);
- a ring city without a centre; and
- metabolic city, a cluster plan consisting of ring roads.

4.3 Urban management

The local authority of the new district is the Zhengdong New District Administrative Committee, which is designated by the Zhengzhou Municipal Government with powers to exercise unified leadership and administration. Urban management actually follows the government-led model in which the local authority is responsible for controlling the entire process of urban affairs. Public participation remains at the initial stage, which is characterised by informing the public rather than collecting opinions for improving urban development policy making. In addition, being at the initial construction stage, the local authority exerts itself in:

- commitment to attract investors;
- commitment to hasten construction of the new district; and
- development of human resources through applying preferential policy to attract new talents.

5. Evaluation and analysis

Owing to the constraint of time, however, a limited number of semi-structured interviews were conducted with decision makers in the urban planning department. Randomly unstructured interviews were carried out in several sampling frames, including state-owned and private sector entrepreneurs, and general citizens, based upon a pre-set protocol to sustain the internal and external validity. By using the key success factors for knowledge city established in the previous section as the criteria as shown in Table II, the practical performance of Zhengdong New District is comparatively analysed. The results are summarized and presented in Table V, which stands self-explanatory with further explanation as follows:

Owing to the fact that the management of developing the new district follows the traditional Chinese management style, the information in terms of facilitating knowledge-based development appears to be fragmental and unintentional. Based on the analysis of the primary data obtained from the government documents and the semi-structured interview, it has been concluded that the preconditions of knowledge-based development have not yet been met in total. However, the strategic development plan granted by the central government has somewhat considered

Table V.
Summary of the evaluation and analysis of Zhengdoing New District

Goal	Preconditions	First-level factors	Second-level factors
Sustainable city	The information in respect of the city's human environment is fragmental and unintentional	Strategic plan	Have a clear strategic vision, which incorporates and takes into account the entirety of in-depth knowledge concerning the city status
			Have a set of specific objectives
			Have set up a series of measures
			Strong political will
		Institutional environment	City management relies basically on the Zhengdong New District Administrative Committee
			Reasonable leadership
		Finical capacity	Unwarranted government funding resources
			Private financial resources are limited
		Technological infrastructure	Have a high level information and communications technology infrastructure
			Very good platform for new knowledge-based goods and services
			Few citizens are familiar with new technologies knowledge has not been made accessible to citizens, in a systematic, efficient, and effective way
			Problems exist in education
		Human and cultural environment	Somewhat dissatisfied quality of life
			Lack of knowledge-sharing culture
			Unfit for fostering intercultural symbiosis
			Made attempt at generating, attracting and retaining highly skilled citizens in different domains
		Social environment	Lack of participation and active support from private sector and non-government organisations
			Weakness on international network of relationships with leading entities in knowledge-based innovation
		Urban infrastructure	Urban design and architecture pursue preciosity
			Not fairly using and exploiting its monumental, architectural and natural heritage as one of its main factors of attractiveness
			Emphasized the importance of repairing the environment, and pro-environment decision making

advantageous and unique features of the city. In terms of institutional environment, it appears that any decision making is still controlled by the Zhengdong New District Administrative Committee. The public are not appropriately consulted with and provided with adequate opportunities to get involved in the decision-making process of urban development policies. Although, progress has been made in encouraging public discussion, it is in fact nominal rather than dynamic. Furthermore, working in partnership with private sectors is confined only to project-oriented *ad hoc* agreements between government and business interests.

5.1 Tough issues

At this stage, unwarranted financial capacity may be the bottleneck and may result in a situation where the creation of the new district has to be interrupted, or shrunk. According to the initially static budgetary estimate, the construction of the new district requires about US$100 billion in total, round US$10 billion per year. The demand of the huge investment seems beyond the city's fiscal capacity, though the local authority has made its priority to attract inward investments through marketing mechanisms, and has received good responses, however, this is not yet sufficient. As a result, some planed facilities and infrastructures such as schools and hospitals have to be deferred to be built.

It has been acknowledged that a good technological infrastructure, such as IT facilities, has been built in the new district, however, this has not been made accessible to all citizens in a systematic, efficient, and effective way due to the fact that, on the one hand, only a small number of citizens are familiar with it and majority of people cannot afford it on the other.

The issue of social and cultural environment is seen as another bottleneck in creating a knowledge-city in Zhengdong New District. Owing to the philosophical notion that it has been always good to keep low profile, therefore, there is the reluctance of sharing knowledge in the traditional Chinese culture. To some extent, knowledge sharing, life-long learning and intercultural symbiosis are extremely infrequent. Furthermore, the majority of rural migrants have no ability to learn technology and knowledge because of their low educational background on the one hand and have no access to urban public education services on the other. Social environment has also been a vital issue in Zhengdong New District. While the local authority has established a series of preferential policies in attracting and retaining external intelligent people, however, educating and training local citizens has been overlooked. In the meantime, the importance of working in partnership with the private sector in urban planning and management has also been neglected, or at least has not received attention from the Zhengdong New District Administrative Committee who plays the role as a leader as well as a direct provider in the provision and delivery of infrastructure and services.

Physical urban infrastructure in Zhengdong New District is being properly built up under the guidelines of urban design. The precautionary approach has been adopted in the urban development as "A general outline for the environmental impact assessment in Zhengdong New District" has been issued by the local authority. It prescribes that any project in the new district must be evaluated in accordance with this outline. However, since the approach has not been compulsory for urban development at the municipal level, the reliability of the assessment is questionable. Moreover, there is no social and cultural impact assessment measures incorporated into the practice.

5.2 The embryo of knowledge city in China

In general, the vision of creating both socially and environmentally dynamic and harmonious new district have not been fully evidenced in the implementation of the strategic plan of Zhengdong New District. However, it has to be acknowledged that a big number of positive results have been achieved owing to the adoption of knowledge management factors. This indicates that it is not impossible to use knowledge management theory to guide the practice of creating new cities and towns in the Chinese context if the principles of sustainability are appropriately attended.

It has to be pointed out that the municipal government never claims that Zhengdong New District is a knowledge city. However, it is believed that the strategic development plan was made following the principles of sustainability. Furthermore, it has been accepted that the strategic plan reflexes the framework and sustain various features of the knowledge city, which could be seen as the embryo of knowledge city in China. In the meantime, it has to be recognised that the outcome of the evaluation of Zhengdong New District, which has been discussed in this paper is merely the audit of what is currently happening in the first phase of the project and reflexes the current issues, which might give impact to the implementation of municipal government strategy in the future. It has been realized that the real picture of Zhengdong New District if the project fits well with knowledge city, will be more appropriately identified when the project completed, which will be the work in the future research.

6. Conclusion

The rapid urbanisation in China has been a key challenge that the Chinese society has to face. However, given the negative consequence of urbanisation for environment elsewhere in the world, it appears that the lesson has not been fully learned by the Chinese practice in the past quarter century but followed in the same path taken by other countries. This has been evidenced by the fact that most Chinese cities are now suffering from all of the usual social and environmental problems that happened in other developing countries during the process of urbanisation. The current management approaches typically used in many Chinese cities are still influenced by the idea of central planning and characterised by inflexibility, inadequate responsiveness and lack of public participation, however, a shift of the existing management approach to incorporating knowledge management framework may provide strategic insights into the process of decision making of the strategy for urban planning. In recent years, knowledge-based development and the practice of creating knowledge city have resulted in many successful stories in transforming an industrial city to a socially, culturally, and environmentally sustainable knowledge city. The case study of Zhengdong New District demonstrates that while the local authority is endeavouring to build a physically modern city, however, it might has overlooked the importance of using knowledge management principles as a tool to promote social, cultural, and environmental sustainability. Yet the analysis in this paper presents that it is not impossible to use knowledge management framework as a tool to assist policy makers governing the creation of new city in a sustainable way. Furthermore, the discussion in this paper is expected to be thought provoking in a holistic understanding of the theoretical perspective of knowledge city and further research into this field in the Chinese context.

Notes

1. According to Chinese definition, cities can be divided into 4 categories, i.e. mega city with population more than 1 million, large sized city with population 0.5-1.0 million, medium sized city with population 0.2-0.5 million, and small size city with population less than 0.2 million.
2. Since 1978, there have been four times of major administrative resetting which took place in 1978, 1984, 1997, and 2001.
3. In 2001, a city's population were re-regulated statistically to include both agricultural and non-agricultural populations within the city's administrative territory.
4. Unlike in western countries, urban rural village in China is a typical rural village surrounded by built-up urban areas, or located in the urban fringe area. The infrastructure is normally poor with even worse living conditions. Most villagers have now lost their farmland, living on housing rents.

References

Baqir, M.N. and Kathawala, Y. (2004), "Ba for knowledge cities: a futuristic technology model", *Journal of Knowledge Management*, Vol. 8, pp. 83-95.

Beatley, T. (1995), "The many meaning of sustainability: introduction to a special issue of Jpl", *Journal of Planning Literature*, Vol. 9, pp. 339-42.

Carrillo, F.J. (2002), "Capital systems: implications for a global knowledge agenda", *Journal of Knowledge Management*, Vol. 6, pp. 379-99.

CCPC (2002), Communique of the 16th Chinese Communist Party Convention.

Chi, N.C. (2004), "A conceptual framework for socio techno-centric approach to sustainable development", *International Journal of Technology Management and Sustainable Development*, Vol. 3, pp. 59-66.

Ergazakis, K., Metaxiotis, K. and Pasrras, J. (2004), "Towards knowledge cities: conceptual analysis and success stories", *Journal of Knowledge Management*, Vol. 8.

Fan, C.C. (1999), "The vertical and horizontal expansions of China's city system", *Urban Geography*, Vol. 20, pp. 493-515.

Garcia, B.C. (2004), "Developing futures: a knowledge-based capital for Manchester", *Journal of Knowledge Management*, Vol. 8, pp. 47-60.

Girardet, H. (2004), *Cities People Planet: Liveable Cities for a Sustainable World*, Wiley-Academy, West Sussex.

Hagan, S. (2001), *Taking Shape: A New Contract between Architecture and Nature*, Architectural Press, Oxford.

Henley Management College (2003), Henley Management College, Henley.

Knight, R.V. (1995), "Knowledge-based development: policy and planning implication for cities", *Urban Studies*, Vol. 32, pp. 225-60.

Knight, J.B. and Song, L. (1999), "The Rural-urban Divide: Economic Disparities and Interactions in China", Oxford University Press, Oxford.

Knight, J.B. and Song, L. (2005), *Towards a Labour Market in China*, Oxford University Press, Oxford.

Knight, J., Song, L. and Jia, H. (1999), "Chinese rural migrants in urban enterprises: three perspectives", *Journal of Development Studies*, Vol. 35, pp. 73-104.

Laszlo, K.C. and Laszlo, A. (2002), "Evolving knowledge for development: the role of knowledge management in a changing world", *Journal of Knowledge Management*, Vol. 6, pp. 400-12.

Lin, G.C.S. (2002), "The growth and structural change of Chinese cities: a contextual and geographic analysis", *Cities*, Vol. 19, pp. 299-316.

Liu, X. and Liang, W. (1997), "Zhejiangcun: social and spatial implications of informal urbanisation on the periphery of Beijing", *Cities*, Vol. 14, pp. 95-108.

Logan, J. (2002), "Three challenges for the Chinese city: globalisation, migration, and market reform", in John, J. (Ed.), *The New Chinese City: Globalisation and Market Reform*, Blackwell Publishers Ltd, Oxford.

NBSC (2000), *The Stipulation on the Division of Urban and Rural Population for the Census 2000*, National Bureau of Statistics of China, Beijing, 05.

OECD (2001), *The Well-being of Nations: The Role of Human and Social Capital*, OECD, Paris.

Ovalle, M.d.R.G., Marquez, J.A.A. and Salomon, S.D.M. (2004), "A compilation of resources on knowledge cities and knowledge-based development", *Journal of Knowledge Management*, Vol. 8, pp. 107-27.

Pivo, G. (1996), "Toward sustainable urbanization on mainstreet cascadia", *Cities*, Vol. 13, pp. 339-54.

SGS Economics and the Eureka Project (2002), "Towards a knowledge city strategy", Technical Report, Melbourne City Council, Melbourne.

Shenzhen Statistics Bureau (2004), *Statistics Yearbook*, Shenzhen Statistics Bureau, Shenzhen, available at: www.sztj.com/pub/sztjpublic/tjsj/tjnb/default.html (accessed 17 March 2006).

Shen, J., Feng, Z. and Wong, K-Y. (2006), "Dual-track urbanisation in a transitional economy: the case of Pearl River delta in South China", *Habitat International*, Vol. 30, pp. 690-705.

Simmie, J. and Lever, W.F. (2002), "Introduction: the knowledge-based city", *Urban Studies*, Vol. 39, pp. 855-7.

UNDP (2002), *Developing Capacity through Technical Cooperation: Country Experiences*, Overseas Development Institute, London.

United Nations Development Programme and Natural Resources (1992), *UNDP's Handbook and Guidelines for Environmental Management and Sustainable Development*, UNDP, New York, NY.

WCED, WCoEad (1987), *Our Common Future*, Oxford University Press, Oxford.

World Bank (1994), *Making Development Sustainable: The World Bank Group and the Environment, Fiscal 1994*, World Bank, Washington, DC.

You, J.X. and Chen, Q. (2004), "Urban management pattern oriented by public satisfaction, (in Chinese)", *Journal of Public Management*, Vol. 1, pp. 51-7.

Yu, L. (2006), "Chinese urban planning in transition: market economy and its way forward", *GBER*, Vol. 5, pp. 21-38.

Zhang, L., Huang, J. and Rozelle, S. (2002), "Employment, emerging labor market, and the role of education in rural China", *China Economic Review*, Vol. 13, pp. 313-28.

Zhu, D.J. and Zhou, J.L. (2004), "Study on the Shanghai world exposition and innovative ways to improve Shanghai's urban management in its new round development (in Chinese)", *Tongji University Journal (Social Science Section)*, Vol. 15, pp. 1-5.

Further reading

Chang, K.S. (1994), "Chinese urbanization and development before and after economic reform: a comparative reappraisal", *World Development*, Vol. 22, pp. 601-13.

Fei, X. (1984), "The development of small towns and its social implication in China", *Outlook Weekly*, pp. 17-25.

Fei, X. (1985), *Four Points on Chinese Towns (in Chinese)*, Xinhua Press, Beijing.

Fei, X. (1986a), *The Discussion of Township*, Tianjin People's Press, Tianjin.

Fei, X. (1986b), "Small towns in changing countryside", Beijing Review Press, Beijing.

Fei, X. (1989), *The Study on Rural-Urban Development: The Relationship between Rural and Urban, and Small Town Development*, Hunan People's Press, Changsha.

Fei, X. (2000), *The Discussion of Small Town Development*, Qunyan Press, Beijing.

Lynch, K. (2005), *Rural – Urban Interaction in the Developing World*, Routledge, Oxon.

NBSC (2004), *China Statistic Yearbook – 2004*, China Statistic Press, Beijing, available at: www.stats.gov.cn (accessed 30 May 2005).

Song, S. and Zhang, K.H. (2002), "Urbanisation and city size distribution in China", *Urban Studies*, Vol. 39, pp. 2317-27.

Wong, S.W., Tang, B.S. and Horen, B.v. (n.d.), "Strategic urban management in China: a case study of Guangzhou development distract", *Habitat International*(in press).

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