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Evaluation of plan implementation in the transitional China: A case of Guangzhou city master plan

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ABSTRACT

Evaluation of plan implementation is very complex, and empirical study is scarce due to the methodological difficulties. Over the last two decades, there has been a great deal of urban planning activities and rapid city development in China, but there is a lack of evaluation of plan implementation. This research aims to help bridge this gap, and it explores to what extent a plan has been implemented and what factors have affected plan implementation, taking the Guangzhou city master plan as a case study. It adopts the grid overlay method and compares the land use plan and actual land use to obtain the result of accordance, deviation and unfulfilment. The discrepancy between the land use plan and actual land development is examined based on both land use type and the spatial planning management unit. By analyzing several cases at the site development control plan level, this paper explores why the land development is not consistent with the land use plan.

Introduction

Failure to implement plans has long been considered a significant barrier to effective planning (Berke et al., 2006). Calkins (1979) names the lack of plan implementation as "new plan syndrome": Plans are continuously redone or updated without regard to the implementation status of the originally prepared plan. The lack of an understanding of the degree to which plans are implemented and of the determinants of effective implementation has hindered planners from making better plans.

Evaluation of plan implementation is very complex. First, the methodological issues have to be considered. Plans are made to guide the future physical development of cities. However, objectives such as the social, economic and ecological development of a city are difficult to measure quantitatively. Second, the question of what type of plan should be implemented remains controversial. In other words, is the degree to which a plan is implemented related to its quality (Laurian et al., 2004a, 2004b)? Third, the timing for the measurement of the impacts of a plan is important, since the long term impact may not materialize for many years. Also, in what forms can plan implementation be evaluated? Should the evaluation focus on the physical plans of communities (traditional core of urban planning) or object-oriented plans? Last but not least, planners are not omnipotent and cannot control market forces or demand for land. Thus, many of the factors that influence implementation are outside of the planner's control (Altshuler, 1966). All of these factors have made the evaluation standard of a plan ambiguous and consensus difficult to achieve.

In the fast-growing cities, the evaluation of plan implementation is even more difficult. Substantial flexibility in planning is needed to accommodate rapidly changing urban landscapes, and the frequent adjustment of plans makes the evaluation hard to proceed. The rapidly changing urban situation, the unique trajectory of urban development, and the backdrop of globalization have opened an arena for Chinese planners to apply various urban planning theories and test their effects. On the one hand, plans have proved to be a vital instrument of urban policy and a catalyst for urban change. Physical plans put forth graphic images of the future that can rally stakeholders to act (Neuman, 1998). On the other hand, due to the lack of financial and political considerations, traditional physical planning was not adequate to cope with the rapid development of a transitional economy, and the lack of *ex post* evaluation of physical plans has cost Chinese planners many opportunities to improve and reform traditional planning in China.

In the last decade there has been burgeoning literature on changes in the traditional urban planning approach of China (World Bank, 1993; Wu, 2002; Xu and Ng, 1998; Zhu, 2000). However, there have been few publications addressing the evaluation of plan implementation. In order to help bridge this gap, this research focuses on the following factors, taking the Guangzhou city master plan as a case study:

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(1) To what extent have plans been implemented in Chinese cities.
(2) Which factors affect plan implementation in the fast-growing Chinese cities.

Following this introduction, the second section of the paper discusses the literature related to plan implementation. The third section examines the urban planning framework in China, and the following section presents an empirical evaluation of the implementation of Guanzhou city master plan. This paper concludes with a summary and recommendations for future research.

A review of literature on evaluation of plan implementation

While there is a large body of research on the evaluation of policy implementation, there has been a curious lack of parallel inquiry into evaluation in the planning field (Talen, 1996a, 1996b). Although some work has attempted to link policy-implementation theory to planning practice, planners have not yet developed an equivalent ability to link plans and plan implementation practices to subsequent impacts (Berke et al., 2006). Given the lack of methods to empirically evaluate plan implementation, many plans are impressionistically rather than empirically assessed (Laurian et al., 2004a, 2004b). As a consequence, planners know very little about the effects of a specific plan on the city development process. Although measuring the effect of plans on urban development is a formidable empirical challenge, and differences between local institutions and across metropolitan areas make it difficult to compare the planning implementation outcomes, a fuller understanding of the relationship between plans and their outcomes should help policy makers both to better understand the likely impacts of plans and to tailor them to achieve desired outcomes (Adams et al., 2005).

Modelling the effects of planning has been relatively little researched, partly because their quantification is very difficult. Silver and Goode (1990) and McGough and Tsoloacos (1994) adopted macroeconomic models to analyse national or regional data, but planning variables are absent. Recently, Bramley and Leishman (2005) adopted panel data to explore the impact of national and regional policies on local housing market, and Henneberry et al. (2005) used the cross-sectional data to estimate the impact of planning on commercial property markets in England. US studies usually employ hedonic pricing model to examine the effects of zoning and growth controls (Kline and Alig, 1999; Podogzinski and Sass, 1991).

There are usually two types of evaluation approaches to assess the implementation of plans: non-quantitative and quantitative methods. The non-quantitative method is frequently used; however, the evaluation criteria can be subjective and depend on the understanding of the evaluator of planning objectives, process and outcomes. Alexander and Flaudi (1989) developed a model, plan/programme-implementation-process (PPIP), and gave five criteria for comprehensive evaluation: conformity, rational process, optimality *ex ante*, optimality *ex post*, and utilisation. Moreover, a proposed framework, including a serious of evaluation questions, was provided to avoid the extremes of policy and plan evaluation implied in the traditional model with its standard of conformity and the 'decision-centred' model with its standard of utilisation. However, no empirical studies were provided for this type of evaluation. Innes and Booher (1999) proposed consensus building as a new framework of evaluating collaborative planning, and provide a series of process criteria and outcome criteria as principles of evaluation. While assessing the role of Atlanta regional development plans in guiding local development policies, Waldner (2008) compared regional and local policies to check if regional plans have influenced local comprehensive plans.

The quantitative approach is seldom applied due to methodological and data difficulties. Nevertheless, it has proven to provide solid support for the assessment of the role of plan in implementation. Since the late 1970s, several categories of quantitative approaches have been developed with the advancing computer technology. For example, Alterman and Hill (1978) used grid overlays to quantify "accordance and deviations" between land use plans and actual land use. Regression analysis was used to test the explanatory strength of political and other factors that could

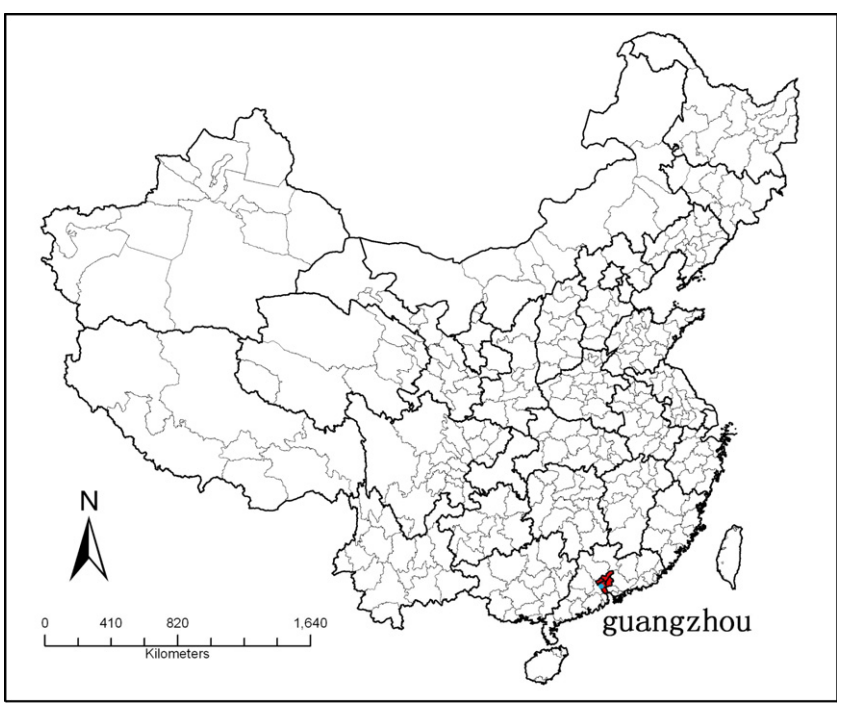

Fig. 1. The location of Guangzhou in China.

Table 1
City expansion of Guangzhou since 1980.

Year	1980	2000	2004
Built-up area (km2)	136	298	350.8
Population (Million)	5	9.9	10.2

Source: Guangzhou urban planning bureau.

affect implementation. Calkins (1979) applied a "planning monitor" to measure the extent to which the goals and objectives of the plan were met and to explain any differences between planned and actual change. This was accomplished using various ratios that produce effectiveness measures, such as the ratio between actual occurrence and anticipated occurrence as a measure of forecasting effectiveness. Calkins (1979) also included an effectiveness measure of spatial objectives in which planned and actual inventory values for a number of sub regions were calculated. Using bivariate statistical measures, the differences between planned and actual spatial distributions were quantified. Unfortunately, no empirical results obtained from this method have been reported in the planning literature. The more recent approach of plan evaluation demonstrated by Berke et al. (2006) represented another attempt to assess plan implementation. Berke et al. (2006) used a sample of plans, permits, and district-council planning agencies in New Zealand, and examined two conceptions of success in plan implementation (conformance and performance), the effects of the implementation practices of planning agencies, and the capacity of agencies and permit applicants to bring about success.

While evaluating the plan implementation, we have to address a key question: is a plan with high implementation conformance a good one? Another key point is that, if implementation is defined and measured in terms of conformance, plans and planners have an important influence on implementation success. Alexander and Flaudi (1989) argued that plans not implemented do not always indicate failure, and on the other hand, plans do not cease to be a criterion of success. They hold the middle ground where implementation is still important but where, as long as outcomes are beneficial, departures from plans are viewed with equanimity. Talen (1997) argues that success in planning depends on successful procedures, plans and policies (whether or not implemented). She proposes a conformance-based evaluation to compare outcomes with plan intentions, and puts forward six investigatory steps as an analytical process to evaluate plan implementation. Waldner (2008) states that a plan has multi-functions. For example, a plan can provide a basis for policy making and communication, reduce uncertainty, etc. Thus, it is logical to examine how well plans have influenced policies, rather than conformance *per se*.

Identifying the factors affecting implementation is as important as plan implementation. Laurian et al. (2004a, 2004b) categorize

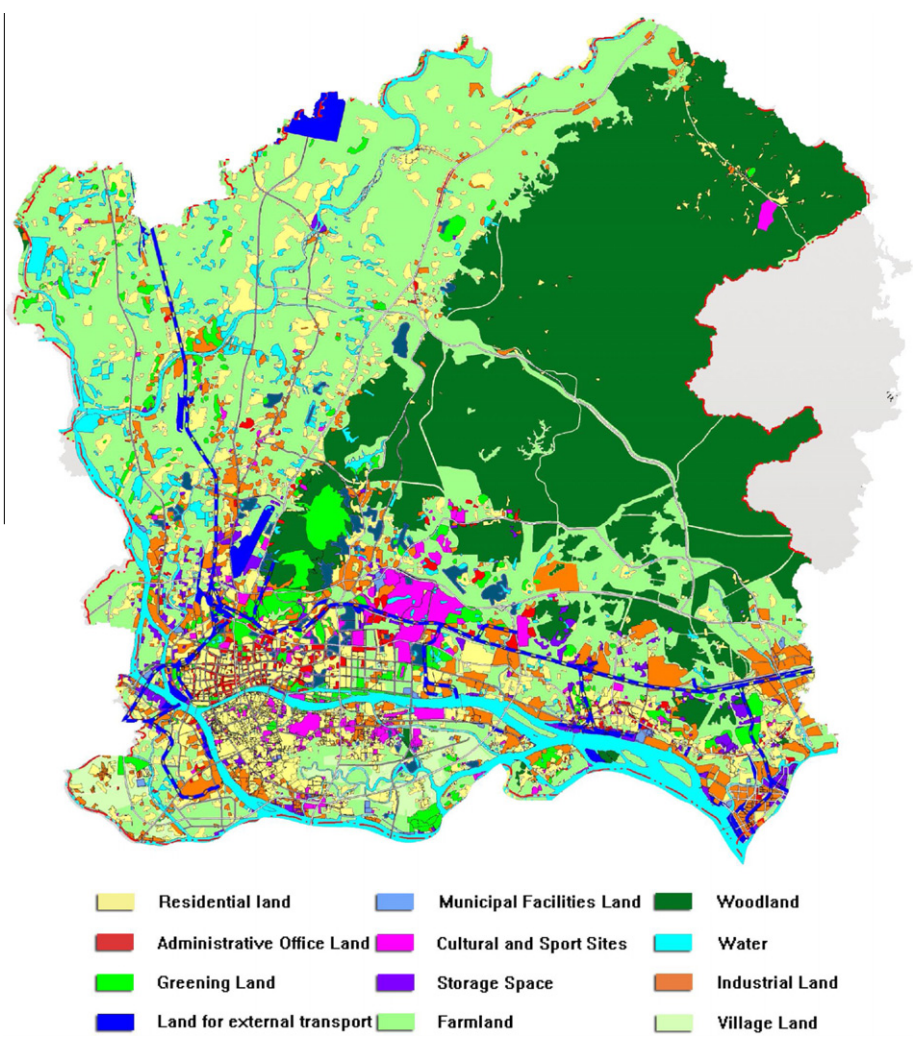

Fig. 2. 2001 Present Land Use of Guangzhou.

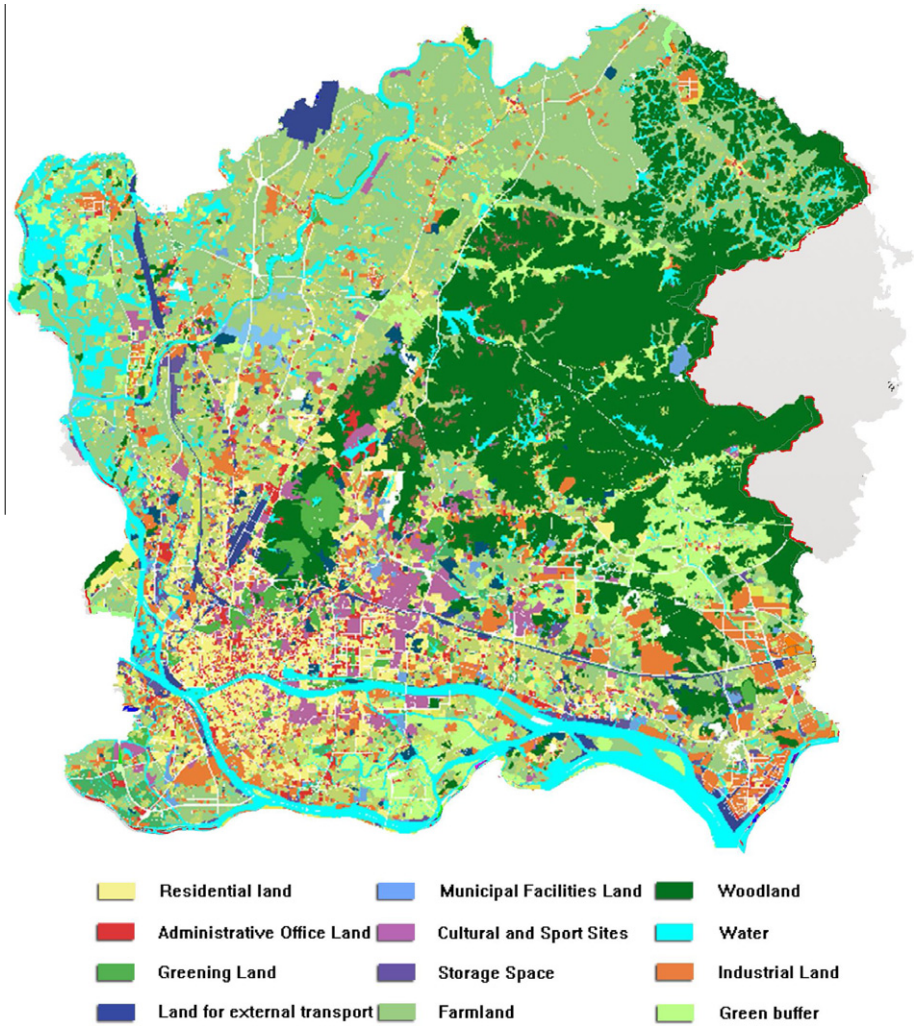

Fig. 3. 2007 Present Land Use of Guangzhou.

the factors of plan implementation into two types: internal factors to the plan (e.g. its quality) and external factors to the plan (e.g. the characteristics of the planning agency and of local developers). Key factors of implementation are: the quality of the plan; the capacity and commitment of land developers to implement plans; the capacity and commitment of the staff and leadership of planning agencies to implement plans; and the interactions between developers and agencies. Therefore, while analyzing the effects of a plan, we cannot simply conclude that a plan with high level of implementation is a good one. Only the combination of quantitative and qualitative analyses can help achieve better understanding of the role of plan in city development.

The research on plan implementation is very rare in China, partly due to the complex nature of the Chinese urban planning system. Among the few studies, Sun and Deng (1997) conducted a survey on development proposals approved in Shanghai city from 1980 to 1990, and compared the conformance and deviation between plans and actual development (approved development proposal). They found that the approved plan only partly guided the city development, and broad economic, social and political contexts have affected the plan implementation. Thus it is unfair to attribute the plan implementation failure to planners. Pu (2005) uses grid overlay to quantify "accordances and deviations" between the master plan of Tianjin city (the 1995 plan and 2002 land us) and actual land use in 2002 and finds that the implementation of the 1995 city master plan is not optimistic. He then conducted a questionnaire to identify various factors related to plan implementation. He found that the pursuit of economic interests is one of major factors leading to plan violation. Their research, however, has not established the analytical framework between plan implementation and factors affecting implementation.

Urban planning framework in China

Since the economic reform, China has adopted a distinctive form of state-led growth. According to Oi (1996) and Zhu (1999), the core of the growth is that local governments have played a unique role in economic growth, acting as both regulators and advocates of local enterprise growth. With the establishment of a Land Use Rights (LURs) system in 1988, a land market has been established, which has triggered more economic growth in China. Under the LURs system, as the owner of all urban land, the state has substantial control over land supply and land use (Tian and Ma, 2009). With the rapid, large-scale city construction, local government needs to enhance its control over urban development, guide and regulate urban construction. Local plans thus become a major tool to serve this purpose. In reality, the nature of a plan is top-down, and public participation is absent in the making and implementation of plans.

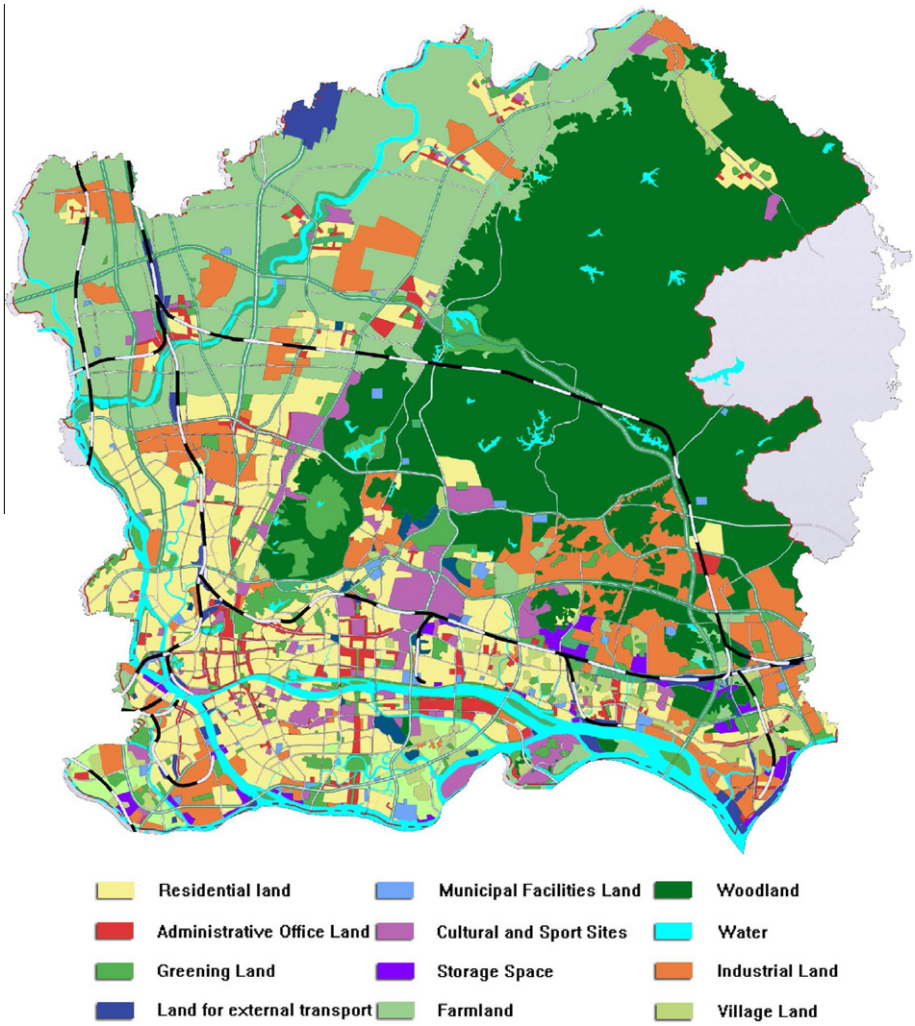

Fig. 4. 2001 Land Use Plan of Guangzhou. *Source*: Guangzhou urban planning bureau.

In order to guide and control urban development, the City Planning Act was promulgated in 1990, which introduced a two-tier planning system to China: city master plan and site development control plan. Moreover, medium and large size cities must prepare district plans between the master plan and site development control plan.

City master plan

A city master plan is prepared by the planning department, which forecasts the size of city built-up area and population over the next 20 years, designates areas for various types of land uses, such as residential, commercial, industrial, and farmland within the city planning boundary designated by the municipal government, and arranges trunk infrastructure and citywide social amenities. A city master plan includes many subject plans, such as the housing plan, the industry plan, and the transportation plan. The city master plan is made of two types of contents. One is the compulsory part (e.g., basic farmland, wetland, and historical area whose development should be strictly controlled). The other is the non-compulsory part (e.g., the residential area might be changed into other uses according to the market situation changes). Theoretically, the deviation from the compulsory part will incur legal punishment, and the deviation from the non-compulsory part is allowed after required procedures.

Table 2
Overlay results of the 2001 LUP and 2007 PLU.

Land use type	Type of unfulfilment (%)	Type of accordance (%)	Type of deviation (%)
Residential land	18.6	31.5	49.9
Commercial and office	23.9	19.7	56.4
Land for public facilities	13.5	43.7	42.8
Industrial land	22.0	30.7	47.3
Land for open space	0.7	88.4	10.9

The implementation mechanism of a city master plan is related to government capability and market situations. The location of public facilities, such as roads, parks, schools and theatres, usually refers to the city master plan. However, their construction depends on the financial capability of the local government. For those facilities decided by market choices, such as residential, commercial and office areas, a city master plan usually designates their location, but in practice, the economy operates with few constraints imposed by city master plans. The residential areas might be changed into industrial areas, and the office areas may be changed into residential areas to accommodate new investments. This is allowed in the implementation of a city master plan after required procedures. There are also some situations where the compulsory

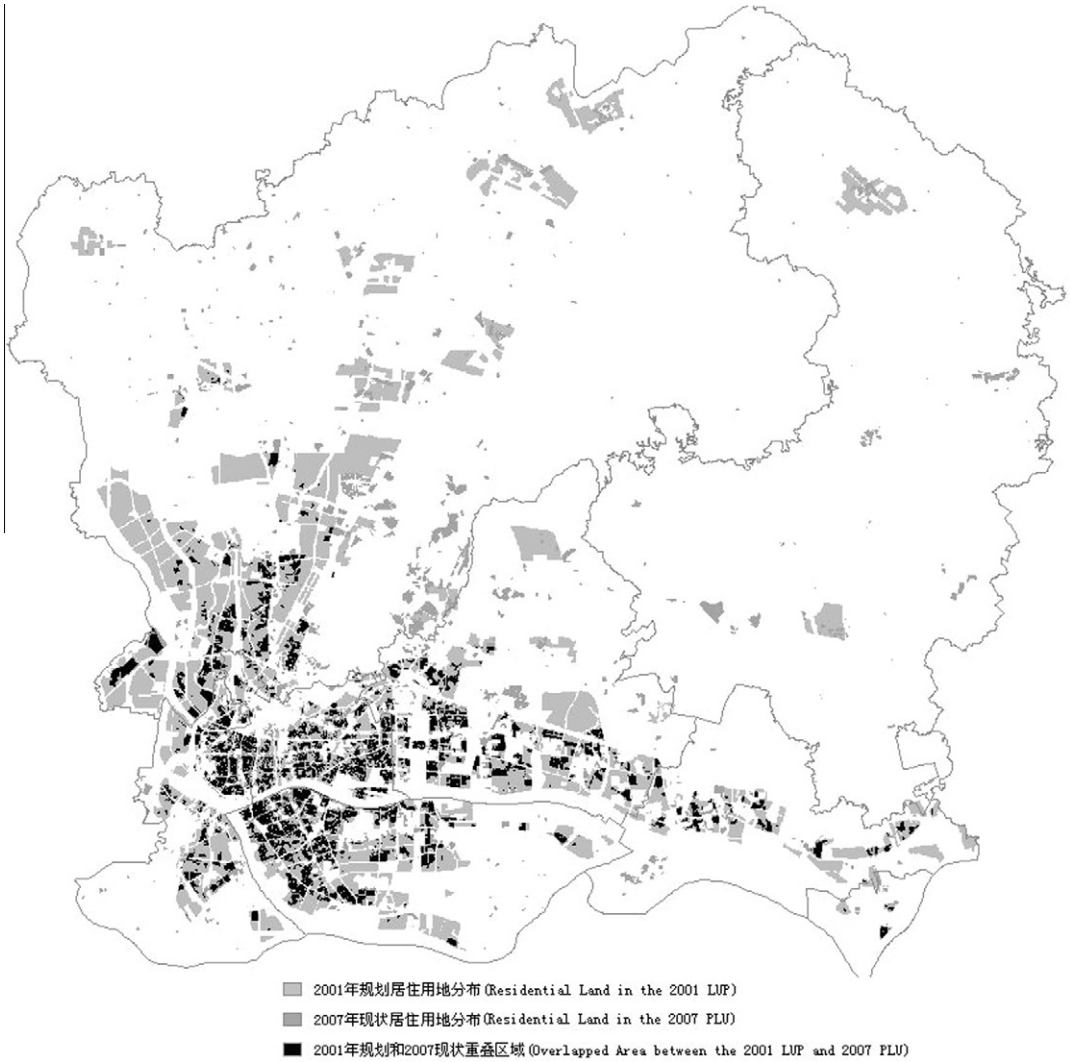

Fig. 5. Overlay result of residential land.

part of a city master plan is violated, for instance, the open space designated in the master plan is eroded by construction.

A city master plan has a significant impact on the real estate market particularly because the arrangement of infrastructure facilities can change land values of certain areas. The formulation of a city master plan, however, is very physically orientated, and seldom takes social and financial factors into account. According to the survey of the World Bank on city master plans of several Chinese cities (1993: p. 98), "...new or amended master plans prove only that the Design Institutes in charge, reporting to the local Urban Planning Bureaux, continue to be dominated by architect-planners with little access to 'feedback' based on systematic monitoring of relevant small-area demographic and economic indicators, and these agencies still show little apparent concern about the economic cost or consequences of the actions outlined in the plans..." Moreover, the examination and approval of a city master plan sometimes take nearly a decade.[1] When the plan is approved, it is almost a one-decade-old legally binding document and not adaptable to current land use and density issues. The existing master plan has no phasing related to the implementation of its policies, and it is more like a physical design instead of a comprehensive plan.

[1] According to the 1990 City Planning Act, the master plans of all provincial capital cities and cities with more than one million of population have to be approved by the city, provincial congresses and State Council.

Site development control plan

Theoretically, the approved city master plan and district plan set up the framework of site development plan. Site development control plan is prepared by either the municipal or district government, and its framework borrows some ideas from the American zoning system, but the difference is that it is not a statutory plan. Site development control plan mainly identifies eight planning parameters plot by plot:

(1) Permitted land use type.
(2) Maximum floor area ratio.
(3) Maximum building height.
(4) Maximum lot coverage ratio (footprint area divided by the lot size).
(5) Minimum open space ratio.
(6) The location of the entrance.
(7) Minimum car parking standard.
(8) Public facilities contribution.

Site development control plan is essential in defining development rights of a piece of land, and therefore forms the basis of planning management. The planning parameters stipulated by site development control plans are attached to the Land Use Planning Permit. Among these parameters, permitted land use

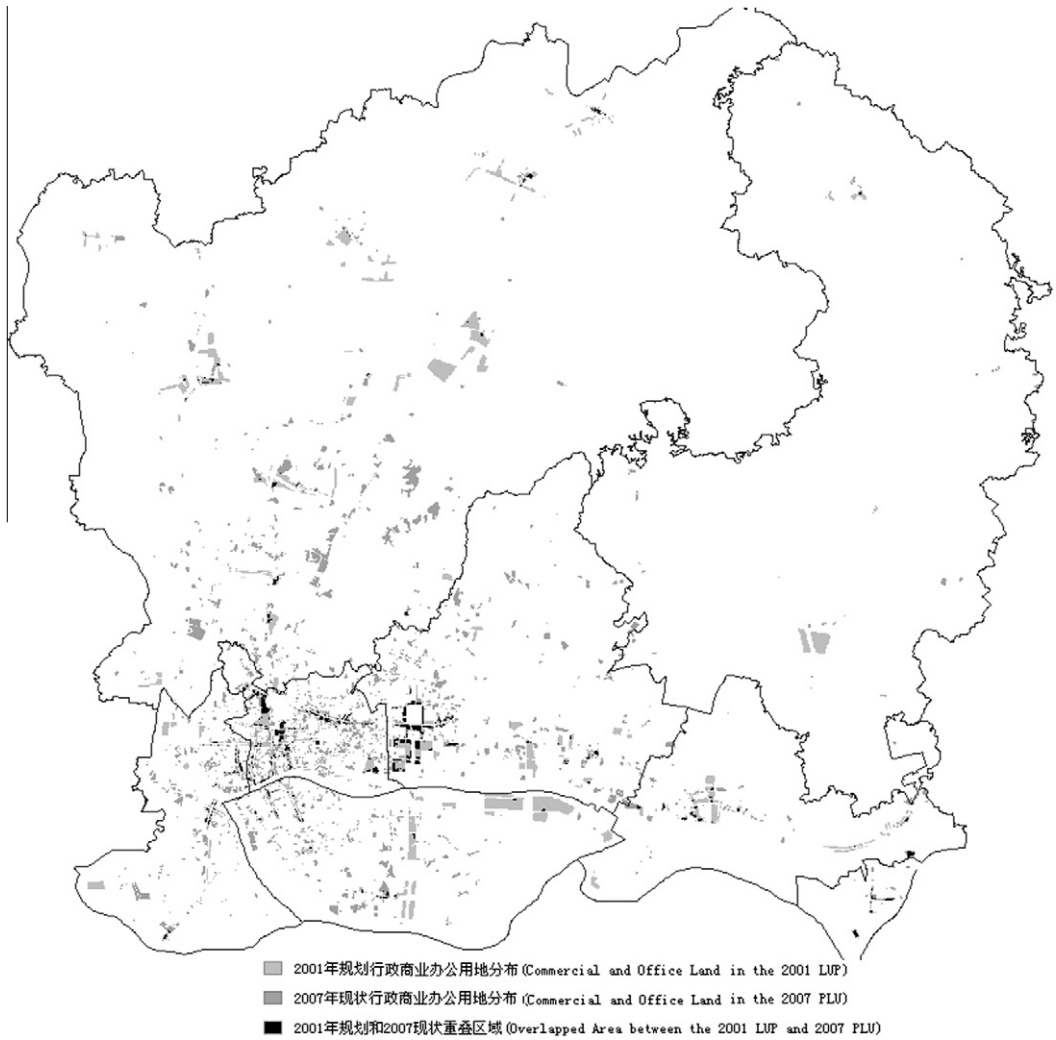

Fig. 6. Overlay result of commercial and office land.

type and plot ratio are the most important factors in determining land value.

In Guangzhou, an urban planning bureau is in charge of making site development control plan. It divides the whole urban area into many different "planning management units" (PMU) according to the road layout and administrative boundary of grassroots. The area of PMU ranges from 0.2 to 0.5 km^2 in the old city area and 0.8–1.5 km^2 in the new development area of the city. Site development control plan has to go through the review procedure organized by the municipal government.

Similar to the discretionary planning system of the UK, planning control is not regulatory in China. The land use plan does not guarantee the application consistent with the plan to be approved automatically. In reality, physical and environmental amenity factors remain the key criteria for planning decision-making, and social and economic effects have only been given intuitive considerations, rather than systematic analysis. The approved site development control plan can be a guideline for planning parameters decisions of a specific piece of land, but not always. The decision of planning parameters is subject to wide discretion of planning officers. The developer frequently bargains with the planning officer to obtain favourable planning parameters, usually for higher density, more floor space or less public facilities contribution. All decisions are made behind closed doors; therefore decision-making of development control is basically a black-box process. With the lack of internalizing the externalities due to planning parameter changes, this planning control system has invited rent seeking and caused some uncertainty in the land market (Zhu, 2005). According to the interview with planning officials in Guangzhou city, from 1997 to 2004, unauthorized space numbered 8.19% of total completed floor space.

Evaluation of plan implementation in the transitional China: a case of Guangzhou city master plan

Guangzhou is selected as a case study based on the following reasons:

(1) Guangzhou is the centre of the Pearl River Delta, one of the most prosperous economic zones in China (Fig. 1), and it has the third biggest urban economy in China. Its plan implementation scheme is typical in developed regions of China.
(2) It is one of the fastest growing cities, where deviation from plan might be more frequent since the prediction of future development becomes more difficult in the fast-growing cities than slow growing cities.
(3) Compared with other cities, the land use database of Guangzhou is more systematically recorded. The availability of data is also a key reason why it is selected as a case.

Guangzhou stretches over 7434 square kilometers and population reached 10 million in 2004. Guangzhou has been growing very

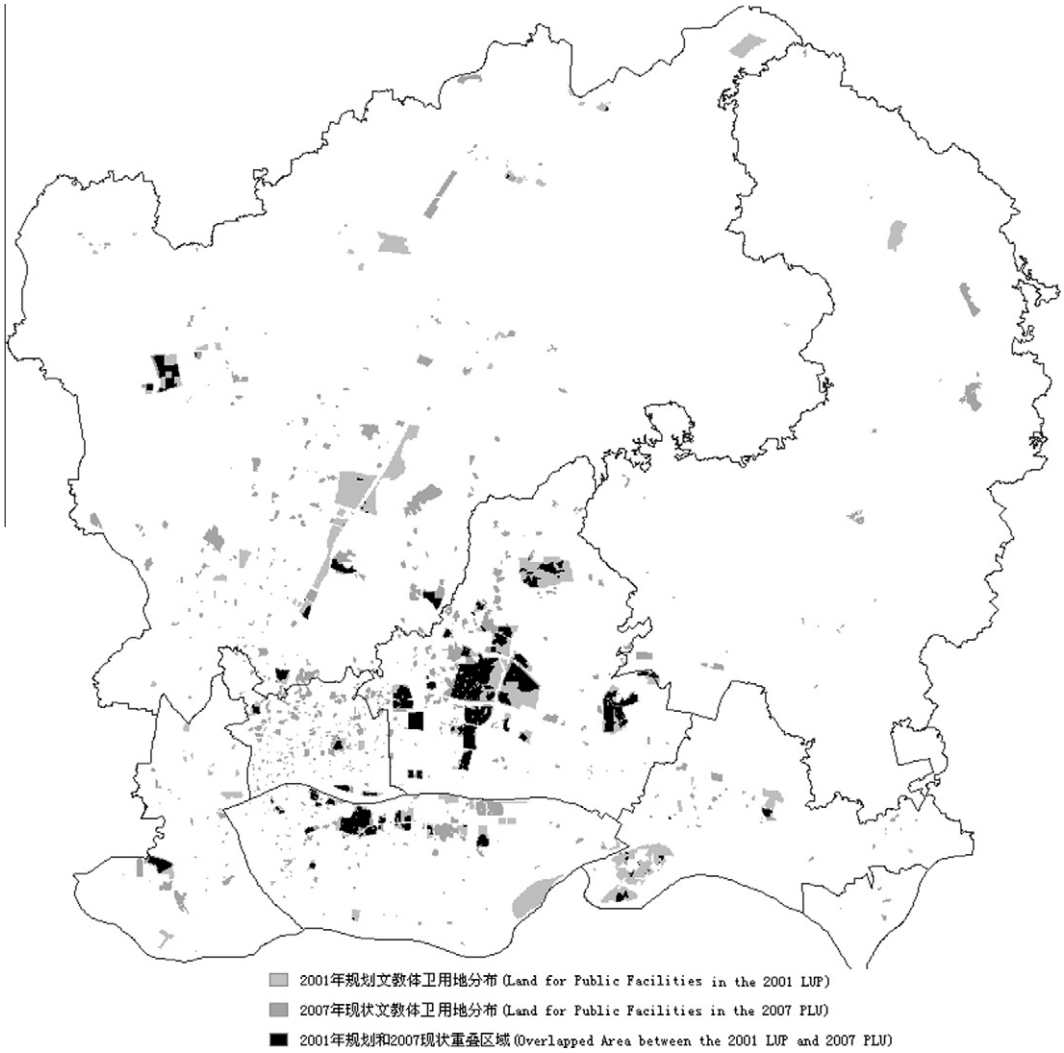

Fig. 7. Overlay result of land for public facilities.

fast since the economic reform, in terms of both economic performance and built-up area. From 1980 to 2004, the average annual GDP growth rate reached 14.2% and the central built-up area more than doubled (Table 1).

Research area

Since 1954, the Guangzhou Municipal Government has been making master plans, and master plan has been amended periodically to accommodate changes of city development. However, before the 1990s, the computer technology was not developed enough to support the plan-making in China, and all maps were drawn by hand. Constrained by the unavailability of precise data of the earlier editions of city master plan, this research selects the most recent edition, 2001 master plan of Guangzhou city, as a case study and examines to what extent the plan has been implemented. The 2001 master plan was made to forecast the city growth until 2010, and guides the construction of infrastructures and arrangement of land use. Moreover, a city master plan has multiple objectives, such as population distribution, housing provision, industry development, and its implementation involves many aspects and requires substantive research. In this paper, our research will focus on the material side of land use comparison.

The research area includes the seven districts of Guangzhou city: Baiyun, Luogang, Yuexiu, Liwan, Tianhe, Haizhu and Huangpu. Yuexiu district and Liwan district are the historic city center, and Tianhe district is the new city center. Haizhu district is located in the southern section of the city, and Baiyun district and Huangpu district are the periphery areas of the city, located in the north and east edges of the city, respectively. Luogang's main function is to develop the manufacturing and hi-tech industries.

Research methods

Land use is the core of city master plan, and this research focuses on the implementation of land use plan. Maps of the 2001 Present Land Use (PLU), the 2001 Land Use Plan (LUP), and the 2007 Present Land Use (PLU), are compared to examine the level of conformance between land use plans and actual land use (Figs. 2–4).

In China, the land use plan at the master plan level involves more than 15 types of land use, and the evaluation of our plan implementation focuses on five major types of land use: residential, commercial and office, public facilities, industrial and open space, which are critical for city development and environment quality.

For every type of land use, three indices are defined:

Type of accordance

The plan is implemented if 2007 PLU is consistent with the 2001 LUP, and this is named as "accordance". The plan is not

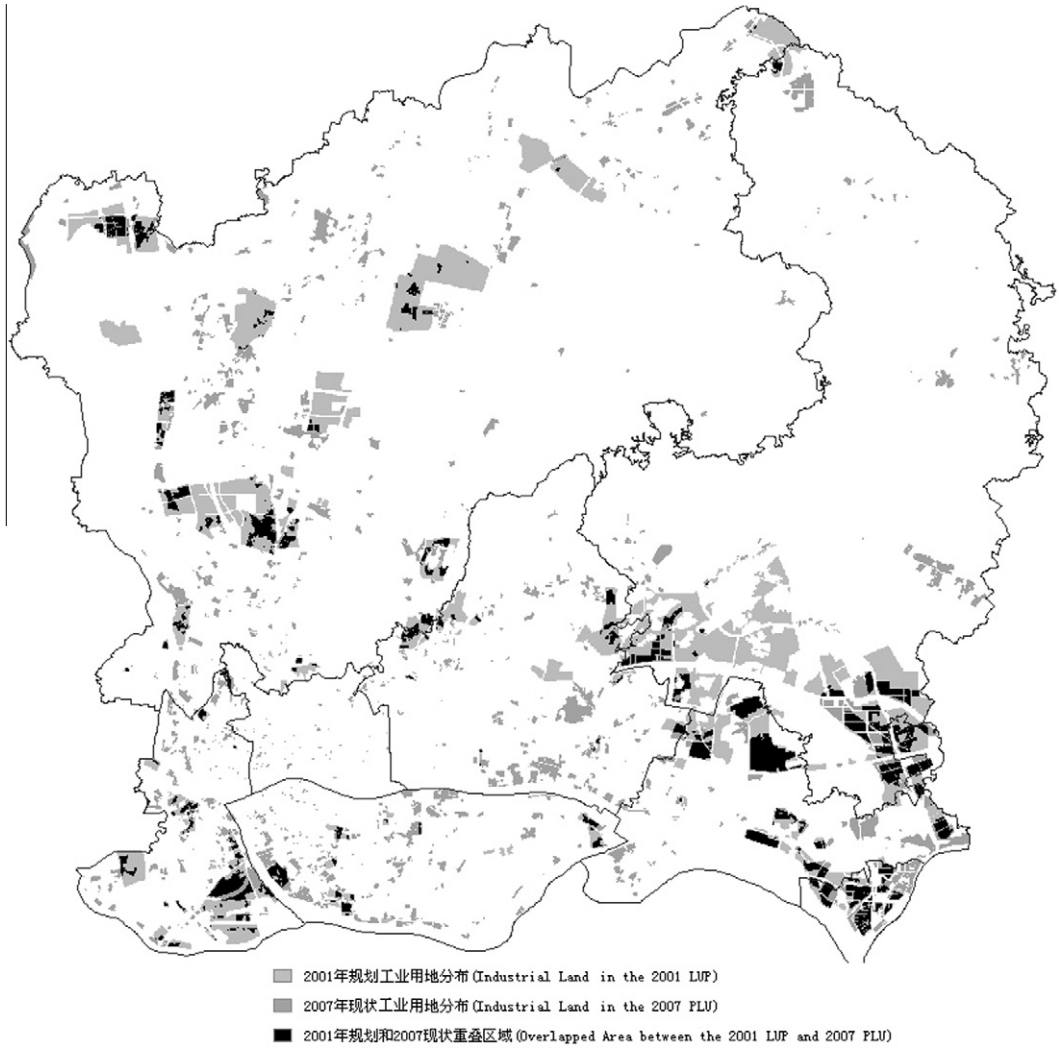

Fig. 8. Overlay result of industrial land.

implemented if 2007 land use is not consistent with the 2001 plan.

Type of un-fulfillment

If the use of a parcel of land in 2001 PLU and 2007 PLU is consistent, but different from the use in 2001 LUP, which means that the plan might or might not be implemented in the future. This is defined as "type of un-fulfillment".

Type of deviation

Land use has changed between 2001 and 2007 and there is a deviation between actual development and the 2001 plan.

After comparison between the land use plan and actual development, we presented our results to the Guangzhou urban planning bureau, and interviewed more than 10 planning officials to discuss with them reasons why and where development is consistent. Moreover, we selected several cases of conformance, un-fulfillment and deviation, and interviewed planning staff in Guangzhou to identify the factors affecting plan implementation.

Results

We analyze the overlay results according to two categories. One is examining the accordance level of different land use types, and the other is examining the accordance level of different PMUs to identify the spatial characteristics of plan implementation.

Overlay results of different land use types

Based on the overlay and calculation, we obtain the results of evaluation of the 2001 LUP, which is revealed in Table 2 and Figs. 5–9.

Analysis of residential land plan (Fig. 5)

The overlay shows that around 50% of residential land development deviates from the 2001 LUP. Among all deviation cases, 80% are located in the Baiyun and Huangpu district, both of which are suburbs. This is because historically the planning management is more stringent in the central area than in the suburban area in China. On the one hand, developers are under more scrutiny in the city center due to its locational significance; on the other hand, most of the central area has been developed and new development is very rare, thus the deviation occurs less frequently. There is 18.62% of residential area which has not been developed according to the land use plan, and majority of them are located in the Baiyun district, implying that the residential land development is slower in the Baiyun district than in other districts.

Analysis of commercial and office land plan (Fig. 6)

Commercial and office land plan has shown the least level of accordance, i.e., 19.7%. This implies that the 2001 LUP incorporated a limited understanding of the commercial and office land market.

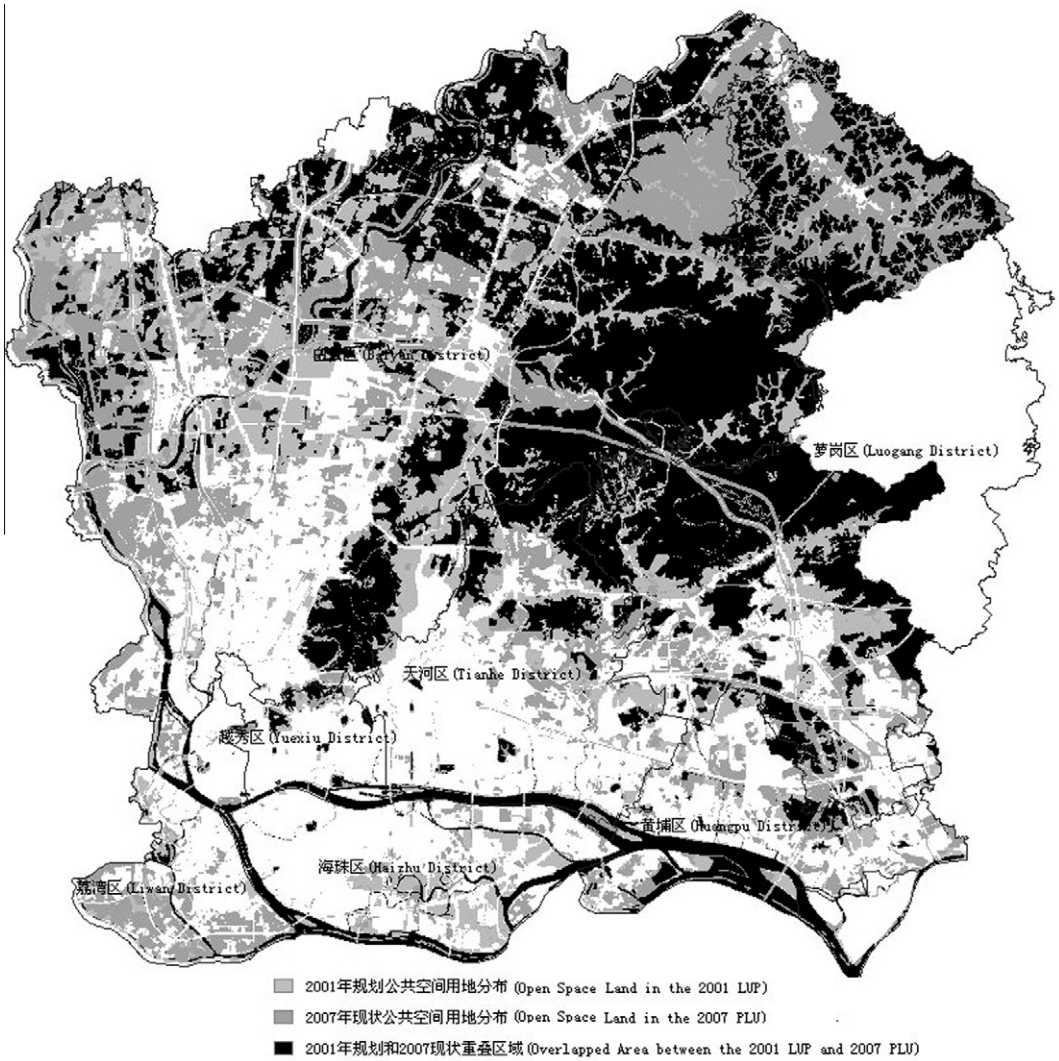

Fig. 9. Overlay result of land for open space.

Table 3
Conversion of land deviated from the plan, unit: km^2.

	Residential land	Commercial and office land	Land for public facilities	Industrial land
Residential land	–	9.23	9.69	12.39
Commercial and office land	2.23	–	0.95	1.06
Land for public facilities	3.77	2	–	2.73
Industrial land	2.39	1.77	4.19	–
Open space	8.68	5.23	14.12	21.69

Note: The row is the land use type in the plan, and the column is actual land use type converted from the original plan. For example, 9.23 means that there is 9.23 km^2 of planned residential land has been converted into commercial and office land.

In the deviation cases, 49% occur in the Baiyun district and 16.2% occur in the Tianhe district. In general, deviation happens more in the suburban areas than in the city center.

Analysis of land for public facilities (Fig. 7)

Interestingly, we found that the land for public facilities has a relatively high level of accordance (43.7%), although the deviation (42.8%) is equally noteworthy. The accordant cases are mainly located in the Tianhe district (64.4%), and the deviated cases are mainly located in the Baiyun district (58.9%). The relatively high accordance of public facilities land reveals that the land use plan has to some extent guided the spatial layout of public facilities. Meanwhile, only 13.53% of land for public facilities has not been developed in accordance with the plan, which is acceptable since there were still three years until the end of the planning term in 2010 (note: we analyzed the 2007 Land Use).

In Chinese cities, the construction of public facilities is funded by the government. While locating the public facilities, the government usually refers to the plan. However, if the situation changes, for example, the land for public facility is acquired by the third party, or the funds from the government are insufficient, the land for public facility will be changed into other uses.

Analysis of industrial land (Fig. 8)

There are 47.3% industrial land development deviating from the land use plan, and 30.7% of industrial land has not been developed. The deviation mainly occurs in the Tianhe district, Haizhu district, and Baiyun district. There are relatively high levels of accordance in the Yuexiu and Liwan districts because the industrial development is rare in the old city. In the Luogang district, the major industrial area of the city, the deviation rate reaches as high as 63.1%, and only 28.2% of land is consistent with the LUP, implying that the actual industrial land development seldom follows the plan.

Analysis of land for open space (Fig. 9)

There is 88.4% of open space land in accordance with the land use plan, showing that the control for open space is successful,

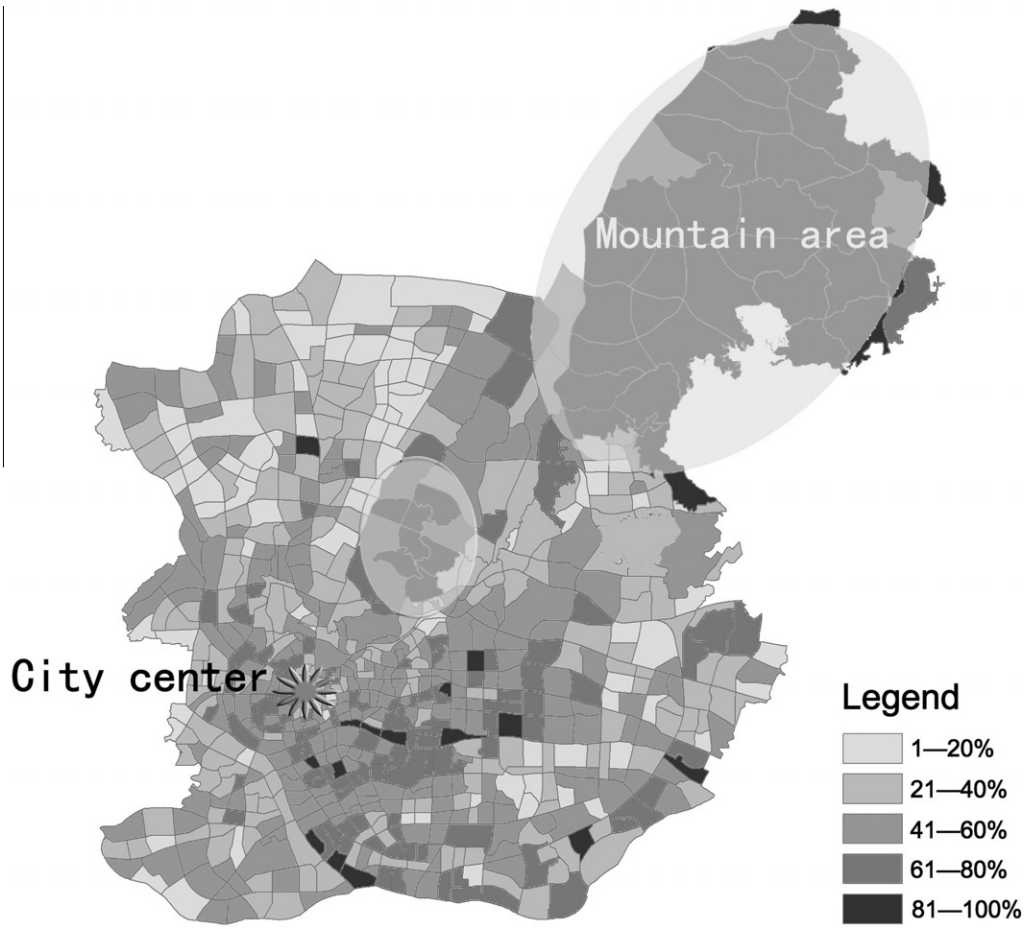

Fig. 10. Accordance level of planning management units.

Table 4
Number of PMUs with accordance level.

Accordance level (%)	1–20	21–40	41–60	61–80	>80
Number of PMUs	92	220	246	118	53

and this is because the majority of open space land is in Baiyun and Maofeng mountains. The 78.30 km^2 of open space land deviating from the LUP mainly goes to residential, commercial and industrial land uses.

In general, except for the land for open space, the accordance of the LUP is low (ranging from 19.7% to 43.7%, depending on different types of land use), and the deviation from the LUP is as high as around 50%. Among various land use types, land for open space has the highest accordance level, and this is because most of the land for open space is in mountain areas, and the stringent control of this type of land is relatively successful. The accordance level of land use for public facilities is fairly high owing to the fact that the government is funding their construction. While guiding market activities, such as residential, commercial and industry use, the plan has shown limited understanding of market forces. Table 3 has shown that the land use in the plan has been converted into other uses. For instance, we can see that more than 50 km^2 of original open space land has been converted into residential, commercial and other uses, but none has been converted into open space. This is not difficult to understand since the cost of conversion of open space land is lowest compared with other type of land use. Nearly 40 km^2 of other land uses have been converted into industrial land, but only around 8 km^2 of the original industrial land has been converted into other uses, implying that the city government has been paying more attention to the development of industrial land. Although the deviation from non-compulsory part is allowed, the high deviation level implies that the objective of plan has not been reached. In order to examine the reason behind the deviation, we take the plan for Zhujiang New City as a case in the following section.

Overlay results based on PMUs

Overall, there are 729 planning management units in the study area. The results of overlay between the 2001 LUP and 2007 PLU are discussed below:

(1) Fig. 10 and Table 4 show that the PMUs with accordance level ranging from 21% to 60% take the major share, accounting for 64% of all PMUs. The number of PMUs with lowest accordance level (1–20%) is 92, and the number of PMUs with the highest accordance level (>80%) is not high, but they cover a relatively large land area (Fig. 11). The units with highest accordance level (81–100%) are mainly located in the northern part of the city, which is the mountain area and designated as open space in the 2007 PLU (Fig. 9). Major units with lowest accordance level (1–20%) are located in the Baiyun district, and this is consistent with the above-mentioned observation that the deviation from the planning is more frequent in the periphery areas of the city.
(2) Fig. 11 and Table 5 reveal that 72% of all PMUs witnessed a deviation level of 21–60%. The number of PMUs with lowest deviation level (1–20%) is 75, and the number of PMUs with

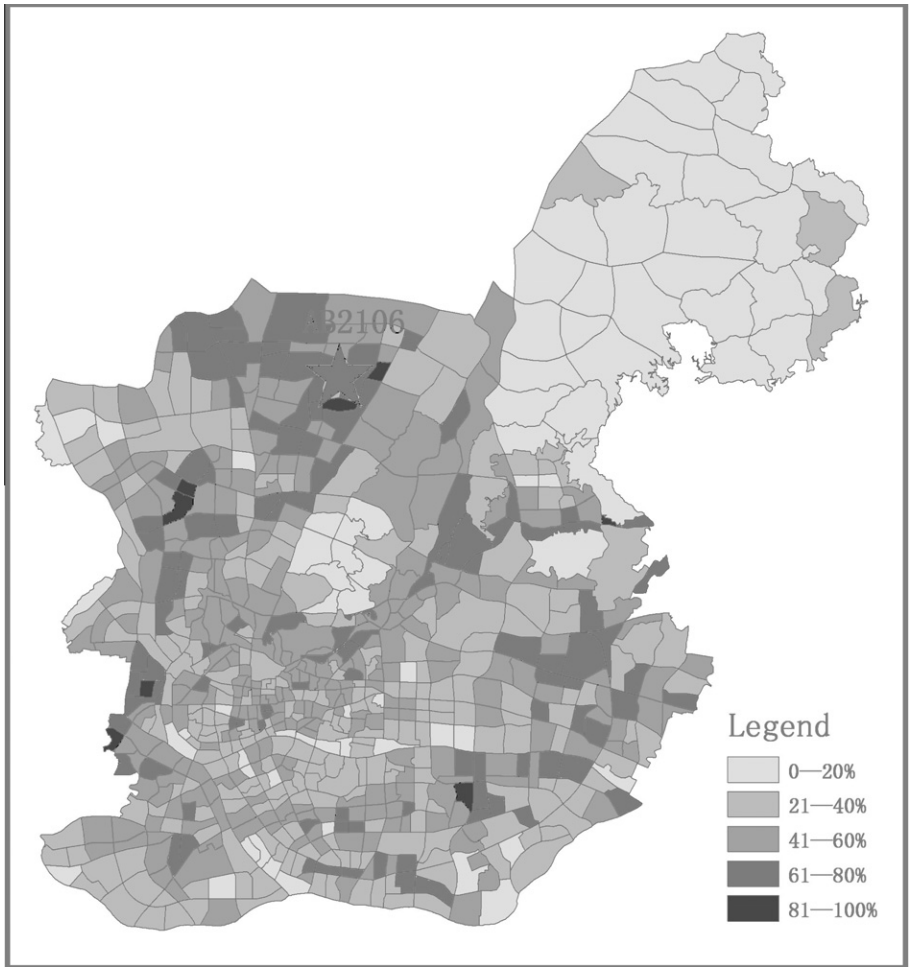

Fig. 11. Deviation level of planning management units.

Table 5
Number of PMUs with deviation level.

Deviation level (%)	1–20	21–40	41–60	61–80	>80
Number of PMUs	75	249	279	118	8

highest deviation level (>80%) is 8, covering a relatively small land area (Fig. 14). The units with high deviation levels (61–80%) are located in the north-western part and eastern part, since the land control is relatively weak in the periphery city, and the units with highest deviation level (81–100%) are scattered in the city.

(3) Fig. 12 and Table 6 reveal that the un-fulfillment level of PMUs is mainly below 20%. The number of PMUs with lowest deviation level (1–20%) includes 86% of all PMUs, and they cover 85% of the land area. The units with highest un-fulfillment level (81–100%) are very few.

To sum up, the accordance and deviation level of more than half of all PMUs ranges from 20% to 60%. In terms of spatial characteristics, the accordance level is higher in the old city center and mountain areas (where the new development is very rare) than in the periphery area. This is due to the fact that land use control in the periphery area is relatively weak and new developments are substantial. As for the individual PMUs with the highest deviation and un-fulfillment levels, we checked site development control plans and tried to find out why the land development has not followed the original land use plan.

Analysis of factors affecting implementation

In addition to the evaluation of plan implementation, this study should be able to identify what factors have affected the implementation of plan. Alterman and Hill (1978) divided implementation factors into three broad categories: political-institutional factors, attributes of the plan, and urban system factors. Political-institutional structure has significant influence on the effectuation process (Walker, 1941). In China, local authorities have wide discretion in deciding whether planning permission can be granted and what planning parameters can be imposed, even though these granting parameters are inconsistent with the approved plan. Thus, it is not unusual that the plan is frequently violated when planning permission is granted. Moreover, the making of the LUP is usually the job of architect-planners, and does not include financial considerations. In reality, it has proved to be a map full of different colours and is a legacy of the planned economy. Therefore, it is not difficult to understand that when market elements are gradually introduced into city development, the deviation from the LUP might be the reaction of market to a rigid land use plan, and nonconformity of outcomes or non-implementation of plans are not necessarily failures. Last but not least, Chinese cities have been experiencing the unprecedented fast-growing period, and the fast-evolving reforms have posed both opportunities and challenges. Under such situations, it is very difficult to make projections for the future of the city, and thus flexibility is more meaningful for plan implementation than rigidity (Alterman and Hill, 1978).

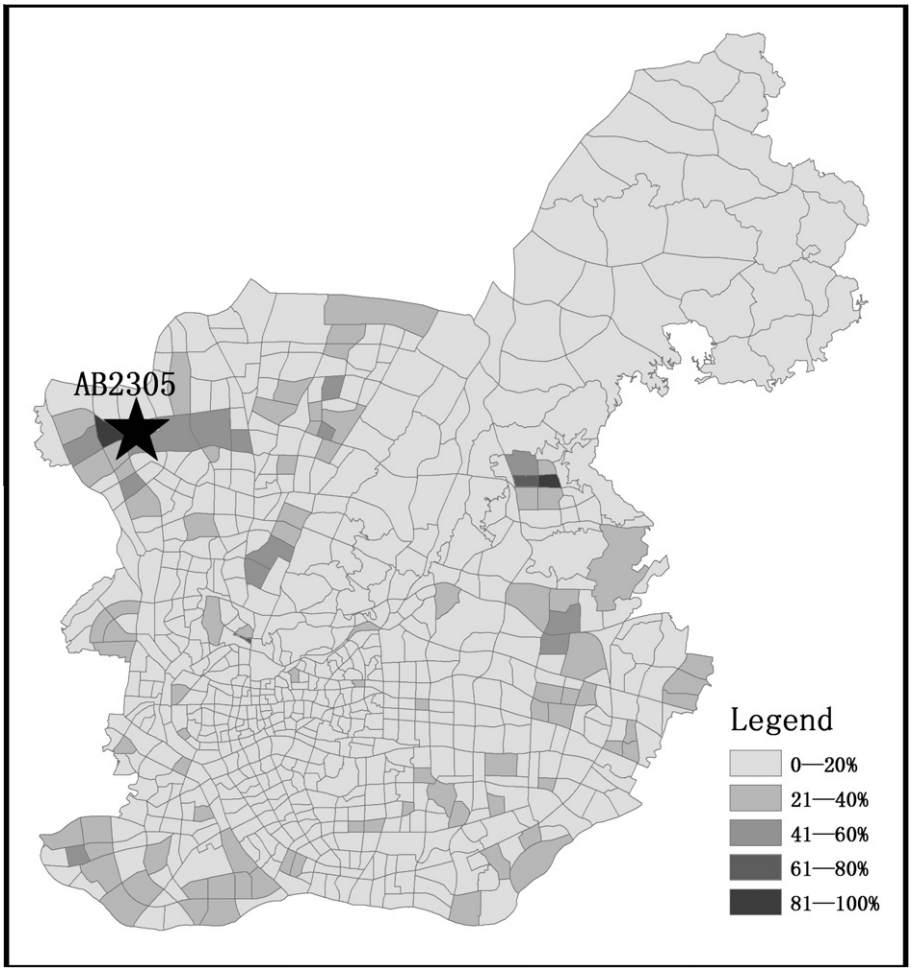

Fig. 12. Unfulfillment level of planning management units.

Table 6
Number of PMUs with un-fulfillment level.

Un-fulfillment level (%)	1–20	21–40	41–60	61–80	>80
Number of PMUs	629	83	13	2	2

The above three factors can partly explain why a master plan cannot be implemented completely according to the plan, however, they are not sufficient to deepen our understanding of the reason behind the implementation of Guangzhou city master plan. We need to check site development control of PMUs to find out what has impacted the plan implementation. However, the number of PMUs is substantial and it is impossible for us to go through every PMU. We have already identified the PMUs with highest accordance level, and found that the land use control for open space is successful. In order to understand the reason for deviation and un-fulfillment, we provide a PMU with the highest deviation level and a PMU with the highest un-fulfillment level. Additionally, we selected a key area of the city, the planned CBD—Zhujiang new city. In our research and analysis, we tried to find out why they have not been developed according to the master plan.

Fig. 13 shows a case with the highest deviation level. AB2106 is located in the northern part of the city, the Baiyun district (please refer to Fig. 12). According to the plan, much land is designated for research use (represented by the pink color) to provide more space for the several existing research institutes and attract new research organizations, and then enhance the R&D capability of Baiyun district. In reality, however, many plots of land were developed into the industrial use to make profit. According to the survey and our interview, the reason lies in the following factors: (1) north of Baiyun district is not attractive enough for research institutes due to its inferior location; (2) the district government does not invest in the construction of facilities such as roads; (3) the land use management is not stringent in the periphery of the city and the informal development booms.

Fig. 14 shows a case with the highest un-fulfillment level. AB2305 is also located in the north of Baiyun district (please refer to Fig. 15). According to the plan, AB2305 was to be developed into an industrial area. However, when making the plan, the planners did not realize that most of the land in the AB2305 was designated for basic farmland use. Under the stringent national legislation, the basic farmland cannot be converted into non-agricultural use without the permission from the state council. Due to the difficulty of obtaining permission from the higher-level government, the farmland remains in its agricultural use. Since the state is still carrying out the stringent basic farmland protection policy, it is difficult for us to envisage when the plan of AB2305 will be implemented.

Fig. 15 shows the Zhujiang new city case. In 1992, the Zhujiang new city was designated as the new CBD of Guangzhou city, and it covers a land area of 6.68 km^2. It has been 18 years since its plan was formulated. By 2005, however, less than 60% of the original plan was finished. There are multiple reasons why the plan cannot be implemented. For example, the 1997 Asian Financial Crisis has reduced the demand for office use, and many developers have asked to convert their office land into residential land. Some of

Fig. 13. One of PMUs with highest deviation level (AB2106). Above: the existing land use; Below: the site development control plan.

their applications have been rejected by the planning authority on the ground that this area is planned as CBD rather than a residential area, and some land is thus left undeveloped. Meanwhile, the government has not made supplementary policies to promote the development of this area. For instance, the government has been leasing much land for office in other areas of the city at much lower price than Zhujiang New City, leading to the over-supply of office land and the decrease of land price in Zhujiang New City. The benchmark price[2] of office land was RMB3600/m^2 of floor space in Zhujiang New City before 1996, but declined to 2800/m^2

[2] According to Li (1995), A Benchmark Price (BMP) is the average price level established within a specific time period in a particular area/locality for a particular land use. One of the objectives of the formulation of the BMP is to provide local authorities with a set of guidelines to determine a reasonable land price when 'negotiating' with real estate developers for the conveyance of LURs

Fig. 14. One of PMUs with highest un-fulfillment level (AB2305). Above: the existing land use; Below: the site development control plan.

of floor space in 2000 due to the over-supply of land in the city (Tian, 1999). A lot of land has thus been left vacant.

Conclusions and recommendations for further research

The issue of plan implementation is complex, not only because this concept and the criteria of assessment are debatable, but also because the methodological problems with evaluating implementation success are substantial. However, they are not insurmountable. Learning from experience can only be accumulated and transformed into knowledge through systematic evaluation, generalization, and development of new theories and norms of practice (Alexander and Flaudi, 1989).

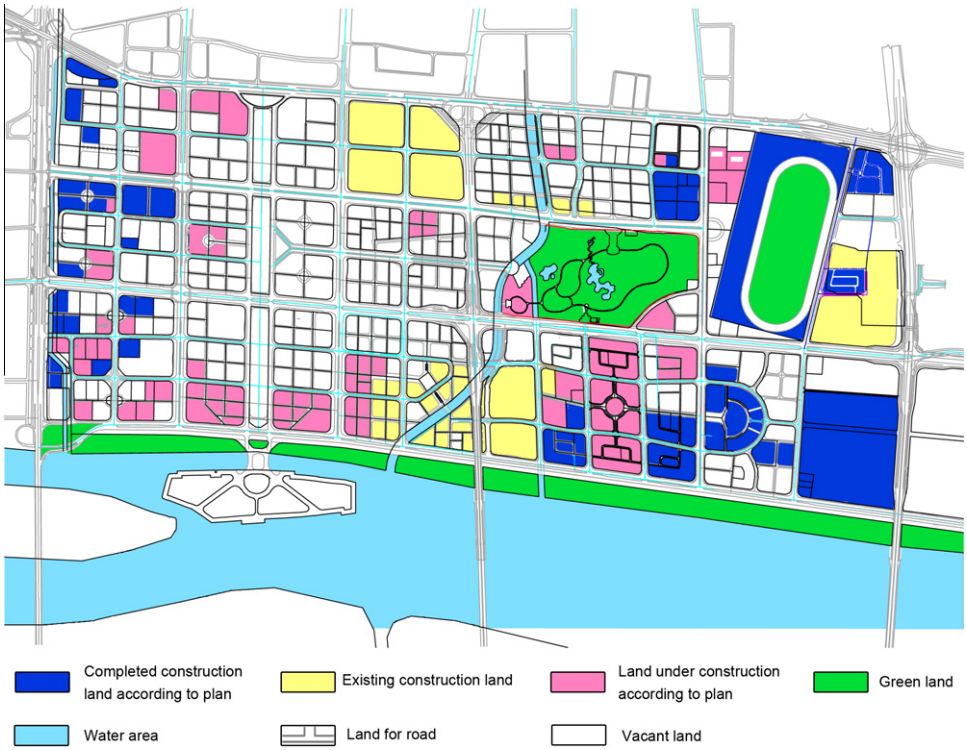

Fig. 15. Land use development in Zhujiang new city in 2005. Source: Guangzhou urban planning bureau.

This research presents a case study in for the evaluation of a plan implementation at the macro-level. Given the large scope of the research and the complexity of a city master plan, the evaluation is neither a policy evaluation nor a comparison between plan intentions and outcomes, but focuses on the comparison between land use plan and actual land development. The criteria adopted in this case study are accordance, deviation, and un-fulfillment through grid overlay. The spatial pattern of plan implementation, based on PMUs, is also examined. The results have shown that the implementation of open space and public facilities is more successful than that of residential, commercial, office and industry use because the open space and public facilities are funded by the government. As for the spatial characteristics of plan implementation, we find that the accordance level is higher in the city center and mountain areas than in the periphery area, since land use control is weaker and there is much more new development in the periphery. Further exploration at the site development control level reveals that the internal factors, such as the attributes of the plan and the plan management ability, and the external factors, such as market situation change and rapid growth of the city, have influenced the plan implementation. Moreover, the capability of government in guiding market activity to accommodate the plan should be improved. Finally, a plan finished 10 years ago can lead to fewer conformances. In summary, the factors affecting the implementation of the 2001 Guangzhou master plan can be seen as follows: location of area, plan monitoring strength, level of government control, changes of market forces, and date of plan. This research, however, does not explore the factors affecting implementation due to its large scope. Further research on detailed aspects of a plan, such as its development control, is needed to enrich the evaluation of plan implementation in China.

Identifying success or failure of a plan depends on plan intention and perspectives (Talen, 1997). In China, because of the physical-oriented, top-down nature of a city master plan and its lack of social and financial considerations, the evaluation of its policy objective is elusive. According to the evaluation results, the 2001 LUP has been reasonably successful in guiding the city's own investment and locational decisions of open space and public facilities. Nevertheless, it has played a very limited role in guiding market activities, partly because the land use arrangement is too detailed to fit the needs of a macro-level plan, and too rigid to meet the needs of rapid population and economic growth. In fact, too many efforts have been put on the detailed land use arrangement that should have been decided by market forces, and thus less attention has been paid to strategies and policies of city development. The conventional city master plan has been the target of extensive criticism (World Bank, 1993; Xu and NG, 1998) and the reform of city master plan making is imminent in China. The reform may focus on simplifying the contents of conventional city master plan, increasing its flexibility in guiding market activities and enhancing control in public facilities and open space.

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