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Integration of incomplete and scattered information to help urban planning and decision-making – With special reference to Tehran

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1   INTRODUCTION: PROBLEM UNDER STUDY, PURPOSE AND METHOD

Urban planning involves processes of making and implementing spatial decisions and policies on different aspects of urban life such as housing, employment, education, recreation, etc. and it has wide-ranging information requirements which depend upon many sources of production, public and private, formal and informal. The cities of the less developed countries (LDCs) – more than their counterparts in more developed countries (MDCs) of the world, face major problems in managing their structural changes. The experiences of cities in the MDCs have usually proved inappropriate in the LDCs and consequently new and innovative solutions are continually being explored for these cities.

This paper is concerned with the integration and sharing of spatial information which from one side can be classified into different functional categories (such as natural and environmental resources; physical spaces and space uses; socio-economic, political, etc. dimensions and organisational structures of urban life) and from the other side can be categorised according to different geographical levels. This information that may be termed urban planning information (UPI) is important in any urban planning activity – correctly or incorrectly - done under the title of urban planning. Considering their use in a cycle of planning, they may be identified "as related to different stages of policy making, implementation of the plans and urban management (refer to Nghi and Kammeier, 2001, p. 62). The study of UPI is done with the intention to devise an effective way to integrate various sources of information for the requirements of decision making in different stages of any urban planning cycle, as well as setting up relations and interactions between various spatial data users and producers within any information system or urban planning context.

In this paper, the existing approach to urban planning in a case example, i.e., the city of Tehran (the capital of Iran) will be reviewed in order to be able to follow briefly its UPI requirements, the problems and shortcomings that exist in relation to the collection; accessibility; accumulation and integration of not only the plans but also the UPI. Then a simple urban strategic planning approach that can be used first as an improvement of the existing planning approach and second as a basis and guide for integrating both plans and UPI, (with special reference to Tehran, but with an tacit potential to be applied in similar contexts) will be presented. This can ultimately (i.e., outside the agenda of this paper) lead to the introduction of a more refined multi-criteria urban information and planning model matching the simple urban strategic planning approach. Also, the multiplicity of this city's information sources will be reviewed briefly in order to find the ways of integrating these varying sources and proposing a framework, including the participation of all stakeholders. The paper concludes by suggesting that simple, low cost, easily maintained and user-friendly spatial UPI systems have the best chance of success in the cases such as Tehran that the integration of both plans and UPI seems to be a very difficult task under the present decision-making and organisational environment.

2   PLANNING CONCEPTS AND INFORMATION REQUIREMENTS 1

Information plays a central role in planning (refer to Rubenstein-Montano, 2000, p.156), whether in the MDCs or the LDCs.

During the post Second World War period, in many European countries, urban planning was essentially an exercise dealing with "the physical planning and design of land-use and built form" (Taylor, 2005, p.34-5 and 46). The "general and fundamental criticisms" of the prevailed approach to urban planning, was mainly towards the lack of an adequate understanding of the phenomena" and" how they are actually functioning and being based on "very little empirical analysis" and "an inadequate comprehension of the complex relationships between physical environments and social life", as well as "failing to grasp" the "problems of human social life and its manifestation in cities" (Taylor, 2005, p.46, 54). This ultimately led to radical changes and the introduction of adapted concepts of planning. Primarily it was the rational process view of planning (refer to Mc Loughlin, 1971, and Chadwick, 1971 and Faludi, 1973 in Taylor, 2005). This concept of planning was reflected in the strategic plans which had due consideration to the social and economic as

well as physical aspects (also refer to Taylor, 2005, p.63). Considering the debate about the necessity and implication of this view of planning about the adoption of a comprehensive approach to planning and the difficulty of gaining a comprehensive knowledge and access to the relevant information about the environment to be planned, an alternative approach " which claimed to be "more relevant to the real world of planning and policy-making", i.e. the incremental or piecemeal approach, was later introduced (refer to Lindblom, 1959 and Pettit and Pullar, 1999, pp.340-41). The Mixed scanning approach as was also introduced, "distinguishes more fundamental or strategic decisions from more detailed decisions" (Taylor, 2005, p.73). In fact the mixed scanning approach as "a hybrid model of both the rationalist and incrementalist approaches", "involves imposing patterns on information received, formulating a program within this framework and going back to changing that framework when- ever one gets stuck on the more detailed level (refer to Faludi, 1973).

"it is now generally accepted that one can not investigate the effects of the planning system independent of its political economic context, and that the market system of land development in particular plays a crucial role in determining the outcomes of planning practice" (refer to Taylor, 2005, p.107). Broadly speaking, it can be said that in many countries of the world – more or less developed - either the traditional (i.e. master planning), the rational comprehensive or some form of mixed-scanning approach are or has been practiced. The major point about the adoption of any of these approaches, in any country or city, is that of their process, the different stages of the adopted process, the adaptation of the process to the local conditions and the UPI requirements of each of the stages. Almost all these stages not only require spatial information but also considerable information processing and analysis. Part of the information requirements of the planning process, especially problem formulation and evaluation of the existing conditions, require the collection, manipulation and analysis of spatial features in order to be able in the following stages of the planning process to generate plans, strategic and operational. Problem formulation and the evaluation of conditions require the collection; manipulation and analysis of spatial features in order to generate plans (refer to Pettit and Pullar, 1999, P.342). Adoption of planning approaches developed in the MDCs, in the LDCs has always posed problems that can be stated as (a) "the inherent differences between planning problems" in the two groups of countries, and (b) "the large dichotomies between indigenous legal or customary traditions and the foreign legal system from which the model for planning provision was derived" (McCoubrey, 1988, p. 371), and (c) the differing degrees of adherence to and acceptance of the idea and practice of planning.

Different planning concepts have varying information requirements: Master or strategic planning, incremental or mixed scanning approaches versus each other and also versus urban management procedures have varying information requirements. Management practices require agencies to use more detailed information for routine operations. These different requirements can "explain the existence of various specialised ad hoc systems in urban planning, such as management information system (MIS), land information system (LIS), and urban GIS" (refer to Nghi and Kammeier, 2001, p. 63). One important point about using the methods devised in MDCs is that general principles and analytical tools that have been developed there cannot be used in LDCs without considerable modifications and adaptations and there is a need for the development of new approaches appropriate to the varying conditions (also refer to Masser, 1974, p. 157)

3   DISINTEGRATED SOURCES OF UPI

While there are many data sources in any city –formal and informal, organised and unorganised - the official procedures are not usually capable of sharing and integrating necessary information to support decisions when planning and managing an urban environment. Also in any city – apart from information shortages – there are many hidden data potentialities that are not used and are not included in or part of an established and effective UPI system. In addition, any decision-making activity involves combining various types of information in order to analyse the different elements of a spatial structure and their interaction. Integration of not only disconnected but also incomplete and scattered information with varying information sources can reduce information uncertainties and reinforce the effectiveness of decisions to solve problems in an urban area.

Different stages of a planning process - whether comprehensive or incremental - including problem formulation and evaluation of policies, require the collection, manipulation and analysis of spatial information. Also, integration and sharing of (spatial) information among different urban information users

and producers can be considered as key element of both an urban planning and management system and the relevant decision support system. This is while any city lacking the appropriate information system, or being unable to set up such a system, or unable to coordinate and integrate urban information – especially in a disintegrated planning setting - will enhance the uncertainties and constraints surrounding its decision-making environment.

4   INFORMATION SYSTEMS, BARRIERS AND URBAN PLANNING

Planning has an integral part which is the collection, manipulation, and analysis of spatial data (refer to pettit and Pulman, 1999, P342). Although it is usually presumed that both producers and users of UPI have ample knowledge and access to necessary tools to define and represent their UPI requirements, in many countries, it is not always true. In fact "in the information era, there is still the contradictory situation of information-poor activities and the under-utilisation of advanced information tools (such as GIS) and this is while the "drastically needed data remain unavailable" (refer to Nghi and Kammeier, 2001, p. 62) for urban decision makers and for building an appropriate UPI system.

The advent of sophisticated information systems and advanced computer-based tools has been not only greatly useful for a wide range of urban planning and managing functions, but also has facilitated the storage, updating, retrieval, and display of spatial data. Their use is expected to facilitates the production of more useful information products, increases planners' ability to analyse spatially related phenomena, and help provide the basis for more informed public and private decision making (also refer to Nghi and Kammeier, 2001, p. 62-4)

These systems have been used to an increasing extent in many LDCs (refer to Klosterman, 1995, p 2), and even where the decision-making environment, planning and information systems are incomplete, disintegrated and not prepared (i.e, is not equipped with all the necessary instruments), public resources are limited or resources allocated to public are not sufficient, and experience with advanced information technologies compared to some MDCs has been (at least until recently) almost missing (also refer to Dyckman et.al., 1984). As a result, some LDCs provide both "the greatest opportunities for - and the most significant obstacles to – using advanced information systems along with computer-based tools for planning" (refer to Klosterman, 1995, p. 2).

Recognising the fact that these systems are tools for storing, manipulating, displaying and analysing spatially related data, it becomes clear that the availability, continuity and quality of data are essential components of such systems. If the data are inaccurate, incomplete or discontinued, the use of sophisticated information systems will only be useless and would be nothing more than the waste of much needed resources in many LDCs (also refer to Klosterman, 1995, p. 2).

In many countries, data on many features of an urban system and many areas of human life, are almost readily available or can be obtained from different official records. However, public agencies around the world are discovering that much of these data are outdated, inconsistent, incomplete, designed only for administrative or regulatory purposes, and very difficult to integrate (also refer to Klosterman, 1995, p.4-5). The weaknesses of some of the LDCs in terms of availability, access, processing and integrating information – as referred to in different studies - reveal some facts that can be listed below (refer to Klosterman, 1995; Bishop et al, 2000, Pettit and Pullar, 1999):

- Lack of adequate data, as a considerable amount of social and economic data is usually collected at national levels, but very little on a local level.

- Local authorities often have very limited data-collection capacities.

- The collected data are often not collected with the aim of being part of an information system or to be usable for a much wider range of applications and be used along with computer-based tools for planning.

- The collected data are not consistent with respect to time, geographic coverage, or definition, making data integration extremely difficult.

- Digital representation of spatial data is sometimes rare due to the lack of appropriate equipment and trained staff.

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- Information about state owned land or government property is poor and restricted (especially where there are large military land holdings).

- Most information about land ownership and utilities are in the hands of personnel in separate departments and as a result can be easily lost or mishandled.

- Information about the location of underground utilities and facilities is often worse than the maps showing above the ground features.

- Where maps exist they are often out dated or classified as restricted information and access by public or public departments is very difficult.

- Where current and unclassified maps exist, they are usually of different scales aggravating the problem of efficiently sharing information.

- •Large-scale base maps are often unavailable. When available, they are often extremely out of date, making them of limited use especially for monitoring the rapid, unplanned, and unregulated growth of larger cities.

- •The most readily available spatial data are usually collected through remote-sensing techniques that deal primarily with land cover and the physical environment. As a result, socio-economic and land-ownership data that are essential for urban and regional planning are generally lacking; the data which are available are often limited to census data.

- •The difficulty of collecting accurate and current information on current population and land-use patterns is compounded by the existence of a large "informal sector" that resists the collection of more reliable information in the fear that it will be used against them.

- •Data collection efforts are frustrated by outdated, understaffed, and inadequately funded municipal and district data collection and storage systems that cannot keep pace with constant changes and complexity of human and urban systems.

- •Information collected by government can be extremely difficult to obtain. Many countries view "official" information as confidential. Some countries restrict access to information related to financial, commercial, and trade where speculation might take place. Other countries treat data on geological or natural resources obtained by aerial surveys and remote sensing as military secrets. In others, politically sensitive information is used with extreme caution or suppressed entirely.

- •The lack of current data is compounded by issues related to data quality. The data that are available are often out of date, severely limiting the appropriateness for any planning effort.

- •The collected data are often collected by non-planning local and regional agencies without any concern for their appropriateness for planning.

- •A lack of organisational procedures for monitoring and coordinating the frequency of data updating or for verifying the collected data.

The lack of reliability, consistency and coordination of UPI in many LDCs - including the case example of this paper - results from factors such as administrative inefficiencies, resource limitations and the shortage of skilled personnel and technical expertise as well as lack of funding or political will to support the construction of the UPI system. They also reflect a lack of appreciation of the policy makers; urban planners and managers for the different aspects of application and importance of information systems in any urban planning and managing activity especially when continuance and sustainability reveal themselves as important agendas, locally and internationally (also refer to Klosterman, 1995, p.5). According to the experiences in the MDCs, construction of UPI systems are resource consuming. Thus, the huge costs involved in developing and maintaining an integrated UPI system pose a challenge to fund-scarce urban authorities in many LDCs.

5   BARRIERS TO SET UP UPI SYSTEMS IN TEHRAN

Past and present attempts for integrating urban information in Tehran have revealed limited success because they have failed to introduce a continual and an effective model to, (a) coordinate the planning activities; (b) setting up a hierarchical order in plan preparation as well as a horizontal and vertical relationship between

the information, the content of plans and the processes of planning; (c) coordinate the information requirements of various agencies involved in planning and managing different aspects of Tehran (d) balance the varying interests and circumstances of involved stakeholders, and (e) integrate the various attempts by different stakeholders at different periods of time in terms of setting up a UPI system (Figure 1). Another obstacle to adopt an integrated UPI system in Tehran is that the access to the sources of information involves complicated, expensive and lengthy official procedures. The availability of spatial information for Tehran is not as "poor or non existent" as is said to be for some cities in some LDCs (refer to Bishop et al, 2000, p 87). In Iran, during the last decade, GIS has been used vastly for identification of resources and management of urban and environmental projects, though the practice of analysing the development models by using GIS in urban development planning, is a new experience (refer to Gharagozlou, 2003).
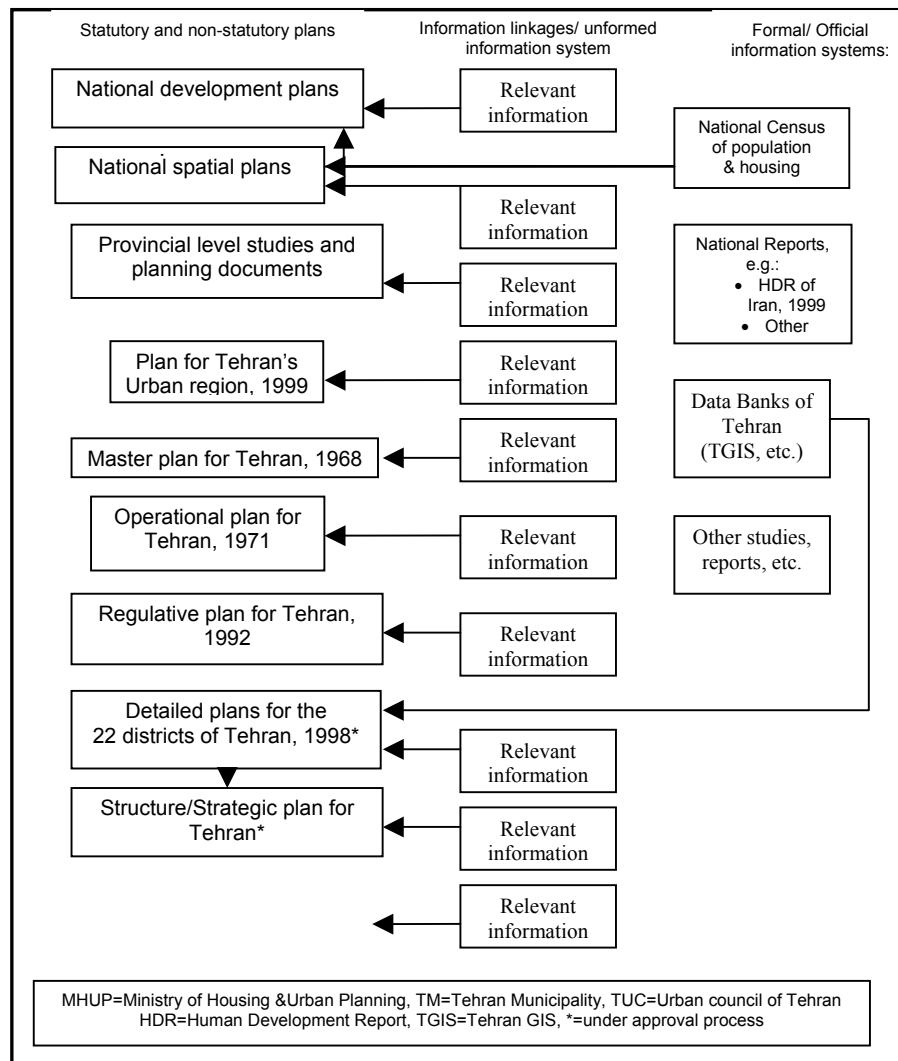

Figure 1: Disintegrated plans, disintegrated information linkages/ unformed information system in Tehran
Source: Writer, 2007

6   PRESENTING A CONCEPT FOR INTEGRATING UPI IN TEHRAN

In order to present an appropriate and effective concept for integration and sharing of UPI in Tehran among all the relevant stakeholders - in a sustainable process, and not in an once and for all time action - a process introducing a planning cycle embracing the urban information system for Tehran, based upon the adaptation of the existing conventional planning method and (step by step) replacing it with an approach more similar to mixed-scanning, is introduced. The improvement of current planning method is suggested in the light of the knowledge gained of the deficiencies in its planning system of Tehran (refer to Daneshpour, 2005) with the intention of emphasising on the key elements and decision areas which are involved in the process of change in this city (Figure 2).
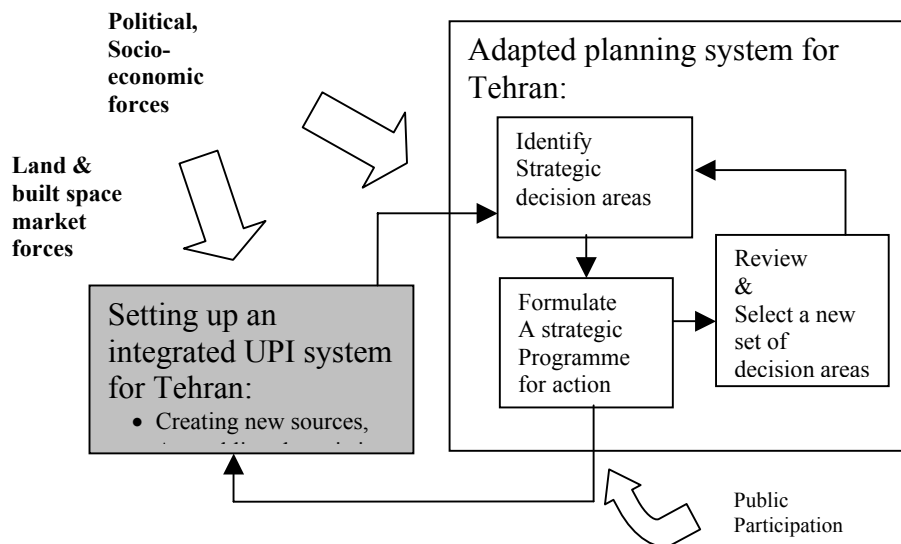
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Figure (2): The proposed process of information integration and planning in Tehran
Source: Writer, 2007

7 CONCLUDING REMARKS

This paper tried to make broad suggestions for integrating information from varying sources and for improving the effectiveness of urban information systems in such cities as Tehran. This is accomplished by shifting emphasis from both the primitive methods of data collection, from one side, and from the other side, the more refined tools developed to support decision making, to a more adapted, sustained and user friendly UPI system. Such a framework will show particular promise for improving planning activities because of its potential for a people-oriented focus and establishment of an integrated decision support system. The need for an iterative public participation process, which can enable feedback at all stages within the planning process, is stressed. For these purposes, there is a need to develop a set of planning tools to assist - not replace - planners in the analysis of problems and the generation of plans: tools to help planners and decision makers to make better-informed decisions, be transparent and use integrated and qualitative-based information in the planning process.

To integrate and share the UPI in Tehran - or in any city with similar circumstances - there is a need to improve existing methods and actions and build a one step at a time system that relies deeply on interrelations. The difficulty of developing an up-to-date and reliable UPI system in Iran – as in many other LDCs - makes it essential that these countries adopt a staged and an incremental process of both urban planning and UPI system establishment. This will be based on the idea that it is better to have a modest system in use than an elaborate one that remains ineffectual. An incremental strategy also imposes fewer demands on existing limited resources and is less vulnerable to organisational, political and environmental changes. The most successful systems have often been some of the simplest, which are immediately useful for improving the urban planning and information collection processes.

When there are numerous barriers such as limitation of resource, and different constraints, it is essential for planners to focus their attention on the data infrastructure which supports the system and adopt modest incremental processes. Otherwise the information systems and advanced computer-based tools will only be another expensive and short-lived whim that does little to tackle the problems and respond to the real needs of people (also refer to. Klosterman, 1995, p. 11). Thus is that this paper concludes by suggesting that simple, low cost, easily maintained and user-friendly spatial information technologies have the best chance of success.(also refer to Bishop et.al., 2000, p. 85).

One important lesson that can be learned from the experiences in MDCs is that in order to do a well-organised urban planning, it is necessary to develop a spatial information system as an efficient tool for management of urban resources. The advanced information systems along with computer-based tools for planning are considered an essential requirement for the cities of the LDCs to improve their urban planning management approaches (also refer to Bishop et al, 2000, p. 87) only if these tools are applied appropriately.

8 REFERENCES:

Bishop, I. D., et. al., "Spatial data infrastructures for cities in developing countries: Lessons from the Bangkok experience", Cities, Vol. 17, No.2, pp.85-96, 2000.

Daneshpour, Z. A., "To study and analyse the spatial structure of Tehran" (unpublished research report), Tehran: SBU (Sh. Beheshti University), 1996.

Daneshpour, Z.A., "Improving urban problem-solving approaches, the case of Tehran", Life in the urban landscape- International Conference for Integrating Urban Knowledge & Practice, Gothenburg, Sweden (www.urbanlife2005.com), 2005.

Daneshpour, Z. A., "Spatial inequality and dislocation in Tehran's urban region", First Bi-Annual EURA Conference: Cities in City Regions, Warsaw: Poland, 2006.

Dyckman, J., Kreditor, A., Banerjee, T., "Planning in an unprepared environment: the example of Bahrain", Town Planning Review, 55, 214-227, 1984.

Gharagozlou, A. , "Presenting Urban Development Model by using Environmental Models & GIS & RS (North-West of Tehran)", Map India Conference 2003, GISdevelopment.net, accessed in 2007/3/25, 2003.

Klosterman, R. E. , "The appropriateness of Geographic Information System for regional planning in the developing world", Computer, Environment and Urban Systems, Vol. 19, No. 1, PP. 1013, 1995.

Lindblom, C. E. , "The Science of Muddling Through" in Campbell, S. & Fainstein, S.S. , "Readings in Planning Theory", Blackwell: Oxford, 1996.

Masser, I. , "planning with incomplete data", Town Planning Review, Vol. 45, No. 2, pp.157-169, 1974.

Mc McCoubrey, H., " The English model of Planning Legislation in Developing Countries", Third World Planning Review (TWPR), Vol. 10, No. 4, 1998.

Nghi, D Q and Kammeier H D , " Balancing data integration needs in urban planning: A Model for Ha Noi City, Viet Nam", Cities, Vol. 18, No. 2, pp. 61–75, 2001.

Pettit, C. and Pullar, D. , "An integrated planning tool based upon multiple criteria evaluation of spatial information", Computers, Environment and Urban Systems Vol. 23, pp. 339-357, 1999.

Rubenstein-Montano, B. , "A survey of knowledge-based information systems for urban planning: moving towards knowledge management", Computers, Environment and Urban Systems, Vol. 24, pp.155-172, 2000.

Taylor, N. , "Urban Planning Theory- Since 1945", Sage: London, 2005.

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