Optimisation of Urban Plan Preparation Business Process using Geoinformation Technology & Management Techniques

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by

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I certify that although I may have conferred with others in preparing for this assignment, and drawn upon a range of sources cited in this work, the content of this thesis report is my original work.
Signed …….

Disclaimer

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DEDICATED TO:

My revered Dad for sparking never quenching thirst for knowledge in me and my beloved wife Hem who always unconditionally supported me to keep on going with this passion.

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Abstract

Urban Plan Preparation Business Process (UPPBP) is the most critical area of concern especially in the eco-sensitive areas of the developing part of the world, requiring, immediate attention for change in its institutional, technological and management aspects in the wake of likely magnitude of urbanisation, emerging enabling Geo-Information & Communication Technology (GEO-ICT) and Geo-Information Management (GIM) techniques as well as changing societal requirements. The present research aims at optimisation of UPPBP by suggesting changes in institutional, technological and managerial aspects of its functionality, to make it more robust and fit to meet the emerging challenges on it. In order to create a logical base to take off with the idea of optimising the said business process an exhaustive questionnaire was designed and a survey of four State Government Urban Planning Departments was conducted. Based upon the conclusions of said survey the diagnosis of the process was carried out by executing internal and external scanning of the process with thrust on one of the Departments namely The Town & Country Planning Department of Himachal Pradesh. Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis and metrics were drawn to formulate future strategies to materialise the intended optimisation of the process. Simultaneously, an overview of Geo-ICT and GIM Technology was undertaken with reference to their potentials and limitations for application in optimisation of UPPBP. In the next phase the UPPBP as envisaged in The Himachal Pradesh Town & Country Planning Act, 1977, was structured into sub-processes and activities, wherein recommendations for substitution of appropriate modern enabling technology at every demanding activity level were crisply given. To support the core optimised process model of UPP and ensuring continuous business improvement in the process supporting processes like Organisation model, Quality model and Workflow management model are also conceptualised. Such models are not in practice at all in the existing UPPBP model. An attempt to evaluate the improvement on implementation of the optimised process model is also made after identifying the possible indicators / criteria and by developing a qualitative improvement scenario, since some quantitative evaluation was not possible in the absence right type of comparable data. However, the results of the evaluation proves that there will be around 30% reduction in over all plan preparation time on implementation of optimised process model. Even in case of some specific activities, which number about 14 activities register improvement as high as 60% or more on account of technological and management improvement actions. The highest betterment is recorded with respect to time criterion followed by cost but the latter will accelerate with time as capital investments will decrease steadily in due course of time. It is thus evident that the timely preparation of plans will firstly, arrest the problem of unplanned or ad-hoc development scenario in the absence of comprehensive plans, secondly, reduce temporal escalation in development costs and lastly increase social acceptability of plans, which is the ultimate goal of any social planning. Thus the process will certainly be in position to achieve the objectives of planned balanced development and help in providing social justice and a liveable environment to the masses. The success in achieving objectives in turn will make the process favourite and widely acceptable making the restoration of its glory possible. The requirements for implementation of the optimised process were also worked out in form of guidelines. The research indicates positive results but to quantify the same some prolong research backed by exhaustive and appropriate database is required.

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Acronyms

GEO-ICT	Geo-Information & communication Technology
GIM	Geo-Information Management.
QMS	Quality Management System
SWOT	Strengths, Weaknesses, Opportunities &Threats
TQM	Total Quality Management
UPPBP	Urban Plan Preparation Business Process
URPBPM	Urban Regional Planning Business Process Model
NMAs	National Mapping Agencies
BPR	Business Process Engineering
CPI	Continuous Process Improvement
UML	Unified Markup Language
GIS	Geographical Information System
DBMS	Data Base Management System
IIRS	Indian Institute of Remote Sensing
NRSA	National Remote Sensing Agency
RM-ODP	Reference Model for Open Distributed Processing
E-SWOT	Extended-Strengths Weaknesses Opportunities &Threats
HPTCP Act	Himachal Pradesh Town & Country Planning Act
T&CP	Town &Country Planning
UPDs	Urban Planning Departments
SDPs	Spatial Development Plans
SoI	Survey of India
WFMS	Workflow Management System
OM	Operations Management
UDPFI	Urban Development Plans Formulation & Implementation
SPOT	Satellite for Terrestrial Observation
DEM	Digital Elevation Model
SQL	Structured Query Language
CAD	Computer Aided Design
CAM	Computer Assisted Mapping
SP_4	Sub Process
PM	Process Model
CTP	Chief Town Planner
STP	Senior Town Planner
DTP	Divisional Town Planner
SDTP	Sub-Divisional Town Planner
PO	Planning officer
QCB	Quality Control Board
QAC	Quality Advisory Committee

1. CHAPTER

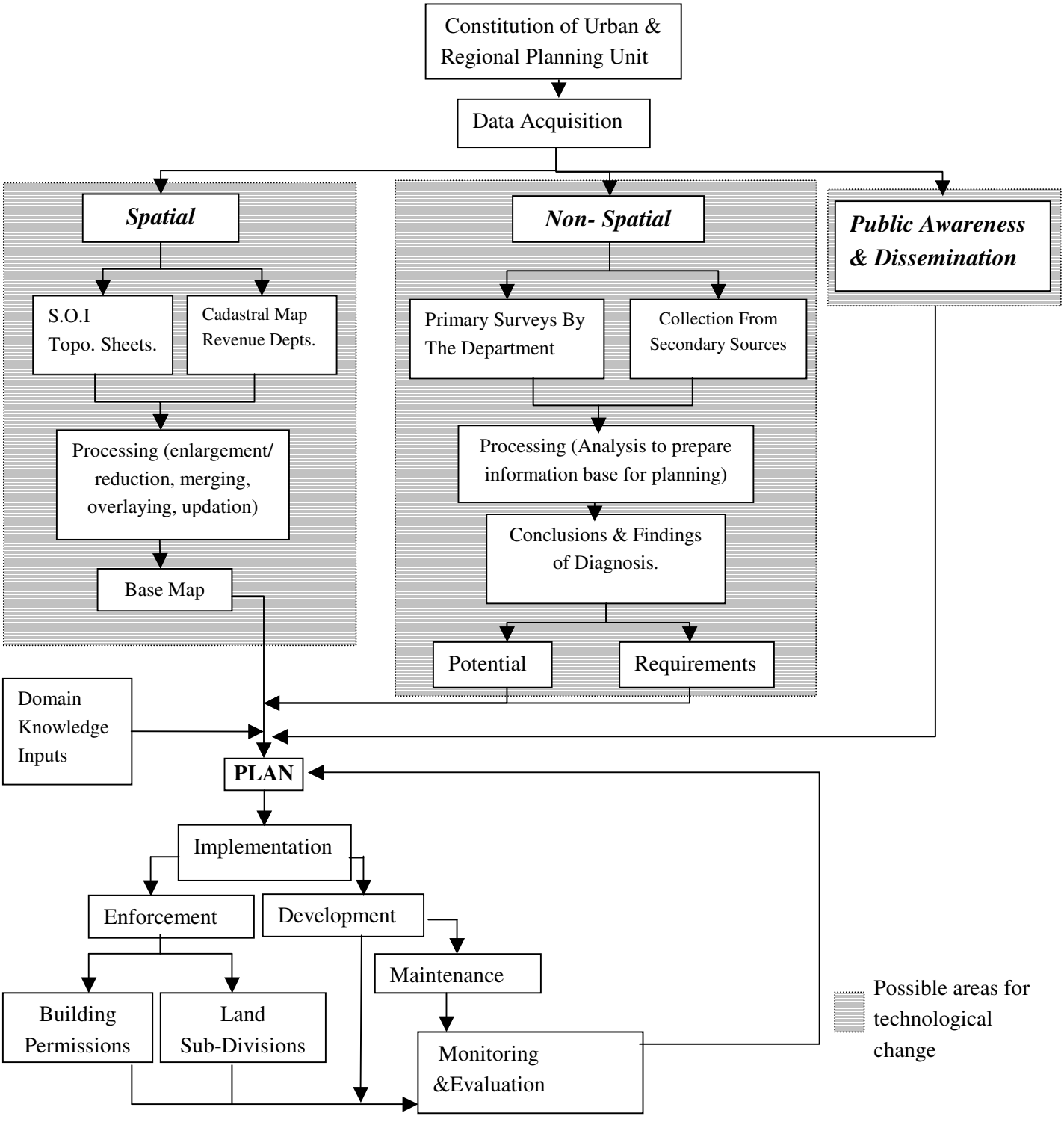
1.1 Introduction

Urban & Regional Planning (URP) is a statutory professional application field, entrusted with distribution of spatial activities in 3-D space as per needs and purposes of society (August.E.Rosnes, 1999). Its history is as old as the evolution of mankind. It is an intermediately step between the policy making and actual implementation stages of the development process. In view of its spatial nature it is also called Spatial Planning. Its synonym is Physical Planning as it generates blue print to translate economic and developmental decisions and priorities into physical realities. It aims at balanced economic development, social justice in distribution of resources and living environmental quality. It has many levels starting from regional level to built-up cluster level. It encompasses the whole space in which all the human activities have to take place. Its arena of play is land (space), which is the most precious, scarce, exhaustible and powerful resource of the society. The anthropocentricity of the field makes it to revolve around man, his pursuits and physical environment i.e., nature.

In Indian context, it is primarily being government concern at various levels and being practiced as a mandatory social service. The discipline is not at all new to the Indian environment as the very initial seeds of urbanization had germinated and flourished in the form of earliest human civilizations on Indian soils with early man's going for settled agriculture. However, the present day urbanization, which unquestionably is an outcome of industrial revolution followed by scientific and technological advances by the human race all over the world. The Western Europe and especially United Kingdom were the first casualties to the industrial revolution induced urbanization and subsequent ills of the same.

As such, out of necessity the earliest concepts and models of modern urban planning emanated from that part of the world, which subsequently spread the world over. We here in India too thus have legacy of the British model of urban planning legislation, education and practice. A realization has now started coming among all concerned with the process of Urban Planning that existing business process of urban planning has become quite mature for optimisation in-the wake of changing technological and societal environment including requirements of the stakeholders. Moreover, the increasing complexities in the business process are calling for introduction of modern business management techniques in managing its affairs. The optimisation is urgently required to provide robustness to the system enabling it to tackle challenges posed by the current urbanization scenario. An over view of the existing URP business process model with respect to the primary function of plan preparation is as follows:

Figure 1-1 Existing Urban Planning Business Process Model



1.2 Litrature Review

The present research is a maiden attempt based on experiences of the researcher in the field of urban planning in Indian set up and the exposure to geoinformatics technological & management tools received during the theoretical part of this M.Sc. programme. As such literature strictly as per the requirements may not be available. The BPR (Business Process Re-engineering) has extensively used in industry far long but it's application in the field of Geoinformatics industry has remained limited so far. However, literature reconnaissance shows that enough BPR works applying geoinformatics technology with respect to geoinformation production organizations such as NMAs (National Mapping Agencies) have been done in other parts of the world especially in Europe that may provide sound direction to the presently intended research. A few of such works are as follows:

Akpoyoware, A.O. Towards improved cadastral services from federal ministry of works and housing, Nigeria: a scenario for change A M. Sc thesis (2003) is devoted to evolve an improved cadastral services system in Nigeria along with methodology to evaluate the evolved system and ways & means to put the new system into operation.

Chuentragun, T. Business improvement for geo - information organization in governmental sector with ABC: a case study, Land Office, The Department of Lands, Thailand, is a M.Sc thesis (2003) work done for accomplishing a methodology, to enable better estimation of current production cost and service cost, more efficient cost control, and better assessment of possible improvement.

(Getinet Beshah, 2003) in his M.Sc thesis has formulated elaborate guidelines for institutional arrangements of the federal governmental geo - information provider organizations in Ethiopia.

(Robinson, 2003) in his work for M.Sc thesis titled -Development of an operational plan and land information system for local property offices in Namibia has come out with an effective low cost Land Information System suiting to the requirements of the users.

(Kwon, 2002) has very meticulously redesigned a Topographic Mapping Systyem using Unified Modeling Language (UML) for National Mapping Agencies for his M.Sc thesis.

(Karioki, 1999) in his M Sc. Theses produced structured guidelines for effecting Business Process Redesign and Performance Evaluation in a geo-information production organisation in a way that would greatly reduce the risk of failure.

(Sani, 1998) in her thesis, Dynamic modeling of geo-information production processes describes a methodology for modeling a core business of a geoinformation organisation. The methodology aims to define the performance measures of the geoinformation production business to study how the process contributes to the organisations business objectives and uses software tools to test and validate the model.

(Salamanca, 1997) in her M Sc. thesis proposes a way of applying the concepts of BPR and Operations Management (OM) in the Geographic Institute "Agustin Codazzi"(IGAC) of Colombia in order to improve its competitive power.

1.3 Research Problem

The Urban Planning Departments are state level institutions established under law to fulfill the prime objective of optimum, sustainable and judicious utilization of land resources by devising strategic plans for both, urban and rural areas. The said Development Plans are the effective instruments for controlling and regulating the physical development of human settlements and resource regions in planned, systematic and scientific manner, so that physical environmental entities may come up in a harmonious fashion. This objective is being achieved by following a prescribed business process model conceptualized under the law and based on expert domain knowledge. The essential inputs for performing this task are primarily used to be the spatial and non-spatial data, which help in characterization and comprehension following diagnostic approach that leads to work out best solutions to urban problems.

Most of the conventional concepts and techniques being in practice during the last century to design for planning and management of towns / cities are turning to be inadequate to deal with the changing situations. This task requires accurate, timely and cost effective spatial data to assess land use requirements, changing patterns and periodic monitoring and evaluation. Acquisition of spatial data either from Survey of India or Revenue Department and subsequent processing of the same to make it use worthy for the purposes of physical planning is really a Herculean task, since in spite of putting all out efforts, resources and time, planners have to compromise with respect to quality parameters like scale, coordinate system, contents, completeness, consistency and presentation. This situation adversely affects successful implementation of the plans. In some instances data are not available at all or not as per requisite specifications of currency, updating and coverage. Thus planning whatsoever is done always lags behind the real world realities. The credibility of the planning process and the planners as such always remain at stake.

The problem at the moment is that the prevalent Urban & Regional Planning URP business process model is not keeping pace with the changing internal and external working environment including available enabling technologies of spatial data inputting, users' expectations with regard to cost, comfort, quality, time and quantity of information as well as ever increasing workload on account of incredible acceleration in urbanization. As such certain gap areas have developed in the business process, which need immediate addressing for averting things going to worst from bad. Apart from this, it is also pertinent to mention here that urban planning business process is both, user and provider of data. Provider in the sense that by using common framework data, it provides value added data / information which becomes base for other applications. From this view point too, it has now become very much imperative to go for adopting modern enabling technologies of data inputting and processing in urban planning business process for the sake of compatibility to interoperability, sharing, consistency and such other concepts of spatial data infrastructure movement the world over in this era of information.

1.4 Motivation

The efforts up till now to channelise urbanization in right perspective could not render the so encouraging results. The comprehensiveness in the urban management has not so far adopted. Consequently, the urbanization has remained imbalanced towards already highly urbanized regions, primate urban nodal locations and all along lines of movement enjoying excellent accessibility in form of built-up corridors. The achievement of the objectives of social justice with respect to distribution of urban land among various stakeholders in society, balanced development and livable environmental quality is as such still a far cry. The emerging pattern of urbanization is putting environment, heritage and land resources at stake. The reason for the present scenario is ineffectiveness of prevalent urban planning process based on conventional methods and technology. Hence, change in the business process is inevitably required at this juncture.

1.5 Geoinformatics In The Context

The fastly emerging Geoinformatics technology has effective tools to overcome most of the problems of urban planning business process on account of usage of conventional methods of data management. A few prominent usages are enumerated below:

High-resolution satellite images can be used for producing detailed maps at large scales.

Microcomputer technology can be extensively exploited for intra and inter organizations communication as well as information dissemination purposes to ensure exhaustive public awareness and participation in URP business process, as it is becoming more accessible and affordable day by day. This change may help in increasing coordination at all levels and in removing redundancy in data.

Digitization of analogue spatial data from different traditional sources and layout plans may facilitate updating of base maps comfortably, faster and with remarkable quality. Digital data provides flexibility, as it is scale free. Overlaying operations of two datasets on two different scales is also feasible. This quality of digital maps has vast potential for addition, alteration, deletion, transfer, conversion, superimposition, merger and any other manipulation of data.

Change detection in land use and land cover or urban growth / sprawls can be detected and updated at faster speed, with higher level of accuracy and at a reasonable cost.

GIS may help in excellent information management, information sharing and removing redundancy. Web GIS and Open GIS have vast potential to create real dynamism in any information based application field.

1.6 Objectives

The prime objective of present study is:

Improvement of Urban Plan Preparation Business Process (UPPBP), using modern GI technology and management techniques, to better responds to evolving societal requirements or challenges on UPPBP.

Sub Objectives

- To investigate business affecting forces posing challenges to the Urban & Regional Planning Business Process / Department in the "AS IS SITUATION" as well as evolving requirements on the process.

- To go for optimising the business process, suggesting substitution of prevalent methods of data management including collection, storage, manipulation, retrieval and dissemination with the geoinformatics technological and incorporation of management techniques in the UPPBP.

- To evaluate the optimised business process model.

- To evolve an effective strategy for operationalisation of improved UPPBP.

1.7 Research Questions

- Has the prevalent URPBPM achieved the objectives of planned urbanization up to now?

- What are the key factors affecting the efficiency of existing URPBPM adversely making it inadequate to cope up with present day urbanization challenges?

- How the existing model can be improved to suit the changing urbanization environment and how the improved model can be evaluated?

- What potential Geo- Information & Communication Technology and Operations Management techniques have for optimisation of UPPBPM?

- What are the institutional requirements to operationalise to optimised process.

1.8 Data Requirement

To strengthen the base of hypothesis for this research a primary survey will be conducted by getting a specifically designed questionnaire for the purpose filled up from the concerned State Heads of a few URP Departments namely Punjab, Haryana, Uttaranchal & Himachal. The information in this survey will be collected on costs, time, and manpower involved in acquisition and processing of spatial / non-spatial data. Apart from said primary survey, data if any, available on such aspects with other organizations like Survey of India and IIRS will also be utilized for analysis purposes. The information on requirements of customers and users will be obtained only from secondary sources and experiences. The inferences of such study will support the assumptions conceptualized to take up this subject for the present research. The outcome of intended research would be replicable in any part of India with requisite modifications in view of local scenario.

In addition Acts, Rules, Administrative Reports, Manuals, Budget statements, Policy documents and other relevant information from various institutions related to urban planning will also be used to strengthen the hypothesis of research.

1.9 Methodology

1.9.1 Introduction

The term optimisation is used in the title of the research as it aims at improving the Plan Preparation Process within the Urban Planning Business Process Model, which represents an independent and well-established field of application having standard and objective processes, sub-processes and activities fixed by legislation / regulations. The sub- processes of Urban Plan preparation will remain by and large unchanged. However, technological shift, removal of redundancy and technology associated addition / alterations will be suggested as per requirements of the process of optimisation. The emphasis is on continuous process improvement operations by importing emerging enabling technologies and management techniques into the processes of urban planning, which are not yet introduced in this field of application at least in Indian context. It however does not anyway mean total discernment of re-engineering concept.

The present research being an attempt to apply the concepts and techniques of operations management on the processes of Urban Planning and improvement of said processes by replacement of conventional technologies with modern enabling GEO-ICT is based upon a combined methodology of these fields of knowledge. As the ultimate aim of research is to optimise the plan preparation process of the urban planning business process model to make it more robust in view of emerging challenges on it, a general methodology, which is evolved after combining many prevalent methodologies propounded by researchers during the last decade for Business Process Reengineering (BPR) / Continuous Process Improvement (CPI) process [N.S.Cameron, P.M.Braiden 2002], is found to be more appropriate for adoption in accomplishment of this research.

The said methodology in all contains eleven generic headings / steps to implement any BPR / CPI project. As it is evolved on the basis of methodologies developed for application of BPR / CPI in the field of manufacturing and involvement of only manufacturing companies a few initial steps namely, re-engineering readiness, plan of action and training of team and communication to organization may require slight alterations in view of different nature and propriety of urban planning business process especially in Indian context, where it is a social, government manned and statutory service. Almost similar eight steps have been advocated by [Radwan, et.al July, 1999], condensing several methodologies developed by other researchers, [see for example Devenport&Short [1990], Borthick&Roth [1993], Rigby [1993]]. As in OEEPE (European Organization for Experimental Photogrammetric Research manual [Radwan et, al 2001] the steps of BPR / CPI are grouped in to three phases mainly, initiation, re-engineering and maintenance.

1.9.2 Initiation

It is the part of a pre-BPR /CPI stage and involves learning about the system its structure, functionalities, inputs, products and services, stakeholders, customers, actors both internal and external. The objective to go for this fact-finding process is to find answers to questions like why a particular system exists, what it does, how it does, for whom it performs, what inputs it uses, what it produces, who are its customers and so on. In brief it is very much similar to clinical history of a patient in the medical field.

In order to acquaint with the mission, vision, goals and objectives of urban planning business process a comprehensive review of prevalent laws related to urban planning, periodical administrative reports of planning organizations, their action plans, urbanisation policy documents, perspective vision documents and performance in the eyes of customers and general public is made.

1.9.3 Continuous Process Improvement

This phase starts with understanding and deciding the suitability of approach to be adopted for organizational change by the BPR team / authority responsible out of techniques like re-engineering, continuous improvement and restructuring. The choice of approach depends on the conclusions of in depth study of the identified processes of the organization and diagnosis of their present i.e., AS-IS SITUATION with respect to deficiencies, bottlenecks and deadlocks. Next step in this phase is to envisage the mission and vision for the TO-BE SITUATION in consonance with the requirements emerging on the process from customers, stakeholders and end users on one hand and available opportunities including enabling technologies. Thereafter business process modelling (BPM) techniques are applied to capture, represent and describe the business processes of the organization. This is then followed by design and building a prototype of the new process subject to requisite structural

(organizational + institutional) and technological change for achieving the envisaged objective of change.

To analyse current situation and prepare a strategic plan the common management tools are SWOT, STEPE and PORTFOLIO. In present context SWOT is intended to be used. SWOT is acronym of Strengths, Weaknesses, Opportunities and Threats. It is a most popular management tool for making analysis of the as is situation of the business processes of any organization. It involves two basic steps namely internal scanning and external scanning with the help of which four above stated elements called SWOT are highlighted / derived. SWOT is pre-BPR process. SWOT matrix provides base for strategic visioning for any organization clearly indicating strategies to avoid previous pitfalls and future improvements. SWOT is a tool for use in the preliminary stages of decision-making, often as a precursor to strategic planning. It is a common tool in performance analysis and in evaluation studies. [Groenendijk, 2003].

To start with an exhaustive questionnaire is designed to collect data from a few State Government Urban Planning Departments for creating a database, so that the very basic hypotheses of this research i.e., need for change in the plan preparation process of Urban Planning Business Process Model may be provided support. The questionnaire covers all aspects of Urban Plan Preparation Process like evolution of planning agencies and institutional infrastructure, processes, technologies in practice, resources available at the disposals of planning agencies, opinions of senior professional planners on performance levels and suggestions for improving effectiveness and efficiency of the process. The general structure of questions asked in the survey interviews covers issues such as;

Urbanization scenario including magnitude, spatial pattern, change trend, potential and challenges to make an assessment of achievement level with respect to basic objectives of balanced development, social justice and environmental quality.

Evolution and legal base of plan preparation process as well as professional leadership.

What are sources, methods (technology), and requirement pattern of resources i.e., time, cost and manpower for spatial & non-spatial data needed for plan preparation? Their adequacy / inadequacy, pros & cons and willingness / readiness as well as opinion for change.

Present status of public awareness, participation, support, response / acceptability with respect to planning products and services and efforts by their institutions to make change in present scenario of these aspects.

The opinions on as is situation, factors responsible for the same, their satisfaction level with regard to status quo and suggestions for change. The questionnaire is at annexure…

Data is collected by the researcher in person by getting the said questionnaire filled up by the senior level professionals of sample organizations in specially conducted interviews. Four Urban Planning Departments of States namely Himachal, Punjab, Haryana and Uttaranchal situated in the northern most part of Indian Union were covered for the survey. The area taken covers a very small fraction of the country yet represents geographical, urbanization spatial pattern and potential diversities well. Two of the sample states are hilly where as the remaining two are located on the plains. The former

are having smaller towns and slower urbanization whereas the latter are experiencing rapid urbanization at the decadal growth rate of as high as 51% against the national average figure of about 35% during the last decade 1991-2001.

The data so collected is compiled, analysed and inferences are drawn. On the basis of these conclusions the case for change with respect to plan preparation process is justified. The challenges on the urban plan preparation process on account of changes in the customers' requirements in the wake of changes in technology and socio-economic milieu are identified. The internal scanning of the organization and the process on one hand and that of external environment on the other are done to explore the driving forces necessitating change on the basis of opportunities and threats to the process or for that matter to the planning agencies as well as weaknesses and strengths of the system. For the purpose of finding out weaknesses and strengths of the planning organization or for that matter planning process various perspectives / special purpose models / viewpoints of a modelling technique called RM-ODP (Reference Model- Open Distributed Processing) are developed. The external scanning of the environment in which plans are prepared is done by developing viewpoints based upon personal experiences and field knowledge and conclusions of the primary survey conducted for the purposes of this research.

Further on the basis of the conclusions of the survey and results of scanning both internal and external E-SWOT (extended Strengths, Weaknesses, Opportunities and Threats) analysis / metrics are worked out to formulate future strategy to bring in change in right perspective after establishing the nature of problems in the AS- IS- SITUATION whether structural / institutional or technological of problems with the prevalent plan preparation process. E-SWOT analysis takes in to account all possible matches of strategies among SWOT elements.

For the purpose of this research the core process of plan preparation is structured in to sub-processes and activities in the light of the provisions of the Himachal Pradesh Town & Country Planning Act, 1977, along with their description, perfomance problems and possible improvement actions with respect to technological or institutional changes. In the next step, a new Organizational Model for the urban planning agency as a whole as well as Quality Model and Workflow Model for the plan preparation process in particular are evolved to coincide with the requirements of the optimised core process model.

1.9.4 Implementation Scenario

The optimised plan preparation process is then evaluated on the basis of criteria including time, cost, quality, amount of contents and level of public participation. As the criteria are highly subjective so far their quantification is concerned an qualitative evaluation technique based on personal experience in the process is evolved to assess the magnitude of improvement on implementation of the proposed process model. An attempt to draw a strategy for adoption of optimised process model for urban plan preparation, suggesting requisite alterations in supporting institutional resources including manpower

and legislative measures is made in the end. Lastly, conclusions of this research and recommendation for future research in the area are addressed.

1.10 Scope Of Research

The present research primarily concentrates and relies on the experiences of the researcher while working in his parent organization. As such the focus of the present research will remain on the Town & Country Planning Department, Government of Himachal Pradesh. It, however, does not in any way mean that the working environment or for that matter the business process is unique and all together different to other similar organizations in other parts of country, so where ever possible and felt necessary in the interest of research things will also be substantiated from other parts of the country. Being professional application field the study will implicitly personify the business process in practice all over the country with a little localized variation, which are inevitable in such a vast country.

1.11 Expected Outcome

The outcome of this research will be an optimised UPPBP comprising of process model, work flow model, quality model and organizational model for urban planning, based on geoinformatics technological and management tools, which will suit to the expectations and aspirations of the users on one hand and technical requirements of future urbanization in the changing technological environment on the other. It will include crisp guidelines for technological shift with respect to identified components of urban plan preparation process to achieve objectives of inter as well as intra institutional operability and information sharing which have become essentialities of present day development process.

1.12 Structure of Thesis

The thesis consists of seven chapters in all as follows:

Chapter One: Introduction

Describes the nature and status of Urban Planning Process in the overall Indian context defining the research problem. The objective of the research is to optimise the Urban Plan Preparation Business Process (UPPBP) including its structure and functionalities in consonance to requirements of the prevalent urbanisation scenario and available enabling technologies at the moment, which have potential to enhance capabilities and capacities of the planning business process. The research questions with relation to stated objective and appropriate methodology to address to those questions is also explained.

Chapter Two: Urban Planning & Development-An Overview

Gives an account of evolution of urbanisation and its present scenario in Himachal Pradesh- a small hilly State of Indian Union in the Himalayan region on which the main thrust of this study will lies.

Chapter Three: As- Is Situation Analysis

This chapter is devoted to diagnose the urban planning business process system architecture following internal scanning through drawing various perspectives approach of RM-ODP modelling technique followed by external / societal environmental scanning for crystallizing the complete task & societal environment of the said business process. To build base for the future improvement strategy SWOT analysis and matrices are exhaustively done on the basis of scanning of the system as well as conclusions of a survey conducted covering four state Government urban Planning Departments in India.

Chapter Four: An Overview of enabling technologies

It presents an overview of available Geo-Information Technologies and Geo-Information Management Technology highlighting their potentials and limitations, which may help in filling up the gap areas in UPPBP and thus rejuvenate the same for coping with emerging challenges.

Chapter Five: Proposed Design for Optimisation of Urban Plan Preparation Business Process

It deals with design of a new optimised business process for urban plan preparation by structuring the process in to sub processes and activities and then suggesting improvement measures. This is accompanied by modelling for organisational restructuring, quality management system and workflow model to ensure continuous improvement of the process even after adoption of optimised process.

Chapter Six: Evaluation of the Optimised Urban Plan Preparation Business Process

In this chapter an attempt is made to evaluate qualitatively the optimised process by developing a scenario for anticipated improvement in the process with respect to criteria like time, cost, public participation, contents of plans and quality on the basis of personal experiences in the field of Urban Planning in the Indian context for about quarter of a century.

Chapter Seven: Implementation Strategy Guidelines:

This chapter suggests guidelines to make necessary changes in the supportive sub- processes related to institutional and man power resources, which assist urban planning process in performance of its responsibilities.

Chapter Eight: Summary, Conclusions and Recommendations:

Devoted to conclude on findings of this attempt and some suggestions to keep continuity of research in this direction in future.

2. CHAPTER

Urban Planning and Development Process – An Overview of Existing Situation

2.1 Introduction

This chapter presents an account of urbanisation process in evolutionary perspective in the State of Himachal with reference to which urban plan preparation process is to be studied and optimised as per the objective of this research. The comparison of the present status of urbanisation is also made with the neighbouring states, which too have been included as sample states in a primary survey conducted for collecting data for analysis of the as is situation of the process. The performance of the organisation or for that matter the business process in the light of available legal backing is also touched upon.

2.2 Study Areas and Process

Himachal is a tiny hill state with a geographical area of about 55,000 sq.km. in the north western part of India in the outer Himalayas. The population of the state as per 2001 census data is 6.07 million out of which 0.6 million is urban. In relative terms urban population is just 9.80 % of the total population. The figure however is not representing the real magnitude of the urbanization in the state, which certainly is to the tune of around 15%. This gap in the recorded data and ground reality may be attributed to the facts that the urban area limits are very old and not containing the larger proportion of urbanization, which has taken place during the last two decades in form of out growths in contiguity to existing built up areas out side the municipal limits and all along the major highways. The population density varies between 2 person / sq. km. in the interior areas of Lahaul & Spiti district and 275 person / sq. km. in lower areas. Though, urbanization is very low, yet it has wide implications on account of fragile eco-system in the Himalayas. The society primarily is rural.

Topographically, the state can be divided into three regions namely Shiwalik hills, Middle Himalayas and Inner Himalayas. The average absolute relief varies between about 300 m to 5500 m from the mean sea level. Geologically, the state has by and large sedimentary rock formation at the sub-stratum level with a few exceptions, which may be attributed to localized metamorphic eventualities. The geomorphic landscape is carved out by the running water and glaciers. The overall topographical scenario is a combination of mountains and interlocked basins. The mountain slopes are steep with thin or no soils where as valley locations have well developed alluvial soil profiles that are for agri-cultural pursuits. The state has considerable landmass under forest cover as about 35%of the total geographical area is under economically valuable forests including coniferous varieties of trees.

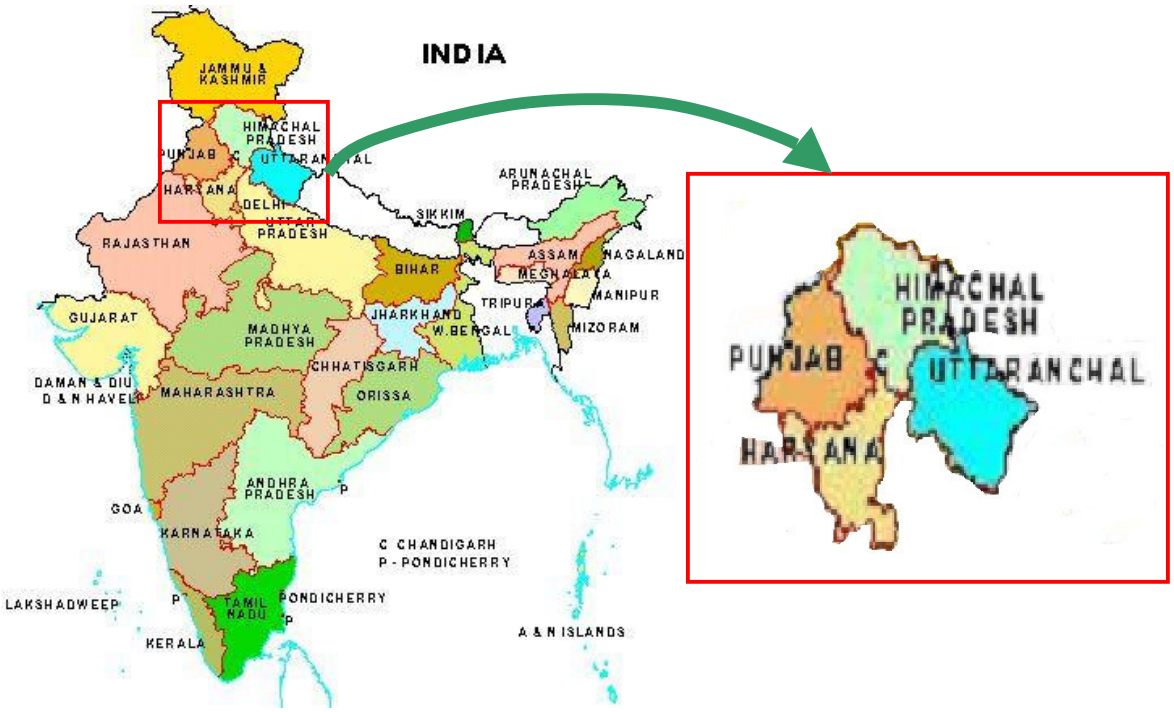


Figure 2-1 Location plan

Economically, the state has considerable dependence on horticulture, tourism, hydroelectric power generation and forest based &other industries.

Urbanisation in Himachal is picking up fast as is evident from decadal growth rates in table below, which show equivalence with adjoining states. Only one city is above 100 thousand population, which accommodates around 25% of total urban population of the state-indicating polarisation in

spatial distribution pattern of urban population. The higher urban decadal growth rates in comparison to rural areas is an indication of imbalanced spatial development and consequent migration of population to towns and cities, which in turn leads to numerous urban problems on account of excessive burden of the available infrastucture.

Table 2-1 Class wise distribution of towns

Class	Himachal			Haryana			Punjab			Uttaranchal		
	1981	1991	2001	1981	1991	2001	1981	1991	2001	1981	1991	2001
I	-	-	1	9	11	20	7	10	14	2	3	3
II	1	1	-	7	11	7	10	18	19	4	4	4
III	2	4	6	15	18	26	27	25	35	8	12	14
IV	5	7	7	25	31	36	36	46	54	11	13	12
V	9	5	16	23	21	16	40	14	28	13	16	23
VI	30	41	27	2	2	1	14	7	7	27	23	14
Total	**47**	**58**	**57**	**81**	**94**	**106**	**134**	**120**	**157**	**65**	**70**	**71**

Decadal Growth Rate

	Himachal		Haryana		Punjab		Uttaranchal	
	1981-91	1991-01	1981-91	1991-01	1981-91	1991-01	1981-91	1991-01
Urban	37.80	32.43	43.41	50.79	28.95	37.58	38.19	13.18
Rural	19.39	16.11	22.92	20.63	17.69	12.28	28.47	20.75

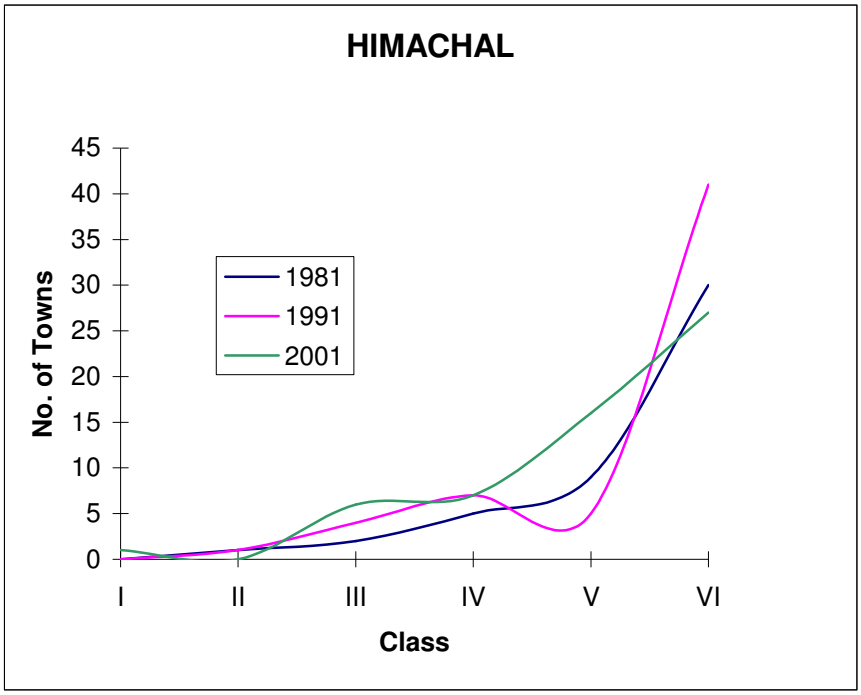


Figure 2-2 Class wise Distribution of Towns 1981 –2001

2.3 Urban Planning an overview on Evolution

Planning and development of land or for that matter Urban Planning has a very long, varied and rich history in Himachal. For convenience three eras can be conspicuously identified as follows:

2.3.1 Pre-British Periods

It dates back to early 12th century when feudal society started emerging on the scene in the interior parts of the Himachal region of the Himalayas. Powerful chieftains started occupying and owning specifically demarcated territories in form of small kingdoms. The planning of land for human habitations started with the initiations of rulers to establish their capital towns accommodating grand palaces, religious institutions, mansions for housing civic administration, fortresses and necessary residential buildings for the courtiers. The sites for locating such settlements were selected giving due considerations to factors like water source, safe from security point of view, accessibility and nearness to agriculturally productive tracts to ensure easy supply of basic needs of food.

Generally the towns come up on flat alluvial terraces of major perennial rivers. Some nice pieces of urban design emerged during this era, which even today are masterpieces of precious heritage. The planning system in this period was centralised, autocratic, aristocratic and dictatorial in nature. Land was available in abundance. Financial resources were no constraints because of feudal nature of society. The demands for basic urban amenities including facilities, services & utilities were limited and in consonance and harmony to carrying capacities of natural sources and systems. The urbanization scenario was less complex. Implementation and enforcement of plans in whatsoever form those were, was easy and successful. Ecological imbalances, environmental crisis and social disorders were not the characteristics of urbanization in this period.

2.3.2 British Period

The next phase of urbanization was witnessed in the Himachal part of the Himalayas on entry and long presence of the British in the region for about 150 years during 1800 A.D to 1947 A.D.The forces attracting and encouraging urbanization were panoramic landscape setting and salubrious climate along with strategic geopolitical location of the area to the frontier regions of the country. The British developed small but beautiful cantonments and health resort towns throughout the length and breadth of the region. The settlements incepted during the period are still dominating the cultural landscape of the state, though with some changes in the physical profiles over time on account of changing socio-cultural and technological environment. The impact of urban planning principles,

techniques and practice of the western world especially England is distinctly visible in the core parts of these towns, which have now been declared heritage zones and are being adopted for conservation. The planning in this phase too remained dictatorial and centralized in the hands of alien rulers and a few locale elite sections of the society. In fact this era was the real start of urban planning in the state as the concepts of land use zoning, segregation of incompatible activities and communities, development of public amenities and civic governance were set in during this phase. The public participation in planning and involvement of masses in decision-making was still missing. The urbanization in this era too was not complex and was well managed. Apart from this small, simple, service non-British-non-elite towns on pedestrian scale were under control and supervision of local municipalities for planning and management of their civic affairs during this period.

2.3.3 Post Independence Period

The urbanization scenario in the post independence era started undergoing transformation as the development process got accelerated on account of changed socio-economic polity of the country. All round development started taking place in a big way without any consideration to the spatial dimensions of physical development in the initial stages of economic resurgence. The socio- economic transformation and industrialization lead to crude type of urbanization having characteristics of polarization in a few priced locations. This concentrated pattern of urbanization led to spatial imbalances in development level, environmental crisis on account of congestion, in optimum utilization of resources and ultimate social inequalities causing disorders. The small urban settlements started growing organically in the absence of some well thought out urbanization policy, non-availability of serviced land, planning & development regulatory agency with appropriate statutory backing and above all unawareness regarding long term effects of unregulated urbanization.

Arising to the situation the State Government created a small unit with in the State Public Works Department in 1964 to look after the Urban &Regional Planning affairs. The initiative proved to be inadequate and inefficient to deal with urbanization forces for want of legal backing, clear understanding of the intend and purposes of the this new institution, ambiguousness about the nature and contents of the discipline of Urban Planning. A timely and right action of the Government thus remained a mere ritual and the urbanization forces continued to play havoc with the highly sensitive and fragile eco-system for another long 15 years till 1979, when the State Legislature accomplished the tasks of enactment of the Town & Country Planning Act, 1977, Rules-1978 and establishment of an independent Directorate of Urban Planning in the State. These administrative and legislative actions were in consonance to constitutional provisions and directive principles related to land, urban planning and local governance of the Union.

Mission: The mission of the Organisation / UPPBP is to prepare Development Plans and Sector Plans to ensure planned development and use of land as enshrined in the Himachal Pradesh Town & Country Planning Act, 1977.

Vision: To bring all the urban areas, growth points and potential regions of the State under the provisions of said Act, so to achieve mission of the organisations.

Strategies: By preparing the conventional seven land uses plan for urban areas.

2.4 Performance:

In spite of right initiatives at strategic level by the Government the Department till now could not extend the law to all areas experiencing rapid urbanization. Urbanization Policy, Planning Regionalisation and Regional Planning have not got any heed from the Spatial Planning Depatment.The Planning efforts whatsoever have been made by the Department have been done in isolation, on adhoc basis and in a pick and choose manner. So far, out of 57 towns planning areas have only been constituted for 21 towns. Development Plans are prepared for just 14 towns. Planning below this level is done very rarely. The implementation of such plans is entrusted upon the State Housing Board, which is declared as The Town & Country Planning & Development Authority after the merger of H.P.Urban Development Authority in 2001.

For taking care of urbanization taking place at certain nodal locations of tourist, religious, heritage and commercial interest as well as all along major Highways about 28 Special Areas have also been constituted and put under the control of Special Development Authorities specifically created to plan, implement, enforce and maintain urban planning activities in such areas. Regulatory /enforcement functions under the law are delegated to Municipal Authorities or District level administrative authorities on the analogy of Special areas Development Authorities, to comply with the spirit of innovative 73rd, & 74thconstitutional amendments and subsequent State legislations for decentralized planning.

These new enactments have created vast opportunities for urban planning profession in the whole of the country but at the moment the provisions of these new legislative pieces are at conflict with the Town & Country Planning Act, 1977, which needs to be addressed immediately for removing the overlapping of functions to overcome the prevailing chaos. By and large, it is apparent that planning function at least with respect to notified urban areas and emerging likely urban growth points and corridors is exclusively being vested in the Town & Country Planning Department presently.

The low performance of the process is causing dissatisfaction among the masses and thus earning on good for the profession and the environmental degradation on account of unplanned development is a common phenomenon of concern for all. In spite of good legislative backing and rich cultural and-planning legacy as well as organisation to deal with the affairs, why the scenario is emerging as such is a big question to ponder upon. What has gone wrong and where? The exodus of rural masses to urban areas is constantly increasing. Urban areas are growing at faster rates in comparison to rural areas causing imbalances in overall spatial development pattern. The unabated growth of towns and cities is making them not worthy to live in on account of deteriorating living environmental conditions out of overburden of infrastructure. Land values and rental values are going sky high making the lives of larger sections of society miserable by compelling them to live in slum like situations.

The situation conspicuously indicates toward the need of comprehending it and suggest curative measures after diagnosing the fact that what has happened to planning system. Here lies the genesis of present research.

Urban Planning is "concerned with providing the right space, at the right time, in the right place, for the right people"[Ratcliffe, 1987]. It deals with allocating spatial locations to various human activities as per their specific requirements and characteristics of compatibilities to surrounding activities, so to ensure harmonious, aesthetically pleasing, economically viable and environmentally sustainable pattern of development of human settlements. In order to go for applying new Geo- Information & Communication Technology and Geo-Information Management Techniques for ensuring continuous Improvement of this field, it becomes imperative to establish first whether Urban Planning is a system and its processes as business processes of some other fields where operations management technologies are in common practice.

2.5 Is Urban Planning a System and its processes business?

A system can be defined as a regularly interacting or independent group of items (components) forming a unified whole [Webster's dictionary]. The components of a system should be identifiable, independently designable and analysable independently of other components. It must have specific purpose and supported by interaction between its components. The combination of components of a system is called structure. The roles of the components of a system are represented by the functionality.

The system structure and system functionality together form system architecture. In other words a system should have a definite way of taking inputs, apply some process on them and ultimately give some output. The combination of the system structure and its functionality is called system architecture. (Radwan, M.M & et. al, 2001).

Coming back to the present context, we may say that Urban Planning Process is certainly a system since it qualifies conditions of definition of a system described above. The Urban Planning Business Process is a combination of distinctively identifiable sub- processes namely data acquisition, data management including analysis, planning design, formalization including legitimatisation, implementation including enforcement and presentation & dissemination. The process takes spatial and non-spatial data as inputs, makes value additions and produces spatial development plans as outputs.

It is also a business since the outputs of this process are being used by a number of customers. The Department of Town & Country Planning is a structured distributed system at the moment. It is created to execute the intents and purposes of the Town & Country Planning Act, 1977, by applying the expert knowledge of the discipline of Urban Planning in the public interest.

2.6 Conclusion:

This chapter has given an introductory description of evolution and present status of urbanisation in Himachal and performance of urban planning law / department in achieving the mandated responbilities. The next chapter now shall be dealing with diagnosis of the organisation and the business process to make in depth assessment of the As- Is Situation.

3. CHAPTER

As – Is Situation Analysis

3.1 Introduction

The chapter is devoted to portray the prevalent scenario of Urban Plan Preparation Business Process under study. The situation analysis is an essential step in the process of improving or reengineering a business process to rejuvenate the same for coping with emerging challenges in its working environment as well as requirements of the customers and end users. The analysis of structure and its functional process of the process / organization are made with an objective to assess efficacy of the system with reference to fulfilment of the mandated requirements / assignments in changing societal environment. To accomplish this objective SWOT analysis-a popular management tool is used.

The study deals with improvement of Urban Plan Preparation Process at local level i.e. city and its hinterland, which is a part / sub- process of Urban Planning Business Process being practiced in Urban Planning Departments. For the purposes of aimed optimisation both the Department / Organization and the business process are inseparable. Any change in one entity automatically makes corresponding change in the other. So, to improve the process, improvement of functional / structural components of the Department is essentially required or any improvement in the functional structure of the Department will automatically result into improvement in the process. Therefore, it makes no difference whether we call it improvement of the organization or the process. The emphasis of research is on the process but with reference to the organization and that to by and large the Town & Country Planning Department of the State Government of Himachal Pradesh of the Indian Union.

3.2 Internal Environmental Scanning

It is a process of self-assessment to take stock of the shortcomings and good points of an organization with reference to its assigned tasks and performance level. How for the system is successful to fulfil its objective? Is it going on a right track and heading toward positive direction? If yes is there any scope for further improvement to achieve excellence in terms of quality of its product / service, reducing production cycle time and cost and reliability? If no, what are the possible reasons for deterio-

rating or dismal situation? Are there some inbuilt capabilities in the system to tackle this type of situation? Studying the architecture i. e. built up structure of the system helps in making this sort of self-appraisal or diagnosis. In the present research an attempt is made to do internal scanning of an Urban Planning Organisation or for that matter UPBP, by using an approach of developing various perspectives for defining system architecture as per RM-ODP system architecture modelling technique.

3.2.1 Organisational Structure

The Department of Town & Country Planning (T&CP) under the headship of Director is established for carrying out the functions enshrined in the T&CP Act, 1977.It is an independent Department under an independent Ministry of the same name at the Government level. It has a hierarchical structure. Apart from the Directorate there are seven Divisional offices in the field. Sub-Divisional or Planning Area level offices further support each Divisional office. The administrative direction and control percolates from top to bottom. The decision making at Government level trickle down to Directorate through the Ministry where policy decisions are converted into action plans and sent down to the field units along with technical strategy for implementation. The Divisional offices translate the action plan into reality and thus do the real task of plan formulation with the assistance of local offices further down below at local / town level. The Development Plans thus prepared then follow the reverse route to top / Government where those are made legal instruments under the statute.

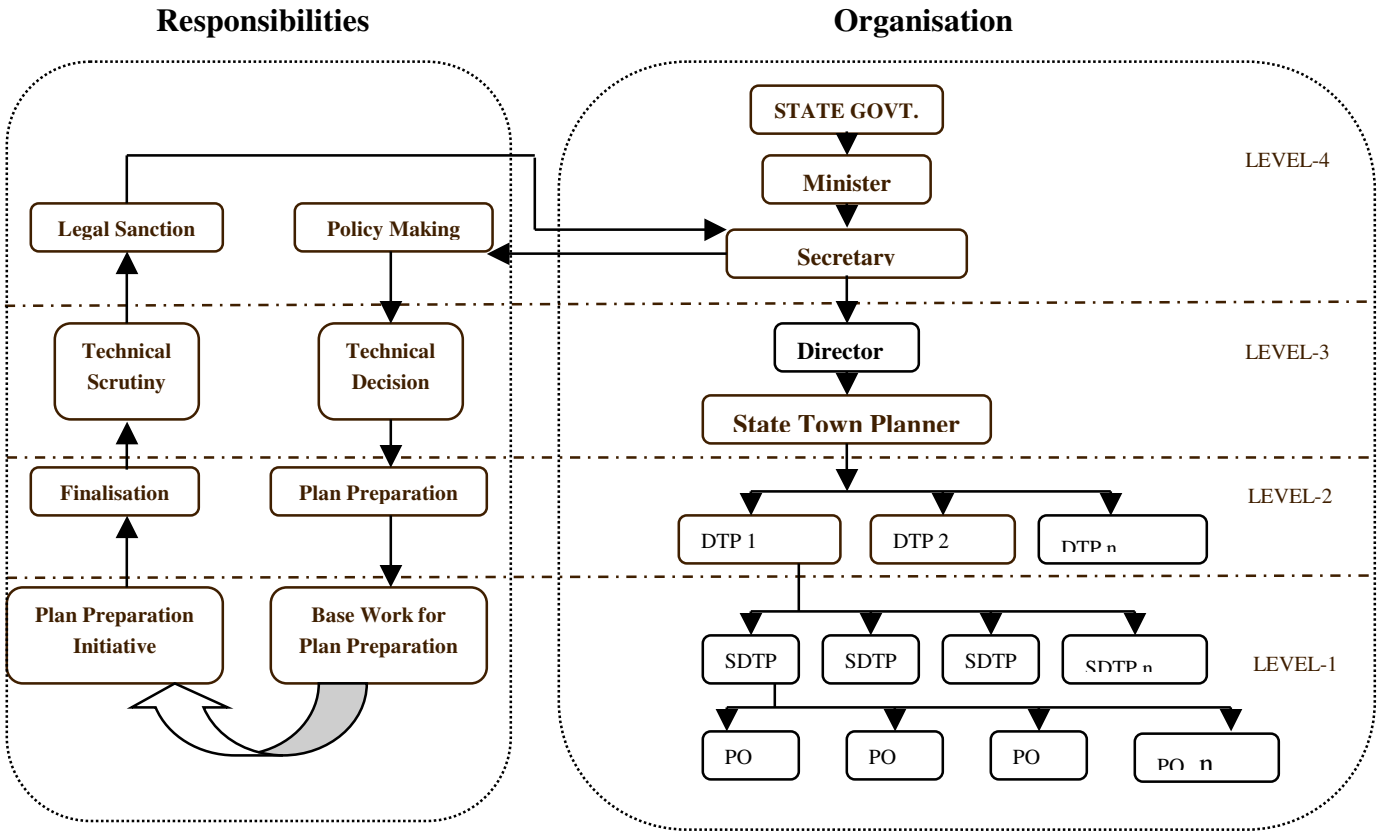


Figure 3-1 **Organisational Structure and Chain of Responsibilities.**

3.2.2 Urban Planning Functions and Products

The primary function of urban planning organization is to prepare blue prints to direct the future physical development of human settlements and their regions in a sustainable manner. The products are in form of written policy documents providing technical services to the society. The spatial development plans primarily contain information related to pattern of distribution as well as density of human population over specified space / geographical territorial unit and assignment of use to each and every parcel of land so to meet with every space need of the concerned community in a most efficient, judicious and optimal manner. Different walks of city community to plan and execute their own developmental projects and programs thus utilize these products. Adherence to the provisions of these products / services is mandatory to maintain orderly existence of the community life. Fig. below represents the external environment of the urban planning department and its boundaries. Apart from this enforcement of regulatory provisions with respect to planning and development of land including construction activities as well as land sub-divisions, implementation of developmental proposals through the various development agencies and ultimately evaluation & review are also assigned responsibilities of the Department.

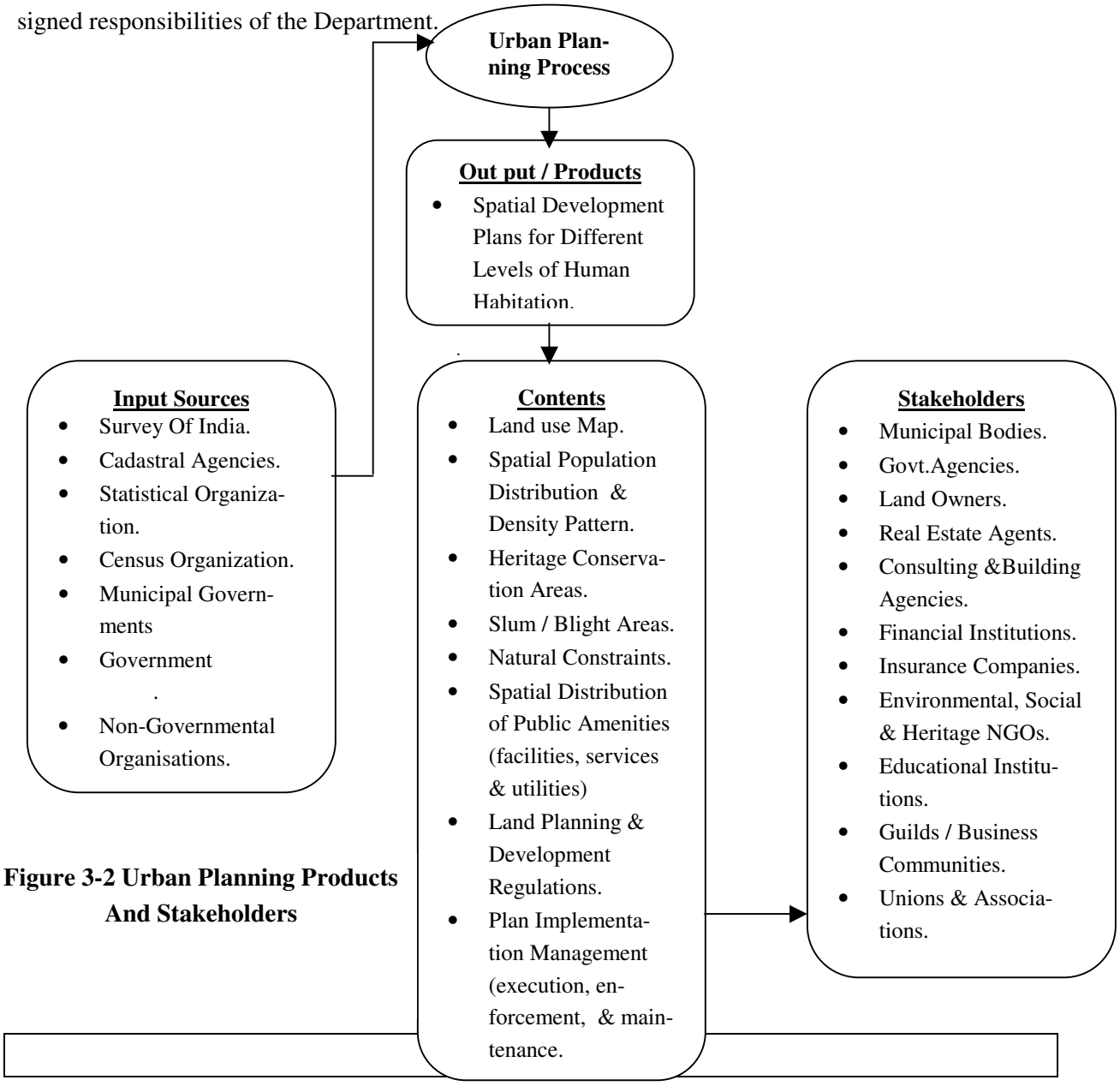


Figure 3-2 Urban Planning Products And Stakeholders

3.3 Architectural Viewpoints

A system can be defined as a regularly interacting or independent group of items or components forming a unified whole [Weber's dictionary]. The combination of various components of a system is called structure. The roles of components are represented by the functionality of the system. The combination of the system structure and its functionality is called system architecture [OEEPE Manual, M.M.Radwan et.al.]. The various constituting parts of a system can be analysed from different viewpoints. To understand the urban plan preparation business process system unambiguously the following viewpoints are developed along the lines of a system architecting technique Reference Model –Open Distributed Processing (RM-OPD).

3.3.1 Technology Perspective

This perspective is concerned with the technology being put to use or in practice in a system / process of an organization to achieve the end product or to accomplish the assigned task. In Urban Planning Departments (UPDs) the assigned task is used to be the generation of Spatial Plans that involves stages / sub- processes of spatial data acquisition, processing, analysis, updating, change detection, requirement projections for both space as well as infrastructure, resource (space/land) allocations and finally presentation and dissemination of the outputs of the UPDs. The technology required for the performance of above-mentioned sub- processes are land surveying, mensuration, engineering drawing & cartographic presentation techniques and mathematical & statistical computing.

The survey conducted reveals that all the (UPDs) are using the analog means for conducting the said sub-processes of Urban Plan Preparation Process (UPPP). For management of both spatial and non-spatial data there exits no Database Management System (DMS) and all works related to information management is being done manually using conventional methods in the as is situation. The process thus suffers on account of all inherent shortcomings of data namely geometrical inaccuracy, incompleteness, inconsistency and inappropriate coverage. These problems in data quality affect the quality of the output of UPPP i.e., Spatial Development Plans (SDPs) adversely and ultimately leads to dissatisfaction among end users as well as customers of such plans.

3.3.2 Process Perspective

It decomposes the system into various functional components and their interrelationships / interactions during the course of information processing for the purpose of generating the output in the form of either some goods or services. In Urban Plan Preparation Process System which produces Spatial Development Plans has functional components like Surveying Unit, Research Unit, Planning Unit, Architectural / Cartographic Unit and Legal Unit. Spatial Development Plans (SDPs), which are the final outcome of UPPP, are formulated by the Planning Unit. The other units listed above are suppor-

tive units each dealing in specific component of the whole system and making its output available to the Planning Unit in form of an essential input. The Planning Unit synthesizes the outputs of all the supportive processes.

The field offices perform all the sub- processes single-handed under supervision and control of the higher-level hierarchical organizational offices. The final product i.e., Plan is sent to the central and apex order technical authority for scrutiny and getting the same approved from the Government to make such a Plan a legal instrument under the provisions of some statute in the hands of the concerned authorities for shaping the future built environment on scientific and systematic lines. The UPP produces thematic maps by using common framework data acquired from different data providers in the scales varying from 1:4000 to 1:25000 and making certain value additions in the same. These maps generally include physical / geographical constraint maps, heritage conservation plans, slum areas improvement plans, redevelopment plans for built environments, housing / industrial development plans, proposed land use plans, future urban growth spatial patterns & trend direction maps and population distribution & density maps.

3.3.3 Data / Information Perspective

Alike any other sort of planning UP also needs certain specific data for carrying out its business. Planning information is mostly multi disciplinary in nature and it is spatial i.e. about location, non-spatial i.e. about sectors and temporal in content. Planning information requirements are multidimensional i.e. spatial, sectoral, sectional and temporal. Such data are acquired to know what is? Where it is? How it is? How much it is? Why it is there? For whom it is? By whom it is? and so on. The data usually pertain to land / space, human population and phenomenon / landscape emerged on account of human pursuits and space relationships. It is both graphical and statistical in nature. The scale and content details of data varies with the hierarchical level of planning.

In the present context where the focus is on local i.e. city level urban development plan preparation process, the preferably required scale of spatial data is 1:5000 to 1:10000 with 2m to 20m contour interval depending upon nature of terrain and size both geographical extent as well as population. The details must include all natural and man-made landscape elements / objects which can help in distinct identification, segregation, segmentation, demarcation and classification of spatial aerial units of attribute homogeneity and geographical contiguity. The sources of spatial data at the moment are the Survey of India (SoI), Revenue Departments of State Governments. The former produces framework spatial data on scales 1:250000 to 1:25000 for the whole country duly georefrenced and on appropriate map projection system. The data of SOI contain exhaustive 3D -geographical and cultural information. On the other hand the revenue data which has limited 2D- geographical coverage and no cultural information is generally on scales 1:1000 in case of rural areas and 1:500 for urban areas. It has no georeferencing, contouring and map projection system and thus has poor orientation quality.

The operability of this data in digital environment is therefore questionable. Moreover, there are glaring variations in scale, contents, methods of preparation & management and terminology being used in different parts of the country. But at the same time, it has one peculiar quality that it consists of cadastre information as an essential part of spatial data, which is not true in case of spatial data of SOI. This additional feature provides revenue data an edge over the SOI data, so far as wider popularity of use of data in whole development process of the society is concerned. From the temporal content point of view the data of both the above-mentioned providers is of very limited use in the UP Process since the updating of data takes place after very wide gaps of time in both the cases.

In the absence of spatial data on the requisite scales and other specifications for UDPP from the spatial data providers, the UP Departments used to prepare base maps for their use to carry out business by applying various mathematical and cartographic techniques like enlargement & reduction, mosaicing, updating and reproduction. The technologies put to use in this process are conventional and manual, which cause inordinate delays, cost on scarce resources heavily and gives products of lesser accuracy.

3.3.4 Financial Perspective

In Indian context, Urban Planning Organizations / Departments are funded from consolidated funds of the States, far UP till date is a social service and an integral component of State list of functions as per Constitution of India. The Union Government as well as Foreign Donors also makes some project specific funds available, but the same too are appropriated and released through State funding system. The resources, generally very meagre generated by the Planning Departments are also credited to the State exchequers. The funds are needed to arrange and manage planning inputs, salary bill of staff, continuance of capacity building activities and missionary drives for creating awareness towards urban planning principles, techniques, objectives, urgency and current status. On account of financial constraints there always remains a wide gap for funds required and funds available. This financial inadequacy affects the efficiency of the planning organizations.

The survey conducted shows that funds allocations by the Governments to urban planning agencies are not keeping pace with increasing demand on account of widening sphere of activities of such agencies. This paradoxical situation is the root cause of non-implementation of many programs used to be envisaged by the urban planning organizations. The products and services rendered by the planning agencies are by and large made available to the customers or users free of cost as social services. This trend is now becoming very difficult to continue without making compromise to quality and adequacy of such services. As such some sort of pricing policy for these services has become now inevitability. The aspect shall be taken care of in the new intended improved system.

3.3.5 Quality Perspective

This perspective is concerned with the efforts being made by an organization to take care of the interests of its customers. The survival and progression of any service / product provider dependent upon the satisfaction of customers. The urban planning business process being a social service made

available by the public sector organizations, there exits no formal system of quality control. The mandate no doubt provides quality assurance, yet in practical it is ensured by adopting only informal means of executing test checks on the works by superior authorities in the organizational hierarchical structure on the works performed by the subordinate authorities. The quantum of test check and the level of the exercising authority have an inverse correlation. Formally, it is not prescribed anywhere that who should make how much test check / quality control at what levels with respect to which activity / task in the UPBP.

Presently, it is therefore producer's quality in place of customer's one. In the changing environment now to make the Department a Total Quality Organization (TQM), it should have a quality manual and effective quality control system to ensure a quality process and thereby quality service. The whole system of plan preparation should be decomposed into small independent but interdependent / interrelated components / sub-processes to ensure introduction of Work Flow Management (WF). This will help in establishment of the concept of accountability and achievement of the mission and vision of the Department.

3.3.6 Workflow Perspective

Presently, there exists no decomposition of the plan preparation process in to smaller independent but interdependent workflows in urban planning departments. The whole process is implemented without recognizing the suitability of a specific activity in the process to some specific individual or a group of individuals and any consideration to the appropriate time or location for performance of different activities contributing to the achievement of mandated mission of such organisations. This situation affects the efficiency of the process as proper match between the resources and the tasks is not maintained on one hand and accountability fixing becomes difficult on the other. Crisp identification of locations of delays in performance of various activities in the process is not possible. The delays on this account lead to customers' dissatisfaction. Apart from this automation too is quite difficult in the prevalent process. In view of recent technological developments including E-mail, project management, databases, object- oriented programming and CASE tools, Electronic Data Interchange, internet services and world wide web all have necessitated the development of inter as well as intra- organizational workflows. Workflow Management is therefore a foremost need of the UPBP as it will be a prelude to Total Quality Management, which in turn will improve the responsiveness and communication of the same.

3.3.7 Performance Perspective

The analysis of the information furnished by authorities of concerned Departments covered under survey, indicates towards an overall low performance ranging between 20 to 35 / 40 % of the UPBP up till now so far as the question of implementation of development plans is concerned. Even in case of coverage at national level out of 4615towns / cities development plans for only about 1000 cities could be prepared so far. The planning agencies are still after about fifty years in trade could not prepare base maps for more than 25 % of the total notified urban areas what to talk of urbanisation taking place in forms of urban development corridors along lines of transportation and small nodal locations throughout the length and the breadth of the country.

The process has remained slow performer in achieving the assigned objectives. The spatial pattern of urbanization emerged is imbalanced since the polarization of population is conspicuous in primate cities and privileged regions in every state. Migration of population from rural areas to urban nodes is continuous and unabated. The land values are rocketing sky-high and absolutely beyond the reach of larger section of society. The environment is all the way at stake. This dismal performance may be attributed to slow, manual and obsolete technologies in practice in the business; least priority assigned to the business process by the powers whosoever may be there in office on account of unawareness and resource constraints -a common phenomenon of developing economies; population explosion and last yet not least the grey areas in professional practice.

3.3.8 Cost Perspective

In the present situation following components constitutes the cost of urban planning services:
Materials include all consumable stationery articles required for working in both analogue and digital environments.
Tools and equipments include all surveying, engineering, architectural, and cartographic machines and instruments.
Data both spatial and attribute in forms of maps, photographs, images, publications containing textual as well as statistical data.
Professional services includes salary bills of staff as well as contract amounts for obtaining some specialised services required for accomplishment of the main planning service.
Publicity accounts for all expenses being incurred on public awareness for propagation of discipline, opinion gathering process and finally dissemination of information by way of polls, publications, workshops / meetings / seminars, broadcasting and other possible multimedia visualisation techniques.
The survey conducted reveals that >90% of the total budget is spent on salary bill of staff, which is not a healthy sign. On publicity the- most important aspect to make planning participatory some of the state have budget as low as <1% (0.081% in case of Punjab) of the available funds which is very serious concern.

3.4 External Environment Scanning

It consists of overall societal setting in which a particular business institution functions and witnesses the impacts both, positive and negative of such a setting on its task environment and consequential efficiency and effectiveness.

3.4.1 Administrative & Legal Environmental Issues

Administratively Urban Planning in Indian context is a local level function and falls in the domain of third tier of public administration i.e., Local Self / Municipal Government as per constitutional provisions. Its sphere of activities relates to land, which is an exhaustible economic resource bestowed on mankind by the Nature. As per principle of sovereignty land belongs to the national government but for functional convenience sake it is considered to be in the ownership of individuals and institutions for all practical intents and purposes related to use of land to fulfil needs of society.

This issue of land ownership is governed by the cadastral system backed by law. As per the subject lists in the constitution prescribing distribution of functions among federal government and state / provincial governments land is included in the concurrent list. As such both union and the state governments are competent to enact laws dealing with land. Following the directive principles of state and conventions of parliamentary democracy the union government gets the land related laws enacted by her effective with the mutual consent of the provincial governments.

A few examples of laws enacted by union governments are; Indian Land Acquisition Act, 1894; The Indian Land Registration Act, 1908; The Indian Land Reforms Act, 1956 and The Urban Land Ceiling Act, 1976. These are applicable throughout the territorial jurisdiction of the Union of India but only after due ratification and adoption by the provincial governments. Similarly, the land related enactments by the state governments are made to obtain presidential assent through national parliament prior to their effectuation in respective territories for ensuring compatibility with union laws and sovereign supremacy of the Union Government. The Town & Country Planning Acts of various states are good examples of this type of enactments.

The enactments related to urban planning by different states are almost similar in contents following the British legacy borrowed from earliest acts such as The Madras Town Planning Act, 1920 or The Bombay Town Planning Act, 1915 which were based on the contemporary laws in England. The provisions of subsequent enactments have shown some changes also in due course of time to keep pace with changing societal environment but were not enough to cater for the actual changed scenario of Indian urbanization.

In view of the prevailing situation the Union of India has brought a few most innovative legislative enactments addressing sensitive issues like environment, heritage and decentralized planning in the recent past, which have direct bearing on the Urban Planning Legislation in the country. These new enactments are intensively supportive to urban planning statutes and thus have generated enormous opportunities to urban planning business process / profession to articulate and give shape with a difference to the urbanization scenario of the country subject to certain positive adaptations in its task environment. The proper assimilation of provisions of these new enactments, available resources, adoption of available enabling technologies and mission & vision of UPBP may rejuvenate the UPBP Model to cope with evolving challenges in form of societal requirements on the UPBP and achieving the very basic objectives planning. Naming a few such enactments are The 73rd & 74th Constitutional Amendment Acts, 1992, for decentralizing planning & development functions to the grass root levels and ensuring complete involvement of masses in the process of shaping their destiny by their own hands; The Indian Forest Conservation Act, 1980, for maintaining the ecological balance; The Indian Historical Monuments Conservation Act, and The Central Water & Air Pollution Control Act. In case opportunities are provided by these new legislative measures for enlarged scope of spatial planning are not encashed in right perspective by improving the prevalent UPBP to be more efficient and effective, these may prove threats to the very survival of urban planning organisation.

Contrary to the contents of preceding para the old and obsolete laws like Land Acquisition Act or Land Registration Act are becoming insurmountable hurdles in efficient performance of UPBP, since their provisions are not adequate or efficient to cope with changing societal requirements on the UPBP. Such institutional problems need immediate addressing and remedial measures to strengthen the process in view of emerging challenges on the horizon.

3.4.2 Political Environmental Issues

Land being the prerequisite resource for UP on one hand and democratic polity on the other are playing havoc with the society. The inherent characteristics of land like economic power, exhaustible & static nature, acute scarcity in comparison to ever increasing demand and symbol of social status at least in developing economies are making it a tool in the hands of decision making powers / authorities to grind their axes as per their wishes. The UPBP is becoming victim of this situation because the political powers exploit the various social pressure groups by giving concessions or imposing restrictions on the use of land and related policy decisions. This trading off business between the decisions making political or beaureucratic powers cocux is ruining the nobility of the UPBP. Frequent changes in planning concepts & policies, spatial location of infrastructure, land development regulations & byelaws to favour one group / individual or penalize another group / individual are not uncommon happenings in the prevailing UPBP scenario. Any change in power circles pave
way for reengineering of UPBP.In short the professional essence of business process goes with the wind causing irreparable loss / harm to the society intangibly. This grim situation may be attributed to the overall lack of awareness at public, professional and government levels. It can be tackled by the missionary enthusiastic efforts by the professional community and the awakened social groups in form of vigorous awareness drive to further the cause of urban planning process.

3.4.3 Socio-Cultural Environmental Issues

Urban Planning is very sensitive to socio-cultural changes and thus a highly dynamic process. The changes in demographics of a society put stresses and strains on concepts, parameters, standards, policies and strategies of this business process. The various systems of society like education; economic, political exert pressure on UPBP, since urban planning scenario is the mirror in which reflections of all said systems can be visualized. With the increasing knowledge level the people are becoming more conscious about good living environment and thus favouring planning pursuits. The changes in living standards with rising economic level is affecting the demand for better housing, infrastructure and facilities & services on account of corresponding changes in likings, disliking and choices of stacks. The breaking of joint family system to give way for nuclear family social structure, modern improved and affordable means of transportation and communication which have overcome the hurdles of physical distance and time as well as the transformation of society from primary economic base to secondary & tertiary base, have together accelerated social mobility, population migration, concentrated urbanization and there by a new kind of requirements' set on UPBP.

In case of Himachal Pradesh scarcity of developable land on account of hilly terrain, smaller and irregular sized landholdings, increasing pressure of accelerated urbanization on land and social attachment to inherited landed property are a few special reasons coming in the way of smooth sailing of UPBP.Acquisition of land even for laying basic infrastructure net works is an up hill task. The implementation of Development Plans either dose not take off or delayed incredibly on this account. Undue delays in implementation of plans causes dissatisfaction among the end users on one hand where as escalates the project cost manifolds on the other making many proposals obsolete, unviable and infeasible if earmarked space is put to some other use in the meantime. People want amenities but are never ready to part with their land resources making the urban planning task very difficult. Socially, very high value attachment to landed property especially in urban areas has set a trend that every household wants to have at least one house in nearby town or on the major roadside in addition to the existing one irrespective of necessity. This trend has changed the urbanization scenario in the state and resulting into wasteful investment of fiscal resources, loss of precious and scarce land mass to unproductive uses, environmental hazards and socio-economic disparities.

3.4.4 Economic Environmental Issues

The trend of economic reforms initiated in early nineties has exposed the Indian economy fully to the international / global investment and marketing forces. Consequently, availability of money has become very easy, timely and affordable with the entrance of multinational financial institutions on the scene. The interest rates on investment in housing sector which has been assigned topmost priority by the Government has gone as low as 8% / annum registering about 50% downward trend as compared to situation prevalent 5-10 years back. The advancements in the field of information and communication technologies including e-mail, Internet, e-commerce and e-business / banking have further added to the convenience of the customers by making money, materials and technical know how / services available at their doorsteps with assured quality, reliability and timeliness. The reduced interest rates on savings and investments have made investments in land and construction industry very popular. This whole changed economic scenario has accelerated the pace of development-induced urbanisation in a big way. As such the overall pace of physical development has become fast. The Government has also given full patronage to this situation in her policies and programs recognizing the potential of this sector to generate employment and pull out private investments from open market in the process of mobilizing resources for socio-economic development. The pressure on UPBP on account of these economic environmental issues is mounting constantly demanding on process to be more alive to the situation and ready to face challenges around the corner. Adoption of new enabling technologies, taking vigorous all-round awareness campaign to make spatial planning a way of life of present day society and flexibility in planning system to arise to the occasion have become inevitable imperatives before the UPBP at the moment. All these demands require huge investments, which are beyond the reach of fund starved Governments fighting tooth & nails to meet with the very basic essentialities of life in developing economies. Dependence of urban planning agencies on ever shrinking budgetary support of Governments is a cause of great concern before the UPBP or organisations.

Exploitation of new horizons of foreign funding may rescue the planning agencies to come out the quagmire of resource crunch, but to avail such donations and assistances improvement in UPBP system by saying goodbye to obsolete way of working and prevalent technological level.

3.4.5 Technological Environmental Issues

The efficiency of a particular business process is always subject to the available level of enabling technologies. Any advancement in the enabling / supportive technologies bring corresponding improvement in the performance of concerned business process, if simultaneous adoption of new technologies is ensured by the management of such a process. The UPBP is a technical profession dealing in subject, which involves handling of Geo-information right from the stages of acquisition, management, value addition and ultimately dissemination. Its resource inputs i. e. spatial & non-spatial data come from numerous data providers including Survey of India, Geological Survey of India, Census of India, State Revenue Departments, Statistical Organisations and many more such agencies. Most of these data providers are in the process of switching over to the adoption of modern enabling technologies of data acquisition, processing, production and dissemination, as such the UPBP too has no choice except to follow suit to remain compatible to the data providers in the field of geoinformation production.

On the other hand the customers and users of the products and services generated by the UPBP are also acquiring means and expertise in emerging technological and communication tools in their respective fields of operation and thus may expect task environmental compatibility from UPBP. In this societal technological environment the urban planning agencies have to make technological swift to develop capabilities and build capacities in consonance to altering task environment, so to achieve optimum efficiency and effectiveness in the overall interdependent and interacting development system.

The adoption of new technologies in the business processes of urban planning at the moment is quite difficult in the absence of adequate and appropriate human resources. The survey of sample states reveals that there is an acute shortage of manpower to support new technologies. The Departments don't have any policies and programs for human resources development. The people who have acquired expertise in new enabling technologies at their own initiatives even are lying unutilised or under-utilised for want of indifferent task environment. There is no system of any incentives or rewards to encourage people for improving their level of technical know how. No provision for induction of people with backgrounds in enabling technological fields either exist or being under consideration to be made in recruitment and promotion rules of the planning organisation.

However, contrary to the scenario given above there is a trend of encouragement from the Governments for adoption of modern technological and communication enabling tools. In Himachal a good skeleton infrastructure base is created for using modern technologies under a Norwegian Agency for Development assisted competence-building project. The Government of Haryana has made funds to the tune of Rupee 2.41 crore (24.1 million) for computerization of Urban Planning Department during financial year 2003-04.

3.4.6 Stakeholders-Environmental Issues

The process of urban planning in Indian context has witnessed tremendous change in its list of stakeholders over a span of last fifty years in particular. Initially, urban local bodies and other Government & semi- government developmental agencies related to civic management were the main stakeholders. Later on with the increasing population pressure, changing level of literacy & thereby awareness, standard of living, rising economic status of masses, social change especially in occupational structure, population mobility and breaking traditional joint family structure and consequential acceleration in physical development have resulted in addition in categories of stakeholders of urban planning process. The categories of these stakeholders and their demands on UPBP are becoming varied with the increasing complexities of urbanisation scenario. Globalisation of economy, privatisation of management of socio-economic services and infrastructure on one hand and technological & communicational revolutions have induced a sea change in customers' / users' requirements on UPBP.

Broadly, on the analogy of classification of customers' of NMAs by Groot R. (2000), the users of UPBP can also we divided in to two categories of end-users and value adding users. The former may more appropriately be called customers as they make further value addition in products taken from UPBP for the end - users the ultimate target group. The requirements of customers' on UPBP are fast changing with changes in socio-economic and technological environment. The main customers' requirements as stated by Paresi.C (2001) namely, diverse and up-to-date products, fit for purpose, timely delivery hold good in case of UPBP too.

The land owners' group is the prime stakeholder in products / services of the UPBP as the provisions of the Development Plans assigning prospective use to every parcel of land directly hit the economic interests of this group in land. The proposals not suiting to the interests of this group by and large either remain unimplemented or implemented very late on account of hurdles put in the way by the land owners at the stage of acquisition where negotiations and compensation decisions take even decades. This situation leads to dissatisfaction of end users. The instances of the projects becoming impractical and unviable due to these delaying tactics are not uncommon. Faulty laws, social taboos, slow instance processing and above all political / administrative system are the reasons behind this scenario. In cases of proposals appreciating the land values the landowners want to be involved in the process of conversion and development to derive maximum benefits of such appreciation in place of parting with their land resources. In another non- land values appreciating instances of land use proposals land owners want immediate acquisition by the development authorities. Reopening of compensation cases even after actual use conversions and subsequently development on acquired lands sometimes causes conflicts between authorities and owners as well as dissatisfaction among the end users / buyers. The issue needs to be addressed in view of complexities arising on the UPBP on this account. Land acquisition for implementation of urban development plans is the biggest challenge on this business process. Generally the landowners favour assignment of commercial and land value-appreciating uses to their lands and resent putting their lands for non-commercial or infrastructure purposes.

The pressure group of prospective buyer on contrary to group of landowners expects timely, affordable and technically reasonable allocation of land resources to various urban activities from the UPBP. Constituents of this group want that plans should be prepared with in shortest possible time in view of the rising land prices and escalation in construction / development costs.
Another group of stakeholders consisting of municipalities, government & semi- government development agencies and land management & registration agencies, which are legally bound to coordinate and integrate their land related activities with provisions of spatial physical plans also adapt to accepting dictates of such plans half heartily. This type of callous attitude may be attributed to check on autocratic and egoistic functioning of such agencies- a common phenomenon in developing economies.

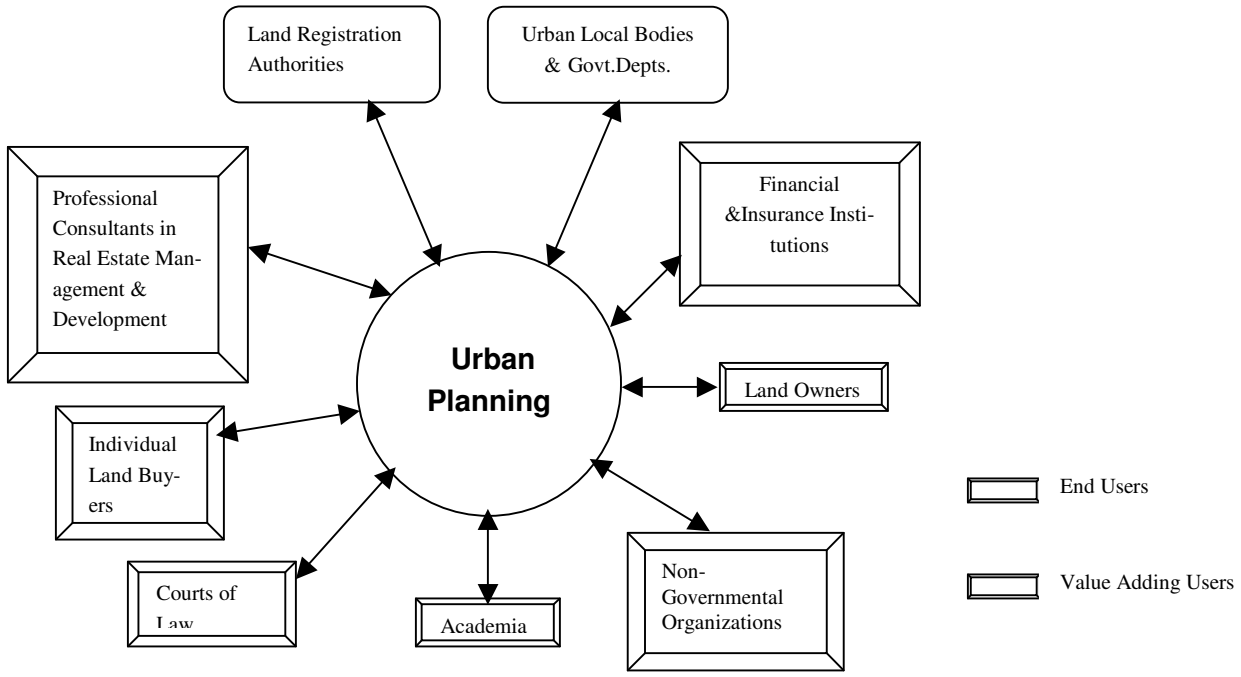


Figure 3-3 **Stakeholders of Urban Planning Products & Services.**

The remainders including academia, courts, financial & insurance institutions, non-governmental organisations and professional consultants need information contained in urban development plans to authenticate, support and propagate their services and activities.

3.5 Performance Problems / Conclusions

The above diagnosis of internal and external environments of urban planning business process evidently points out the following broad problems with, which the process is confronting:

- Multiplicity, obsoleteness and conflicts in legislative pieces in operation in the field of urban planning are barring the process to be a good performer;
- Delays, higher costs, stereotype nature and lower accuracy level of services on account of prevalent conventional technologies and missing use of modern management techniques are not allowing process to be popular / effective, efficient and user-friendly;
- Political system, beaurucratic administration clubbed up with unawareness regarding objectives, importance and consequences on non- adherence of urban planning system is not permitting the process to come to the limelight and take a pivotal placement in the overall societal setting;
- Financial constraints, least priority assigned to planning process in general, as it suits to the haves at the cost of haves not is the biggest hurdle in the smooth propagation of this business process;
- Inadequate and inappropriate manpower resources to manage the process has made the process static, inflexible, routine stereotype and closed one.
- As such the UPBP till now could not make some appreciable advances in the direction of achieving its enshrined objectives of ***planned & balanced development, social justice and liveable environmental quality.***

3.6 Consequences of the Problems

As a consequence of performance problems the UPBP is being steadily relegated to the back and loosing its significance in spite of sound legal backing at strategic level. There used to prevail adhocism in managing urbanisation affairs. The worst sufferer of this situation are the quality of living environment in urban areas, which is deteriorating owing to overburden on infrastructure caused by constant flow of rural-urban migration to the priced locations; land resources which are not being put to sustainable use; cultural heritage is being overshadowed and is in state of sheer neglect and the pattern of spatial development which is witnessing alarming imbalances and is bound to cause utter chaos in cities & towns, if the trend goes unabated. The process thus is loosing support at strategic decision-making levels on account of all-round inefficiency and ineffectiveness.

Failing to understand importance and necessity of UPBP since there is nothing tangibly achieved, the governments are putting budgetary embargoes on planning agencies. The financial constraints have jeopardised the normal growth of planning agencies and for that matter the business process. The funds are not sufficient to cater for increasing requirements of the planning organisations to keep pace with increasing workload, arising needs for adoption of modern technologies and improving the knowledge base of available manpower resources.

At management and decision making level there is acute shortage of senior, appropriately qualified and experienced officers on account of vacancy position caused by prolong ban on creation of new positions and filling up of vacant positions by direct recruitments, faulty recruitment and promotion rules. Well-organised work management systems are altogether missing causing delays in decision-making, appropriate work assignment, progress evaluation, formal quality checks and accountability.

Every body shirks from taking risks of decision-making, sharing responsibility, ensuring adherence to prescribed norms of running business and translating the organisational strategies in to decisions for implementation and improvements.

The staffs at operational level are ignorant about strategic plan of the organisation, alienated, frustrated, dissatisfied and non-committed to the cause of the organisation. The narration on present set up in which the business process under question is sustaining vividly highlights the need for change. The requisite change needs strategies for bringing in improvement in the present situation as well as ensuring continuous improvement in the process in future.

3.7 Key Drivers for Change

The environment of UPBP is changing fast necessitating corresponding changes in its work environment too to get enabled for coping with emerging challenges on it. The following are the key drivers ameliorating change:

- Urbanisation magnitude that is likely to be to the tune of about 500 million by 2020 is going to pose unimaginable management challenges on process. To deal in such challenging task process needs to be extremely efficient, fast, precise and highly. Dynamic. This can only be possible by going for adoption of modern concepts of technology, management and communication fields.
- Privatisation and globalisation revolutions have generated enough heat of competitiveness in every sphere of economic life around the globe and UPBP cannot be an exception to this trend.
- New enabling technologies are emerging very fast and changing the business environment of every business on account of their speed, cost, quality, automation potential, less labour intensiveness, objectivity and universal application. These technologies are by and large time, space, scale, weather and political barriers independent. Adoption of these technologies has also become inevitable in view of the issues of interoperability and data sharing.
- Legislative enactments in favour of decentralised spatial planning, environmental protection, heritage conservation and natural resource management & sustainable development have created enormous business opportunities to UPBP.
- Rising economic level, literacy, increasing leisure time, communication technologies and Information technology together have brought sea changes in the nature, quantum and contents / level of information requirements of the customers. So to meet such demands the business process has to keep it sensible and flexible.

3.8 Strategies for Improvement

Situation analysis is a prerequisite for any improvement project. It is the process of finding a strategic fit between external opportunities and internal strengths while working around external threats and internal weaknesses [Hunger and Wheelen, 1996]. Many management techniques are in practice to perform situation analysis but the SWOT is the most common and widely used one, as such it is chosen for the present research.

3.8.1 SWOT Analysis

SWOT is acronym of Strengths, Weaknesses, Opportunities and Threats. It is a most popular management tool for making analysis of the as is situation of the business processes of any organization. It involves two basic steps namely internal scanning and external scanning with the help of which four above stated elements called SWOT are highlighted / derived. SWOT is pre-BPR / CPI process. SWOT matrix provides base for strategic visioning for any organization clearly indicating strategies to avoid previous pitfalls and future improvements. SWOT is a tool for use in the preliminary stages of decision-making, often as a precursor to strategic planning. It is a common tool in performance analysis and in evaluation studies. [Liza Groenendijk, 2003].

Information for SWOT analysis is obtained from published and unpublished official documents of the sample states chosen for survey as well as the information collected from such agencies on designed questionnaire in special interviews. The various Acts, Rules and personal experiences also supplemented the information base for the purpose. The analysis matrix for Urban Planning Department of Himachal is evolved.

Table 3-0-1 E (Extended)-SWOT Matrix for Urban Planning Organization / Business Process

INTERNAL FACTORS (IFAS) / EXTERNAL FACTORS (EFAS)	**STRENGTHS (S)**	**WEAKNESSES (W)**	**STRENGTHS / WEAKNESSES (S / W)**
	➢ Multidisciplinary team of professionals. ➢ Archive of analogue spatial data of urban areas. ➢ Increasing availability of basic infrastructure for initiating adoption of GEO ICT in planning agencies. ➢ Distributed establishment network all over the state. ➢ Expertise & experience in conventional mapping operations. ➢ Strong legal backing.	➢ Least social acceptability for the profession by public due to lack of public awareness. ➢ Dependence on Government for fiscal resources. ➢ Lack of professional leadership. ➢ Frequent changes in the management. ➢ Lack of technical know how with respect to modern enabling technologies. ➢ Inadequacies of required trained manpower on account of prolong vacancy position. ➢ Delays in service on account of conventional technologies in practice leads to delayed implementation, which in turn causes public dissatisfaction. ➢ Lack of coordination in implementation of plans among different agencies makes the plans anfractuous. ➢ Non-existence of work manual, quality manual, data sharing policy, urbanization policy and capacity building policy. ➢ Non –exploitation of mandatory provisions for Regional Planning. ➢ Lack of motivation &commitment among subordinate staff especially on deputation or deployment. ➢ High data acquisition cost on account of use of conventional technology for data management.	

OPPORTUNITIES (O)	(SO) STRATEGIES	(WO) STATEGIES	STRENGTHS / WEAKNESSES / OPPORTUNITIES (S / W / O) / ACTIONS.
➢ Foreign funding opportunities are available. ➢ Advancements in GEO-ICT & Operations Management. ➢ Availability of excellent education & training facilities in the field of modern enabling and management technologies. ➢ High potential for accelerated urbanization on account of rapid social transformation from rural to urbanite society. ➢ Professional support from NGOs. ➢ Addition of new customers including Banks, Finance companies, Insurance companies, Infrastructure development institutions Telecommunication companies and their changing demands for services. ➢ Globalization and resultant privatization of urban planning practice. ➢ Increasing awareness about planning, environment, ecology and natural / manmade disasters. ➢ Enactment of new acts in consonance with 73rd, & 74th, constitutional amendments for local decentralized planning. ➢ Urban mapping & Information Technology policies of the federal Government & initiatives by state Governments to go high-tech.	➢ Prepare more projects on contemporary issues of **environmental planning** covering recreational, heritage conservation, traffic & transportation management, slum improvement & rehabilitation aspects; **disaster management** covering earthquake resistant development, landslide safe land zonation, fire safety aspects, and **ecological conservation** covering solid waste management, urban forestry, land reclamation & wet land management aspects using GEO-ICT for foreign assistance. ➢ Convert the whole archive of spatial data in to digital format using GEO ICT enabling technologies to create digital database**.** ➢ Train working level manpower to make optimum use of available hardware &software ➢ Convince Government on availability of technical capabilities for decentralized planning to take more responsibilities under new laws.	➢ Make public awareness drive a inseparable phenomenon of planning process with external funds. ➢ Acquire technological assets / equipments including hardware, software &other mathematical /surveying / cartographic under foreign funded capacity building projects. ➢ Avail opportunities of in-service training for strengthening domain knowledge and expertise in emerging technologies. ➢ Prevail upon Government to formalize urbanization policy &muster sufficient budgetary provisions in view of the likely fast urbanization. ➢ Exploit the missionary power of NGOs in creating an atmosphere in favour of the activities of the Department and convincing Government to provide professional leadership to the Department. ➢ Reduce plan preparation time by adopting new enabling technologies. ➢ Enrich plans by improving contents, accuracy and presentation quality as per requirements of customers using GEO- ICT technological and management tools.	➢ Exploit available professional skill for mustering foreign fiscal assistance to continue profession-building activities like awareness & capacity building. ➢ Encash new customers' potential to overcome budgetary crisis by providing value added saleable services as per their needs optimally utilizing the available manpower resources. ➢ Expand area of activities by going for regional / spatial planning exploiting mandatory status of the department and provisions of 73rd & 74th constitutional amendment acts. ➢ Avail professional competence building opportunities by sponsoring people with expertise in conventional mapping pursuits to pave way for adoption of modern enabling technologies in business processes of department so to ensure high level of costumers' satisfaction. ➢ Exert pressure on Government through NGOs for revising, framing and approving various profession related policies. ➢ Make Government to realize urgency of strengthening the department with adequate & appropriate manpower by making human resources development policy encouraging acquisition of higher & modern knowledge as well as amendments in recruitment & promotion rules to make room for induction of people with backgrounds in emerging enabling technologies.

THREATS (T)	(ST) STRATEGIES	(WT) STRATEGIES	STRENGTHS / WEAKNESSES / THREATS (S / W / T)
➢ Reduction in budgetary provisions by the Government. ➢ Competition from the private sector. ➢ Inefficient performance the Government may transfer certain statutorily assigned duties & responsibilities of Department to some other agencies both public and private. ➢ Dissatisfaction among customers. ➢ Political intervention and beaureucratic management may ruin the technical fabric of the Department. ➢ The practice of taking staff on deployment is affecting professional competence. ➢ Resistance against adoption of new technology from within the organization.	➢ Use multidisciplinary professional skill to face challenges from private sector. ➢ Make optimum use of available GEO-ICT means in reducing response time and cost of Development Plan to fight users' dissatisfaction and funds scarcity. ➢ Make use of conventional mapping experiences and expertise to convince Government not to take away any function of spatial planning. ➢ Tackle issues of political & beaureucratic interference with optimal use of professional skills and by using extensively the multimedia visualization techniques to create professional awareness at all levels.	➢ Make data acquisition & updating cost effective using modern means to face fiscal resource crunch. ➢ Decrease response time to gain popularity among customers and the end users. ➢ Avoid over dependence on Government budgetary support by diversifying services. ➢ Restrain from expanding non-productive workforce base. ➢ Try to outsource cost ineffective activities to curtail expenses for ensuring matching with availability of financial resources. ➢ Stop taking staff from ex-cadre sources to avert increasing liabilities on account of inexperienced & non-committed workforce. ➢ Organize workshops, short duration refresher courses and exposure visits to relevant institutions to build confidence among staff in favour of modern technologies in the initial stages of improvement process to nip the misconceptions in the minds of employees in the bud. ➢ Give incentives & career progression for propagating of new technologies.	➢ Don't patronize continuance of conventional technologies which breed delays and thus cause stakeholders' dissatisfaction, but encourage staff to put available GEO-ICT infrastructure to use optimally. ➢ Take shelter of legal base of the business process to counter political & beaureucratic intervention in the task environment. ➢ Make best use of GEO-ICT infrastructure whatsoever available for exhaustive demonstrative purposes to create interest and remove misconceptions & reservations of staff in adoption of modern technologies in performance of business of the department.

OPPORTUNITIES / THREATS (O / T)	STRENGTH / OPPORTUNITIES / THREATS (S / O / T)	WEAKNESSES / OPPORTUNITIES / THREATS (W / O / T)	STRENGTHS / WEAKNESSES / OPPORTUNITIES / THREATS (S/ W / O / T)
	➢ Use archive of analog spatial data to supplement fiscal resources by declaring it a saleable product and making the same available for fulfilling needs of new customers. ➢ Enhance competence of multidisciplinary team of professionals to meet with challenges from private sector.	➢ Giving professional leadership by using professional support from the NGOs may save the technical entity of the department ➢ Increasing obsoleteness may be avoided by availing capacity building opportunities to avoid customers' dissatisfaction. ➢ Avoid resistance in adoption of emerging technologies by exposing and encouraging interaction of staff with education &training institutions and by arranging at home sessions on new developments in the field modern technologies.	➢ Put all strengths of the organisation in exploiting available opportunities offered by the external / societal environment optimally, to remove the inherent weaknesses in the task environment, enabling organisation to face the challenges evolving on it & remain sole spatial planning services provider in future.

3.8.2 Improvement Strategies / Initiatives

Based upon conclusions of SWOT analysis a strategic plan to regulate the future functioning of the UPBP as elaborated below is worked out with reference to Himachal - one of the four states covered in this research. The strategic plan as per International Federation of Surveyors (FIG) usually contains a mission, organisational values, goals, strategies and objectives [Greenway, 2002].

Mission:

To provide healthy liveable environment to the masses in both Rural and Urban areas by putting scarce and exhaustible land resources to balanced, rational, judicious and optimum use.
Organisational values:

The planning business will be conducted as per provisions of notified rules 1978, code of professional conduct of National Institute of Town Planners and Central Civil Services Conduct rules, 1964

Vision:

To become the exclusive Spatial Planning Agency in the State for all times to come by bringing land resources of all potential development areas with in the ambit of the provisions of the Town & Country Planning Act, 1977, for ensuring scientific and systematic management of perspective development, exploiting the available enabling technologies.

Goals:

- Reorganisation of the Department as per requirements of achieving the mission of becoming exclusive spatial planning agency of the state, by getting policies, laws and rules & regulations related to plan preparation process reviewed and amended.
- Formulation of regionalisation and urbanization policies for the state and preparing development plans for all towns of the state
- Adoption of modern Geo-Information technology and management techniques in plan preparation business process and constant public awareness drive.
- Capacity building through adoption of modern enabling technologies and human resource development.

Strategies & Actions:

Strategies are broad ways and means to achieve the Oganisational goals. These can be grouped in to strategic, managerial and operational [Anne Omesiri Akpoyoware, 2003].

At strategic level the appropriate strategies will be for improving the task environment of the business by managing adequate financial resources to implement the improvement programmes, introducing quality and work flow management systems and establishing a strong statutory and administrative base by getting requisite policies and legislative measures formulated or amended.

- Exert pressure on Government through NGOs for revising, framing and approving various profession related policies.

- Expand area of activities by going for regional / spatial planning exploiting mandatory status of the department and provisions of 73rd & 74th constitutional amendment acts.

Actions at management level are related to decentralisation and delegation of powers, arrangement of appropriate and cost effective inputs, creation of congenial work culture and motivation of staffs by ensuring their all-round development, introducing quality control measures to ensure customers' satisfaction and lastly business propagation activities including publicity and mass contact activities.

- Avail professional competence building opportunities by sponsoring people with expertise in conventional mapping pursuits to pave way for adoption of modern enabling technologies in business processes of department so to ensure high level of costumers' satisfaction.

- Make Government to realize urgency of strengthening the department with adequate & appropriate manpower by making human resources development

The operational level strategies will be to go for adoption of modern enabling technologies of spatial & non-spatial data acquisition, handling and dissemination; ensuring security and safety of information in the process; applying checks & balances in a formal manner at each step to ensure quality of product and in time delivery of output.

- Exploit available professional skill for mustering foreign fiscal assistance to continue profession-building activities like awareness & capacity building

- Don't patronize continuance of conventional technologies which breed delays and thus cause stakeholders' dissatisfaction, but encourage staff to put available GEO-ICT infrastructure to use optimally.

- Take shelter of legal base of the business process to counter political & beaureucratic intervention in the task environment.

- Make best use of GEO-ICT infrastructure whatsoever available for exhaustive demonstrative purposes to create interest and remove misconceptions & reservations of staff in adoption of modern technologies in performance of business of the department.

Objectives:

Objectives are specific statements of expected end results. There will be no change in objectives of UPPBP; these will be same as balanced development, social justice and environmental quality.

3.9 Conclusion

This chapter introduced about overall urban planning system in part of India with emphasis on Himachal Pradesh. The as is situation of the plan preparation process is analysed with the help of SWOT technique and a frame for future improvement of the process is outlined. The next chapter is intended to point out areas of concern in plan preparation process which need to be strengthen in terms of efficiency and effectiveness either by changing technology in practice with modern enabling technologies or introducing management tools.

4. CHAPTER

An Overview Of Enabling Technologies

4.1 Introduction

The previous chapter dealt with situation analysis of UPPBP and points out the hurdles in the way of its efficient and effective performance**.** Among others, technologies in practice in the process and missing management techniques together are playing a pivotal role in causing dissatisfaction among customers and providers on account of delays, increasing plan preparation cost, limited information and conventional presentation and dissemination techniques. This chapter is set to present an overview of the modern enabling technologies and management techniques, which have potential to provide solutions to problems in the as is situation of the planning process.

Plan preparation process involves tasks of acquiring spatial and non-spatial data as inputs; process and manipulates /analyses the same to comprehend and simulate the situations and finally generates plans as outputs by applying the principles and techniques of the Urban Planning discipline. As such, the emerging technologies related to the following areas of UPPBP and Geo- information management techniques are to be reviewed with reference to their potentials and limitations.

4.2 Geo-Information Technology (GIT): related to the following areas of UPPBP:

4.2.1 Data Acquisition
4.2.2 Data Management
4.2.3 Information Presentation and Dissemination.

4.2.1 Data Acquisition

Urban Plan Preparation involves management of data both, spatial and non- spatial including major activities of acquisition, processing, manipulations and dissemination. Capturing spatial data is not the prime function of urban planning process and framework data is procured from spatial data providers, which are generally either Survey of India or Revenue Authorities of the States in case of India.

Since these data are not used to be available on the specifications of urban planning with respect to scale, contour interval, aerial extent, and up to date contents, the urban planning agencies have to exert on their own to make such base data useable as per requirements by applying many sub processes like enlargement & reduction of scales, interpolation of contours, mosaicing, addition of or removal of layers manually using conventional technology to have an appropriate base map for plan preparation. The whole exercise takes a very long time sometimes even more than half of the total time of plan preparation [Mohan, 2003}. Thus the plans are delayed i.e., second plan for Delhi came in to operation after 15 years lapse.

These pre- use-processing activities to make data fit to use can be avoided if only data acquired by the providers using modern enabling technologies is taken by planning agencies for plan preparation. It may help in reducing overall plan preparation time. However, for special needs ground surveys are done departmentally to have maps on large scales or for updating the available maps. For this type of jobs sophisticated surveying technology like total stations is available, which gives best results with less cost and time.

The Urban Planning Organisation however now may have spatial data acquired by the providers using the following modern enabling technologies, but developing capabilities for handling such data is prerequisite to take advantage of these technological advancements.

Similarly, the non-spatial data for plan preparation need to be collected from source databases of numerous agencies and the process is called secondary surveys. However the specialised planning surveys are conducted by planning agencies on their own to have appropriate, most recent and accurate data.

4.2.1.1. Spatial Data

It includes sketches, maps, photographs and images of different spatial, temporal, informational and scalar characteristics. Urban Planning at settlement level needs large-scale maps ranging from scales of 1: 500 to 1: 25,000 depending upon level of planning [UDPFI Guidelines, Govt. of India, 1995] i.e., a residential cluster level to regional plan level. The maps should be current / up to date, thoroughly mosaiced and on some ITRF / projection.

For the purposes of city plans map scales of 1:5000,1:0000 &1:25000 are suitable [Survey, 2003]. Maps on 1:25,000 scale are available for about 35% of the area of India with Survey of India and for remaining part the work is in progress. SPOT panchromatic data can yield an accuracy of up to 3 meters [Westin et al., 1988 quoted by Bengt Paulsson, 1992]. Elevation mapping can also be done using SPOT data having stereo capabilities.

Aerial Photography:

Now a day's Aerial photography is being used for generation of base maps and other thematic maps for urban areas, as it proves to be cost and time effective and reliable. Wealth of information pertaining to land features, land use, built up areas, city structure, a physical aspect of environment etc is available from the aerial photography. It gives high resolution and accuracy which is the need of application like Urban Planning but at the same time is costlier, time consuming on account of security restrictions, needs heavy logistics and require intensive ground control net work. [Lecture Notes IIRS, India for M.Sc Geoinformatics, 2002].

Remote Sensing:

Remote sensing is the most popular and powerful mean of spatial data capture about wide range of areas. The useful sources of satellite data for urban application are the US Landsat, Thematic Mapping (TM) series and the mainly French, Satellite for Terrestrial Observation (SPOT) series since long. The availability of high-resolution satellite imageries with the improved spatial resolution of 1 to 4 meters from IKONOS and Quickbird have potential to revolutionise the plan preparation process by making maps in scales of 1:25000 to 1:10,000, available at lower cost and quickly.

The IKONOS sensor has so for collected 100 million sq.km. of imagery that is readily available in digital archive of Space Imaging [IKONOS Product Guide version-1.3, 2003] .The cost of archive data is just Rupee 13/- per hectare [National Remote Sensing Agency, Hydrabad India].In addition ASTER (advanced Space borne Thermal Emission & Reflection Radiometer) is freely available to users all over the world without any cost and is suitable for extracting major landmark features like airports, roads and even large buildings .It is also good for generating precise orthoimages and DEMs through its stereoscopic capabilities[Fly Through Data Generation of Afghanistan by Dr.Philip Cheng and Lausce McBean] .

For Urban Planning applications IKONOS data is excellent for automatic feature extraction, DEM generation and further base map generation. It is also excellent for change detection as revisit time in case of one-meter resolution is 3 days.70% land use land cover features were detected from IKONOS imagery [GIS DEVELOPMENT > Application >Urban Planning > Overview,"Application of Satellite Images and GIS in the Preparation of Development Plans: Case Study: Master Plan for TUDA Region and Zonal Development Plan for Tirupati Town"]. Remote sensing data can be used for various urban and regional planning purposes as listed below:

Preparation of base maps,

Land use and land cover changes,

Environmental impact assessment,

Analysis of site suitability,

Assessment of carrying capacity.

Remote sensing data have low costs, fast production, low security restrictions, low ground control / logistics and above all provides time series data on account of fast revisit periods.

[Bengt Paulsson, 1992]. The satellite images are procurable from National Remote Sensing Agency, Hydrabad in India. Data can be had from even private companies now by e-mail or Internet subject to security and legal restrictions.

Laser Scanning:

It is a combination of precise airborne GPS, Inertial Measurement Units (IMU), precise airborne lasers for distance measurements and digital cameras and video imaging holds the key to-touch, high precision monitoring of the terrain surface. Mean height accuracy of computed terrain heights (spot elevations) run to 10-20 cm. This system, which in many application areas represents a very economical option, has the advantage of supplying excellent height results even in highly inaccessible terrain e g .in forested areas.

Airborne laser mapping has many applications creating to develop several products such as Digital Elevation Models (DEMs), height profiles, perspective views and slope maps etc. [Karioki, 1999 as quoted in GFM-HO-1.10002 JULY 1999]. The automation rate is large, while time-efficiency and cost effectiveness are high [GIS Development Overview, " Height information from laser - Altimetry for urban areas," by Mathias J.P.M. Lemmens]. This technology has vast potential for fast, accurate and economical data acquisition in specialised urban applications including existing land use survey, traffic & transportation surveys, housing surveys and other real time scenario acquisition. It works in cloudy weather also but exceptional stormy and rainy conditions are avoided. The limitation is that of technical know how to acquire data, process and use the same at local level.

Global Positioning System:

GPS is the best technology at the moment to know the exact position (x, y, z) of a point on the earth with reference to International Terrestrial Reference Frame (ITRF) at any point of time. The technology is becoming cheaper and popular. It provides great help in densification of Ground Control Points, mapping and controlling & monitoring navigational activities. The technology isn't good in cloudy weather, thickly forested areas and dense built up areas. However, it works day and night. Anyhow it has revolutionised data acquisition process on its own or in combination with some other technologies [Lecture Notes IIRS, India for M.Sc Geoinformatics, 2002]. Reliability of system is also a problem as the host may stop any service to any customer at any time or make changes in configuration of satellite ephemeris.

Total Station:

It is an advanced electronic distance measuring device (EDM) with capabilities of making calculations of x, y & z dimensions and data recording related to angles and distances and / or coordinates of points sighted and recorded, along with some additional information (usually codes to aid in relating the coordinates to the points surveyed). The data thus recorded can be directly downloaded to a computer at a later time. Its use reduces time in data capturing as no manual recording of readings in the field and the rewrite process for fairing the fieldwork is needed. Moreover, chances of human errors are also eliminated. Additional benefit of this instrument is its workability in forested and built up areas where GPS cannot work. Technology is fast and cheap as well as such equally good for updating data also. However, visibility and specialised skill are limitations of this system.

Mobile Mapping:

Based on combination of electronic imaging, satellite positioning and spatial information systems technologies, mobile mapping is used to capture precisely geo-coded digital images while a vehicle moves along a road at a set speed. It integrates a GPS receiver, with an Inertial Navigation System (INS) and up to four digital cameras. GPS &INS determine the position and altitude of the vehicle at any time, while digital cameras capture high-resolution colour images showing roadside assets and pavement conditions. This technology is best for surveying, mapping and feature inventory applications. The results are better, less expensive and faster as compare to other mapping technologies. [Karioki, 1999 as cited inGFM-HO-1.10002JULY1999]. The tech-

nology is best suiting to Urban Planning needs of conducting real time planning surveys to acquire most recent data at reasonable cost and with in minimum possible time.

Pen Computing:

Pen computers are hand held, lightweight, durable and portable. Data is captured at source on computer by hand using special stylus attached to a clip-sized computer. The combination of these field computers with GPS and wireless communication makes it easy to collect field data and update distributed databases almost in real time [OEEPE Manual, 2001]. Handwriting recognition software translates hand written entries into typed characters eliminating the need to re-key data. (Pen Systems, 1997). This technology provides opportunities to compute in the field. The data can be immediately transferred to a corporate database with the help of simple electronic or wireless connections. The databases can be continuously updated in an efficient, timely and economic manner. [Karioki, 1999 as quoted inGFM-HO-1.10002JULY1999].

Voice Recognition:

The technology is yet young but maturing and will be of great help in saving time as attributes such as parcel number, its geometric information, use, ownership, value; street names, geometric details etc., can all be entered by using voice.

4.2.1.2 Non-Spatial Data:

Pertains to attribute data which generally used to be in numerical / statistical and text forms. These data are collected by different specialised agencies for general purposes of for some specific purpose. The data reside in different databases of organisations at different spatial locations. Presently collection of such data is done manually which is very slow, costly and subject to errors. The modern-ICT technologies namely E-mail, Fax, Computer Networking, Internet etc., permit to access and transfer information at much faster speed saving time, materials and efforts. This all may reduce plan preparation time to a greater extent. The fast and direct communication means help in deciding modalities of data transfer, sharing, fresh acquisition among organisations which otherwise takes very long time. The technologies of voice recognition, mobile mapping and vediography also permit attribute data collection simultaneously with spatial data acquisition very quickly.

4.2.2 Data Management and Handling:

The data collected need compilation, classification, codification, storage, updating and retrieval. The modern techniques to this effect are as below:

4.2.2.1 Geographical Information System:

GIS is a computer based system, which provides functionalities of data entry, data analysis and presentation and thus very useful for planning, decision-making and implementation [Principles of GIS, ITC Educational textbook series, 2001]. It is a powerful tool, which helps planners to view different scenarios by integrating data from maps (spatial data) and other auxiliary data (attribute data) for a geographical area of interest and their outcome so that an optimal strategy may be chosen for planning and development. GIS is basically a map processing technique. GISs can be used to create and maintain geographic databases and are eminently suited for what-if-analysis

in any planning related activity. (Jere A. and Saren A. "Urban planning: A GIS experience" GIS development urban planning over view).[http://www.gisdevelopment.net. /application/urban/overview/index htm/ accessed on 8.11.03]

Data are stored in different layers and analysis can be done for any combination of layers irrespective of source, scale and data format. Overlaying of proposals on the base map for example can give the total picture of the proposed development superimposed on the existing one.

Once the spatial and attribute data is generated in GIS, its application areas are many and varied. Planning agencies can acquire the P.C. based GIS system, available in the market, to have quick analysis of geo-referenced data for planning and development. GIS in comparison to Data Base Management System provides an additional functionality of making spatial analysis, which is very basic function of planning and decision making process.

The GIS is different from other Information Systems on the basis of its ability to catalog spatially reference objects and their attributes with in the context of a map and to perform quantitative analyses based on geographical principles [Obermeyer. J.Nancy and Pinot's. Jeffrey, 1994].

4.2.2.2 Data Base Management Systems (DBMSs):

A large, computerised collection of structured data is called database, where as a software package that allows the user to set up, use and maintain a database is called DBMS [Principles of GIS, ITC Educational Textbook series, 2001].

DBMSs permit concurrent use of same data by many users, help in optimisation of storage space, maintain data integrity and provide query facility. DBMSs initially were not good in functionalities of spatial analysis but now the new systems are providing such limited facilities. These can handle very large data sets. These provide generic functionality of database organisation and data handling. It is very easy to update the database by inserting, deleting and replacing data. It also saves from data redundancy.

The databases once created help in sharing, updating data quickly, easily and reliably. Data organisation and elementary analysis can be done more timely and effectively with the help of DBMSs.Processing and retrieval of data and information are much faster than any other means, which require a fair time lag between collection of data and its publication as useable information. Construction of appropriate databases simplify the process of collection and storage of data, which in turn helps in reducing human error associated with data inputs and computations.

DBMSs like dBase, Informix-SQL, Ingres, Paradox, Oracle, Sybase, R:Base and 4^{th} Dimension running on micro and mini computers, provide tools for constructing on screen data entry forms with built-in editing and checking in capabilities in some cases. Additionally, with laptops survey data can be collected on site and entered directly into the computer database. Availability of floppy diskettes and other media facilitates distribution and exchange of machine-readable data

For easy exchange of data to different formats under hardware and software specifications standardized data exchange tools are also available.

The DBMSs also provide report generation tools to produce printouts that select, sort, join and list various fields from the database and format output with headers, footers, sub-totals and the like. The structured query languages usually supplement DBMS complex queries for data retrieval and manipulation. Additionally, graphic and statistical tools are also available with DBMS now.

4.2.3 Information Presentation and dissemination:

4.2.3.1 Presentation:

It is the most important task in the process of information management because the users for whom the whole process is initiated is only interested in seeing the results and that too in comprehendible manner. Cartography is the mean to present results of data analysis in forms of maps, charts, diagrams, and sketches. Conventional cartography is most time consuming task. Presentation is needed for the decision makers to easily understand the real world situations and take right decisions. The end users also need it to ascertain safeguard to their interests.

The advancements in computer graphics, presentation functionalities of GIS and DBMS have changed the scene of modern cartography which has now become digital in nature. Software like Auto-CAD and Auto-CAM helping speedy and quality wise improved mapping and designing.

Internet is becoming a powerful mean for distribution of information including maps with improvement in presentation quality. The interactive maps and map animations for representing changes have also become reality.

Multimedia (audio, video, animation) presentation techniques have special effect in information dissemination process. Some blinking or moving maps or parts thereof can give special lucid idea of changes by highlighting such map elements.

The presentation of maps on screen has advantage to establish link by a simple mouse click to the related database, photograph, painting or sketch and thus reveal much more information than paper maps. The static map though with less information on them can with the help of hyperlinks or by operation of another GIS functionalities like zooming and panning may interactively disseminate a lot of additional information.

Dynamic maps on screen provide opportunities to the users even to determine the contents of the maps, change visualisation parameters and choosing symbology o r colour of their own choice.

The WWW also allows for the fully interactive presentation of 3D models. The Virtual Reality Markup Language (VRML), is used for this, for instance. It stores a true 3D model of the objects, not just a series of 3D views. [Principles of GIS, ITC Educational Textbook series, 2001].

4.2.3.2 Dissemination:

Computer Networking:

Linking of computers located at several different places enhances the power of data processing and communication. Establishment of computer networks called local area net work (LAN) in planning office and then linking these net works by what is called wide area network (WAN) can help a lot in sharing the data available in different offices and also sharing the processed results. For example, maps and drawings related to Development Plan could be prepared under Auto-CAD and distributed across the network in other offices to update and add the information relevant for the planning purpose. This can facilitate working on the common digital database and economize on time and manual efforts.

Internet:

Internet is the main path through which number of information flow all over the world. GIS has also now started on Internet i.e., Internet is used as a means to access and transmit remote data and present GIS results. Many mapping agencies both, public and private are providing now information through the Internet by establishing their own web sites. This technology can be used for developing web sites by even small institutions or entrepreneurs to propagate their business as cost of establishing web site is very reasonable, but the real question is that of updating the web site failing which it has no meaning. Internet is becoming mean of fast communication and thus bridging the gaps of physical distances

4.3 Geo-Information Management Technology(GIMT):

The privatisation revolution on account of economic constraints and subsequent globalisation revolution on account of openness in economies the world over during early nineties of last century led to emergence of new concepts in the field of business and manufacturing. This change in societal environment compelled the production organizations both in private and public sectors to review and alter their strategic plans to keep pace with the changing situations.

There are many performance improvement management technologies / initiatives, which are closely linked or complementary to each other. The boundaries between them are very thin but the objective of all is same that is improvement and management of processes / operations.

- Business Process Engineering (BPR) / Continuous Process Improvement (CPI).
- Operations Management

4.3.1 Business Process Reengineering (BPR) / Continuous Process Improvement (CPI):

Consequently, among others the concept of Business Process Re-engineering (BPR) came in to being in the United States. It suddenly became popular as Information Technology (IT) became

an "enabling technology which facilitated the introduction of new and more efficient organization design options"[Dur, 1992].
[Hammer and Champ, 1993] defines BPR as "the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as quality, service and speed".

Thomas Davenport, in his book Business Process Innovation {Davenport, 1993}, says,"Reengineering is only part of what is necessary in the radical change of processes. The term process innovation encompassing the envisioning of new work strategies, the actual process designs activity and the implementation of the change in all its complex technological, human and organizational dimensions".

BPR is essentially about recasting the management experiences of the industrial age into the information age framework (Electronic College of Business Innovation).

The definition of term process reengineering in glossary of GFM-Handout series provisional lecture notes [Radwan et. Al, July1999] says, BPR takes a fresh look at the objectives of the process and completely ignores the present process and the organizational structure. When applied correctly, it reduces cost and cycle time between 60-90% and error rates between 40- 70%. It is a radical process improvement approach and should be applied to not more than 20% 0f the organization's major processes.

Briefly, on the basis of the common essence of different definitions, it is evident that BPR relates to the TO-BE situation of some business envisaged after creation of radically different process to provide breakthrough achievements in performance and customer satisfaction. It does not stand for improvement in performance of the existing processes [OEEPE Manual, 2001].

Business Process Improvement (BPI):

It is also called Continuous Process Improvement (CPI) and is very much similar to BPR in objective but differ in methodology. Incremental improvement is the essence of BPI, which suits to some organisations who have smaller empires and cannot think for radical changes to avoid risks because change does not necessarily means improvement. BPI supports 15 to 20% change in some business process [Radwan et. Al, July1999]. It should be an integral part of the organisation culture, even though the degree of improvement varies at different periods.

4.3.2 Operations Management (OM):

Pertains to management of processes, resources, technologies and procedures / methods.

It is management of integrated processes to deliver products and services that comply with the requirements of the customers [Paresi, 2003]. The tasks involved in this field of knowledge includes identification and decomposition of production systems into smallest possible units to comprehend their functioning, interrelationships with other units, requirements, outputs, performance measurement methods & criteria, problems, remedies and possible alternatives of their performance. The various techniques of OP are Process Model, Performance Analysis, Quality Management, Workflow Management, Cost Management, Resource Management and Document management.

4.3.2.1 Process Modelling:

Process is the object of OM. Modelling of business processes is the first step towards performance improvement / optimisation It specify the various structural components of the business process, their specified roles and interaction in the system during the course of processing inputs for generating the outputs. It helps in understanding the nature; requirements of inputs and technology, problems and potentials of the process on which future strategic plans for optimisation are laid down. Modelling also paves way to test, implement and control the process. Process modelling is the basis of operations management.

4.3.2.2 Performance Analysis:

Performance analysis is a computer-supported simulation of the modelled process. It helps in detecting the errors, understand the perspective behaviour of the process under certain specified conditions, evaluate the performance of existing process and comparing the alternatives on the basis of identified criteria. This technique is the most powerful tool in the hands of the decision makers to keep their institutions always ahead of other competitors in the market in the concerned trade. Such an analysis suggests a strategy for continuous improvement of the process and the performance improvement. Performance can be measured at organisation level, business level and operations level. The measures of performance vary from business to business but generally cost, time, quality, throughput and resources utilised are the common parameters.

4.3.2.3 Quality Management System (QMS)

It is a documented organisation structure consisting of purposes, procedures, resources and techniques with the objective to ensure the quality in the organisation. QMS is composed of all parts of the organisation and deals with both the quality of the processes and products in the organisation [OEEPE Manual, 2001]. It describes parameters for quality measurement, quality work instructions, quality management during the course of information processing, and quality reporting and quality management.

The implementation of the same is possible only with consent and involvement of the top management as it is required to be the integral part of the quality policy of the organisation. The Total Quality Management concept aims at continuously increasing value to customers by designing and continuously improving organisational processes and systems. Thus it is evident that customers' satisfaction is the sole aim of QMS.

4.3.2.4 Work flow Management (WFM)

Workflow technology provides functionality to capture, analyse and control businesses. Successful implementation has already been realised in diversity of industries registering improved efficiency and effectiveness. Maintaining organisational level workflow is very complex, time consuming and very susceptible to error. The alternative is to use process models to combine sets of relative activities and define them as smaller business oriented workflows. It forces the logic that governs the linkages and transitions of the activities in a process ensuring that all activities are performed by the right resource at the right time.

It supports the business process by bringing together the human and information resources needed to complete each activity in the process. This leads to improved efficiency and process control resulting from standardisation of procedures. It enhances the ability to manage processes by making performance problems more explicit [Workflow handbook, 1997]. The technology is new but maturing fast and has vast potentials for application in different fields of applications. In UPPBP there is enough scope for applying this technology.

4.32.5 Cost Management:

Cost relates to production where as price to market forces including policies made for intervention in public interest by the sovereign authorities. Cost is worked out on the basis of resources and services consumed for production of a unit of particular good / output plus some overhead charges in forms of taxes and levies. Cost is affected by other business performance criteria like time and quality. Its management is essential to have optimum balance between time and quality, so to capture maximum share of the consumers / market. Activity Based Costing (ABC) is an accounting system that assigns costs to products based on the resources they consume. The costs of all activities are traced to the product for which they are performed. Overheads costs are also traced to a particular product rather than spread arbitrarily across production lines. ABC gives visibility to how effectively resources are being used and how all activities contribute to the cost of a product. This technique helps business managers to find out the weak points in the process model putting adverse impact on cost and then they used to take right decisions to manage the product cost with in optimum limits.

4.3.2.6 Resources Management:

The resources of an enterprise includes movable, immovable, organic, inorganic, men, machines objects, which individually or in combination with some other objects contribute towards the production of either some good or service. Financial & legal instruments, Information / knowledge or skills are also included in resources. These all must be in consonance with requirements of the process meaning thereby that these must have adaptability to the changing scenario of the business process to provide a competitive edge to the enterprise in the market. The arrangement, upkeep, optimum utilisation, up gradation, improvement, disposal, deployment and replacement of resources come under management operations. To create harmony between the business process and the entrepreneurial resources to achieve production goals is the job of process managers.

4.3.2.7 Document Management:

It deals with security and safety of the information of and about the organisation. The process managers have to see that who is to be given access right to documents and to what extent, so that loss, infidelity and misuse of information is curbed. The content resources may include images, word processing files, graphics, multimedia and databases. The history of the development of the business must be preserved in different versions for future references.

4.4 Conclusion:

This chapter has made an overview of Geo-Information &Communication Technologies and Geo-Information Management Techniques, which have potentials to contribute in a big way in the optimisation of UPPBP, either by replacing the old technologies in use in use or by getting entry to this field of application. In the next chapter the UPPBP will be modelled / structured and optimisation / improvement actions will be recommended out of the said technologies and management techniques, so to solve the performance problems of the process in the AS-IS Situation and to achieve the strategic goals set for improvement in the same chapter 3.

5. CHAPTER

Design for Optimisation of Urban Plan Preparation Business Process

5.1 Introduction

The last chapter has dealt with pointing out the areas in the UPPBP, which are being adversely affected by the prevalence of conventional technologies in practice and missing application of management techniques. The available enabling technologies have also been discussed that may replace the ones already in practice to optimise the business process. The present chapter in this background is now going to be devoted to model the UPPBP for optimisation by suggesting changes in technology at appropriate stages in the process along with resource optimisation introducing operations management techniques. The structuring of the process is the same in the To Be / proposed situation as it is in the AS-IS Situation, since it is invariant on account of law and rules of the discipline. The present chapter has two parts:

The first part covers modelling / structuring of the UPPBP and includes proposals for bringing in modern Geo-Information Technologies in place of old, obsolete, analogue and manual technologies to optimise the process.

Where as the second part consists of organisational restructuring / optimisation in view of the technologically optimised core process of UPPBP in the preceding part of this chapter and design for operations management optimisation proposals in line with Continuous Process Improvement (CPI).

5.2 Plan Preparation Business Process Modelling and Optimisation

Process: A pattern of closely related events (activities, actions) that take place to lead to a particular result and can be manifested in many different ways [OEEPE, by M.M.Radwan et. al.]. It may be structured, semi- structured and unstructured. Processes need to be modelled to understand, diagnose and optimise to keep pace with changing business environment.

Process Modelling: "An abstract representation of reality that excludes much of the world's infinite details. The purpose of model is to reduce complexity of understanding….a phenomenon by eliminating the details that dose not influence its relevant behaviour."[Curtis, Kellner, and Over, 1994 as quoted in OEEPE Manual]. The processes are modelled to design new system, evaluation of existing system and finally to compare proposed alternatives for a particular system.

In the present context out of many processes like Decision Making, Plan Preparation, Plan Implementation and Plan Monitoring, Evaluation & Review in the UPBPM the Plan Preparation Process is chosen for Optimisation. It is evolved as per the statutory provisions available for this process in the Himachal Pradesh Town & Country Planning Act, 1977.

The process consists of sequentially structured seven sub-processes / activities / steps / building blocks in all, which are structured in such a fashion that each one of them is independent but at the same time dependent on other for performance of a common task i.e., plan preparation. The process triggers with either a request from some municipality or decision of the State Government to go for plan preparation for a particular spatial entity.

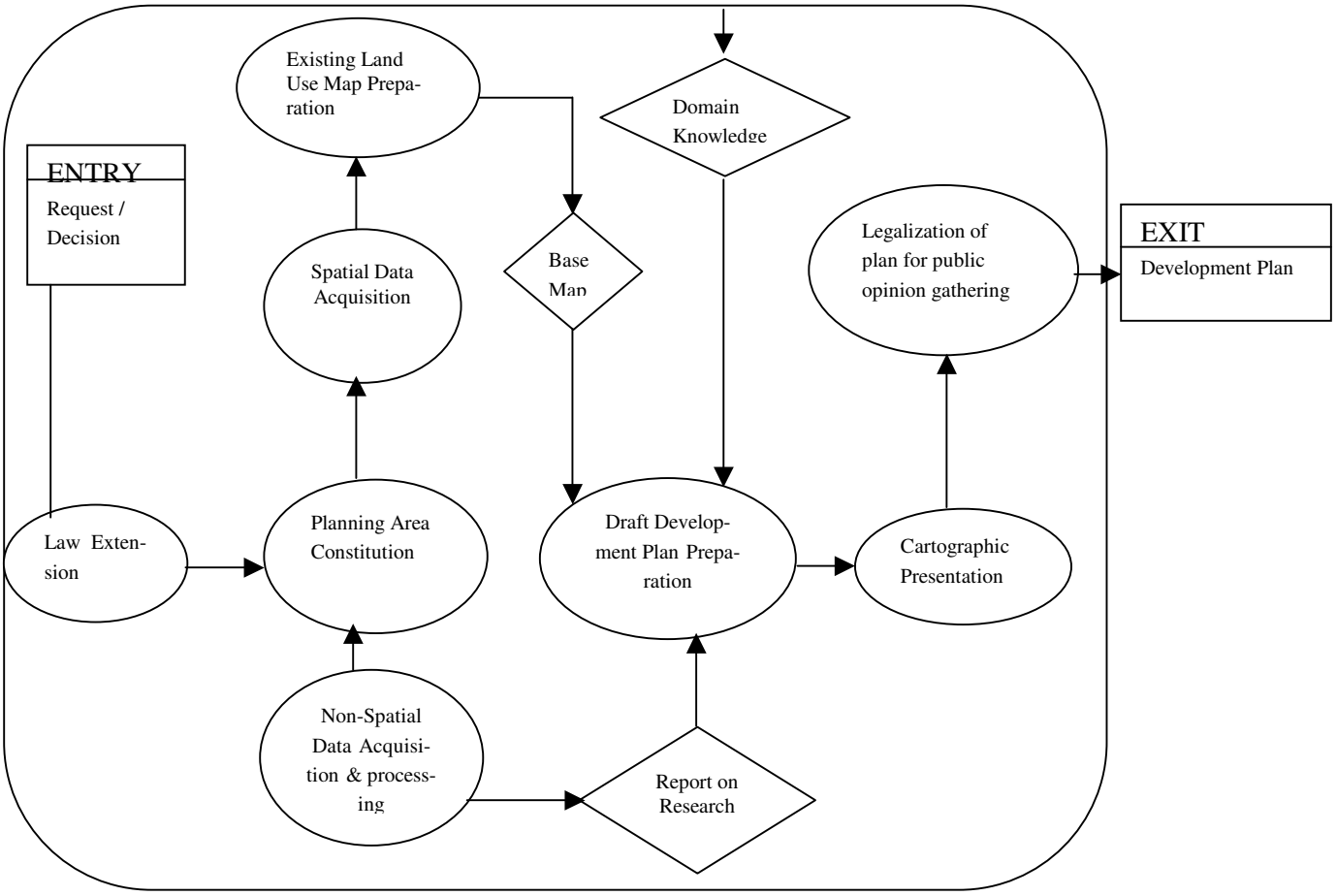


Figure 5-1 **Urban development plan preparation business process model**

The inputs to the process are spatial data, non-spatial data and expert knowledge of urban planning domain. The data are converted into information by value additions strictly as per principles and techniques of application field to generate output to satisfy the customers. The process finishes with notification of the Plan being a public document after approval of the Government.

5.2.1 Proposed Sub-Processes Models

5.2.1.1 SP1 Extension of Law Sub-Process Model and Activities Description:

The initiation on recognition comes from the authority responsible for the area in form of input, which triggers this sub- process. The activities in sequence are as below:

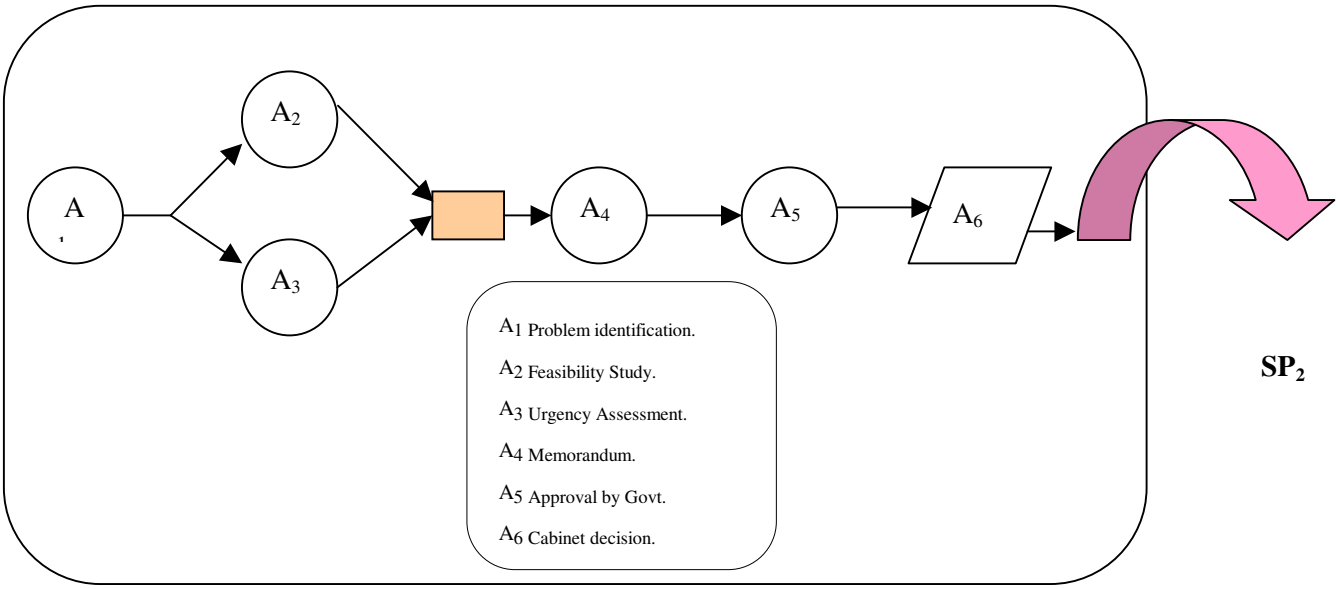


Figure 5.2 SP_1 Extension of Law

Problem Identification (A1): It is the subjective observation of the authority to assume the physical development scenario in some area as problematic situation.

Feasibility Study (A2): To establish reasonability of observation the authority concern conducts feasibility study to make assessment of the magnitude of the problematic situation. The criteria for study may include one or more parameters in combination like:

- Population size and density, so to prove concentration of people on a location to fix thresholds.
- Basic / Non-Basic economic functions ratio to take stock of economic base of settlement. It may be on the basis of percentage of workforce engaged in primary, secondary and tertiary economic pursuits.

- Land and Rental Values in comparison to some standards or other similar areas in the vicinity.
- Built up / non- built up area ratio per unit of area or in some spatial administrative or cadastral unit.
- Growth rate of population in comparison to general trend at local or national levels.
- Administrative set up available in the area to look after civic affaires of the area.

Urgency study (A3): To make assessment of living environmental condition on the basis of criteria:

- Population versus infrastructure.
- Housing density and condition.
- Garbage generation and disposal.

Memorandum Preparation (A4): A proposal to appraise the decision-making authorities is prepared using textual, graphical, and statistical presentation as well as multimedia visualization techniques.

Government Decision (A5): To get the executive action democratised by obtaining consent of political authority.

The output of this sub-process will be in form of a decision, which will become input to next sub-process.

Problems:

Activities mentioned above are done manually by conducting field visits. The task takes long time on account of weather conditions and personal delays; involves costs on account travel expenses and time cost of staff; repetition of work in field and then fairing the same in office and getting it through from various levels of official hierarchies. Above all, the holistic view of the spatial characteristics of the area never becomes possible in the field due to visibility, integration and orientation problems.

Geo-ICT Improvement Actions:

Visualisation & Diagnosis with the help of digital spatial data & modern Geo-ICT to have holistic view of spatial characteristics of area in the office it self to restrict dependency on field visits so to reduce time and cost involved in the performance of this activity.

5. 2. 1.2 SP2 Constitution of Planning Area Sub- Process Model and Activities Description:

The activities B_1 to B_6 involved in this sub-process relates to collection, processing and presentation of spatial and non-spatial data pertaining to the area covered under decision of the Government in preceding sub- process. The detailed steps in this sub-process are as follows:

Reconnaissance Survey (B1): To observe and acquaint with the area with respect to natural, physical and socio-economic profiles, trend, direction, magnitude, nature and potential of development.

Decisions (B2): Regarding spatial extent, boundary and areas not to be included.

Collection of Spatial Data (B3): For preparing map of would be planning area from the State Revenue Department.

Collection of Non-Spatial Data (B4): Regarding area, population and other socio-economic-cultural aspects.

Map Preparation (B5): The activity involves drafting of a planning area map showing all relevant spatial reference details.

Project Report (B6): A comprehensive report justifying the proposal to public and Government as well, containing map, photographs, sketches and statistics apart from textual description.

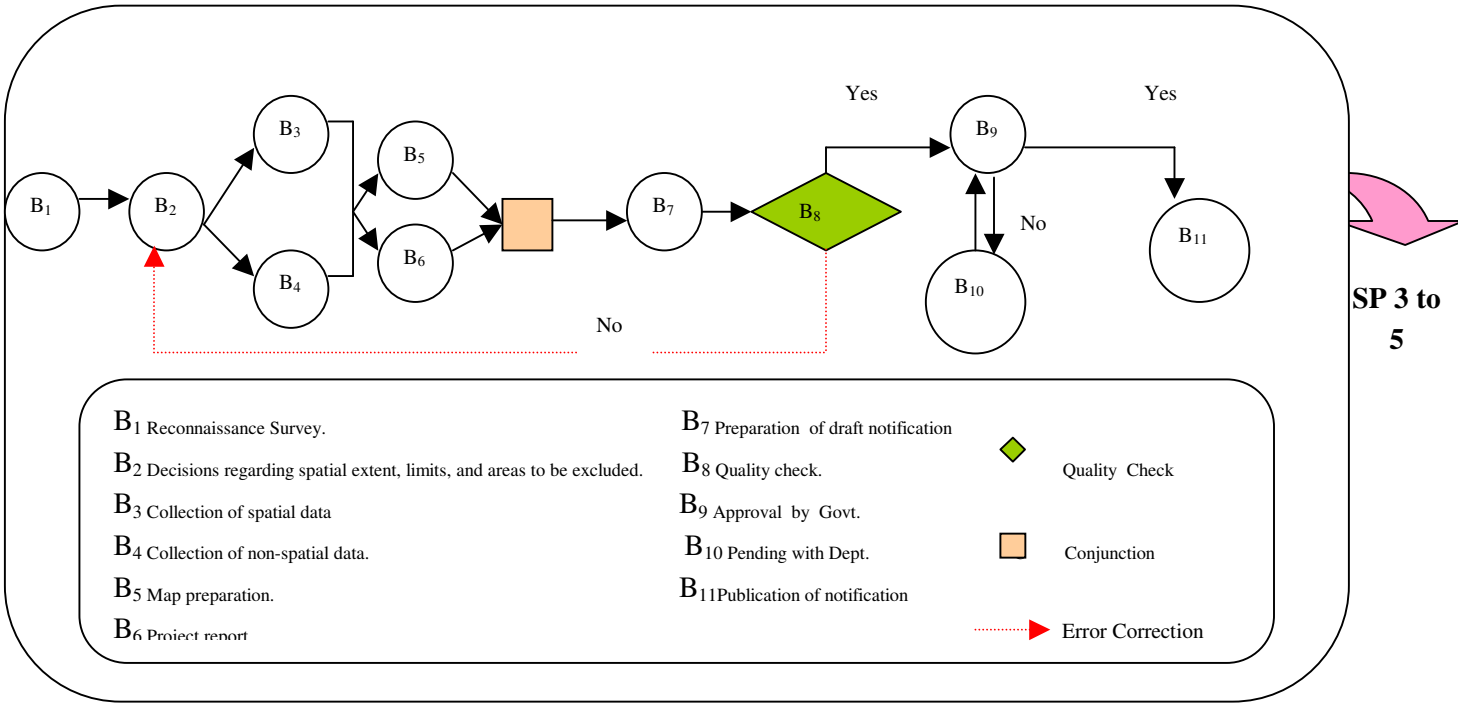


Figure 5-3 SP_2 Constitution of Planning Area

Preparation of Notification (B7): It is a legal instrument prepared in accordance with provision of law to declare and provide legal sanctity to decision of the Government.

Quality Check (B8): Is exercised by in form of scrutiny by the superior authority in the hierarchical organization structure by verifying the site conditions with details of the proposal and a notification prepared in consonance to these both as well as provisions of law.

Approval by Government (B9): Legitimatisation of an executive action of technical nature through cabinet decision.

Publication of Notification (B11): It is a declarative method to legalize the Government decision and thus make it public. This output in shape of a notification enables further progress of UPPBP.

Problems:

- Presently, all tasks related to above mentioned activities are done by conventional analogue cartographic techniques and manually taking more time, incurring higher costs,

keeping resources occupied for longer periods and giving product of comparatively lower quality.

Geo-ICT Improvement Action:

- The digital cartographic techniques will make presentations at a faster speed and generate interactive and more informative maps and reports, which additionally will be easy to amend, transfer and communicative.
- In new process model activities will be done in modern networking and computerized environment, which will remove many delays and thus speed up the process apart from improving the quality of the work at lower cost.

5.2.1.3 SP_3 Spatial Data Acquisition Sub- Process Model and Activities Description:

This is the most important activity of the UPPBP, which needs utmost attention for optimising the business process. The professional responsibility boundaries of urban planner as prescribed by the Institute of Town Planners' India (ITPI) [Conditions of Engagement of Professional Services and Scale of Professional Fees and Charges, ITPI, 1998] clearly spells out that primary survey for data generation is not the professional service to be rendered by an urban planner. It is a prerequisite input otherwise it would be treated as an additional service. Moreover, the emerging concept of National Spatial Data Infrastructure does not support generation of core spatial data by every field of application to ensure sharing of data and thus avoid duplicity [NSDIhttp://www.nsdiindia.org/publication/doc.htm, Oct.30th, 03].

The importance of this activity lies in the fact that the whole process of plan preparation revolves around map of the area. The efficiency and also effectiveness of the UPPBP depend on availability, appropriateness i.e., fit to use, cost, just in time, currency, accuracy and exhaustiveness of contents of spatial data. .

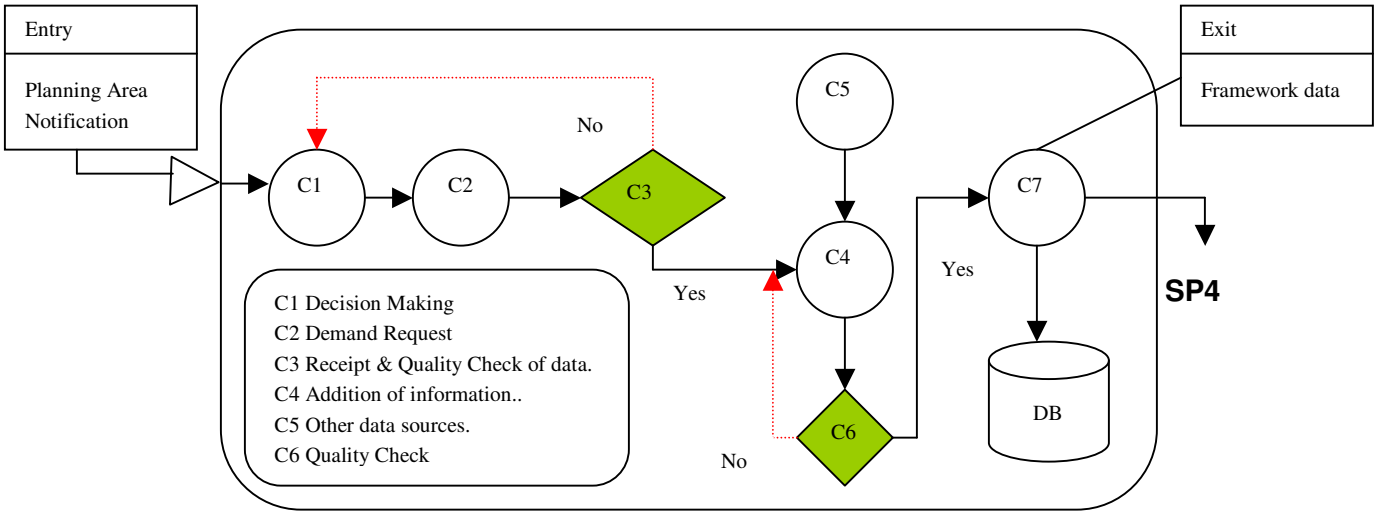


Figure 5.4 SP_3 Spatial Data Acquisition

In background of this discussion, it is evident that this activity / sub-process of UPPBP is over due for complete outsourcing and building capacity to put to use the products and services available in the field of spatial data generation business. Data can be procured in digital form added to the organizational archive / database for future use or value addition. The detailed activities of this sub-process are as under:

Decision Making (C1): Regarding selection of data provider in view of project related aspects such as time, funds availability, accuracy level required and data handling capabilities in the organization

Demand Request (C2): Preparation of demand order requisitioning data related to the area specifying crisply the boundaries, location and extent, scale, contour interval, projection, and level of contents, format and temporal currency to the data provider.

Receiving dataset & exercising quality check (C3): To verify the specifications of data to that of demand request before putting the data set to any use in the process. In case of any discrepancy the issue can be taken up with the provider for necessary corrections.

Updating data set **(C4):** This step adds information to the data set from other sources of information. It is required to add more thematic information to make the data set current and exhaustive in contents as per needs of plan preparation process.

Quality Check (C5): After updating the framework dataset from data from other sources having different specifications of scale, projection, and datum and format quality check is inevitable.

Framework data (C6): On qualifying the quality check the data set thus made up to date becomes right input to the next sub-process and its copy is consigned to the organizational database for other applications.

Problems:

- The problem till recently and which still persists to some extent is that the two main core frame work data providers namely the Survey of India and Revenue Agencies had their own business missions and visions and were not providing data fulfilling the specifications of the UPPBP with respect to scale, elevation information and contents.

- As such the planning agencies used to take whatsoever spatial data are available with the data providers and make the same fit for use by applying available tools and techniques in Mapping sciences / cartography. This situation has twofold impact on the UPPBP firstly, reduction in efficiency on account of delays caused by lengthy and time consuming hit and trail applications on original data to tailor it as per requirements of the process and secondly, reduction in effectiveness on account of both delays and low accuracy of the plans.

Geo-ICT Improvement Actions:

- Now with the availability of ever improving and becoming affordable enabling spatial data acquisition technologies namely aerial photography, remote sensing with sub–meter level spatial resolution, global positioning system, SAR interferometer, laser altimetry, mobile mapping, pen computing, and voice recognition, there are alternatives of getting large scale maps for UPPBP purposes as per specific requirements of the various projects. These technologies either singly or in combination have vast potential to solve the problem of large-scale mapping.
- However, to avail above said opportunities the agencies dealing with UPPBP are essentially required to have resources both, infrastructure and manpower to handle the products becoming available in form of out puts of modern technologies. As data providers are adopting these technologies users will have corresponding capabilities for the shake of interoperability, sharing of data and for receiving or disseminating data.
- Moreover, private data providers are also coming in the market increasing choices before planners. The outsourcing of activities related to urban base map preparation can very well be now done, but the process again requires technical capabilities to play in these deals.

5.2.1.4 SP4 Preparation of Existing Land Use Map Sub- Process Model and Activities Description:

This sub- process further updates the spatial data with respect to existing use of every parcel of land, which is required to find out the magnitude, spatial distribution, direction of development to support the future strategy of planning. The future proposals for a perspective period are to be overlaid on this map. It creates a scenario, which dictates future envisioning for development of an area. It is a legal tool and involves exhaustive efforts to get accomplished as it is prepared only once in evolutionary history of the settlement in normal conditions. Legally no plan can be formulated till existing land use map is prepared and duly adopted under law [The Himachal Pradesh Town & Country Planning Act, 1977]. The steps / functions in this sub-process are as follows:

Designing format (D0): For recording attribute information of each parcel of land.

Project Planning (D1): Taking decisions regarding time, man power to be deployed, methods & quantum of test checks to be exercised during field work and arrangement for transport, communication, stay etc.

Recording Physical objects (D2): Entering buildings on the base map.

Entering Attributes (D3): Regarding use, floor wise use in case of buildings.

Quality Checks (D4) & (D5): in both entries in the format and marking on map are made by supervisory authorities.

Preparation of Map and Register (D6) & (D7): On successful fieldwork the data collected are presented in graphical and textual forms.

Publication of Documents (D8): For checking, satisfaction, and pointing out discrepancies by public.

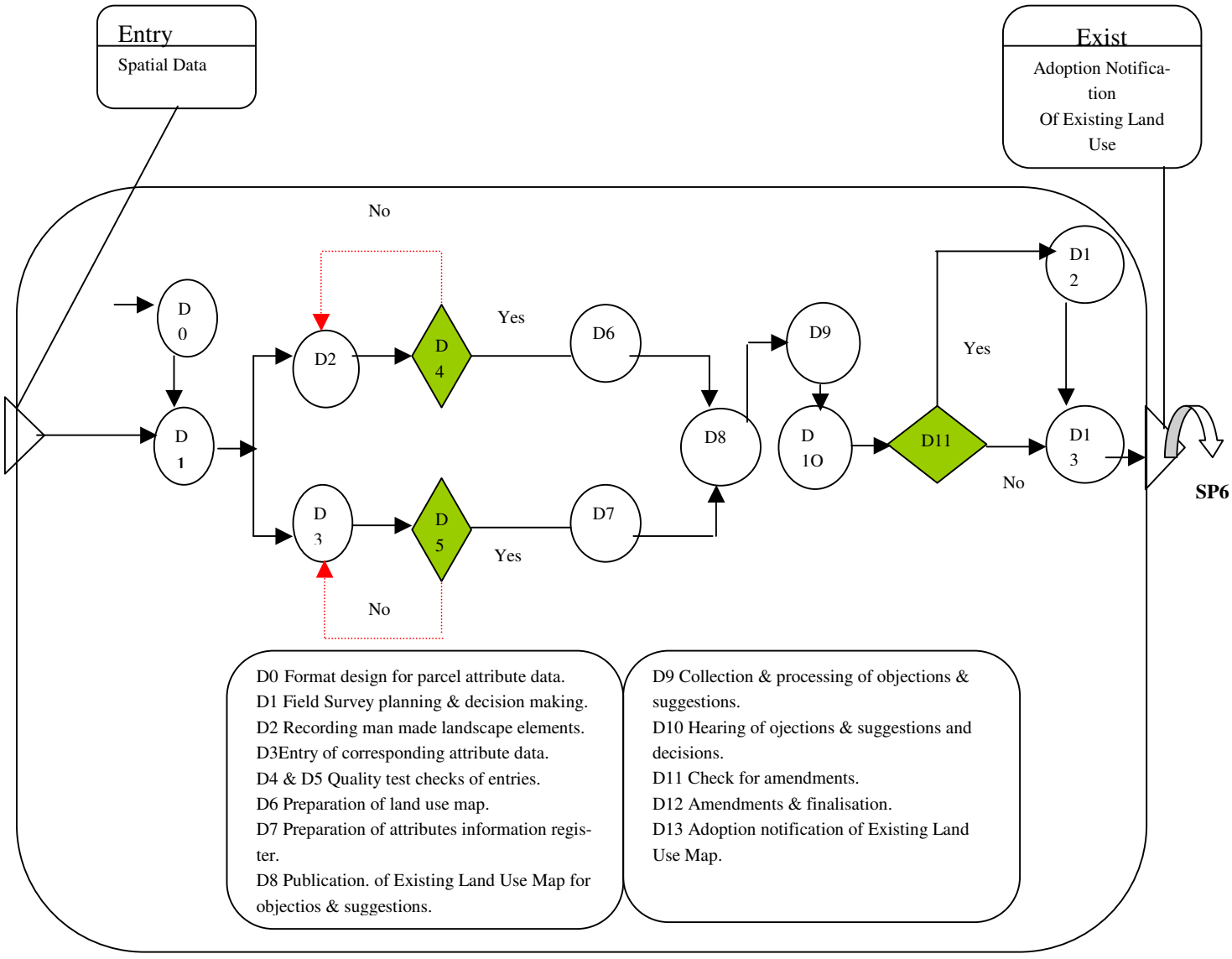


Figure 5.5 SP_4 Preparation of Existing Land Use Map

Processing of Objections (D9): By preparing replies to be put before the objectors in next step.

Hearing (D10): To give opportunity to individuals regarding their objections and apprising them about official version on their apprehensions and finally arriving at decisions to finalize the document.

Quality Check (D11): To ascertain whether some amendments in original documents are needed in consonance to consensus decisions arrived at in the hearing stage.

Amendments & Finalization (D12): By making necessary corrections in form of additions, deletions and alterations in entries either on map or in the attributes in the format.

Adoption Notification (D13)*:* To provide legal status to the document of existing land use consisting of a map and a register a notification is published under provisions in law.

Problems: Manual field operations, use of analogue cartographic methods for presentation and delay breeding legislative provisions together make this sub-process very time consuming and cost escalating. The human error factor also affects the quality of the outcome.

Geo-IT Improvement Actions:

- The high-resolution data from IKONOS sensor can be used to extract feature to reduce time in preparation of this document, otherwise it takes years together. Instances show that about 70 to 90% feature extraction can be done by manual interpretation of images. Thus this activity can be made faster and cheaper.
- Computerisation process especially use of Pen computers can help in recording data directly into the main database from the field itself saving Both, time and money apart from improving the accuracy and quality of work.
- Digital Cartographic presentation techniques & Use of software like Oracle and MS Access for preparing land use attribute documents can speed up the processing of this activity and indirectly help in reducing the ultimate plan preparation time.

Additional Improvement Action

- The Act should also be amended to reduce the land use-freezing period from three years to six months subject to preparation of existing land use map, which also affects the efficiency of the process adversely psychologically. This change can reduce plan preparation time drastically.

5.2.1.5 SP_5 Non-spatial data Acquisition & Management Sub- Process Model and Activities Description:

This sub-process is another area requiring special attention for improvement as it affects the quality and response time of the UPPBP to a greater extent. The input for triggering action is planning area constitution notification. Its operation goes on simultaneously with sub- processes 3&4, but still it takes about 25 to 35% of the time taken for plan preparation [Survey conducted for this Research, 2003].

The requirements are statistical data of every sphere of human activities including demography, socio-economic aspects, infrastructure development, natural resources, which put any impact on physical development and information related to institutional resources like polity, legislation and policies of administration. This whole gamut of information become base for comprehending the complexities of society with respect to its likings, capacities, requirements, behaviors on one hand and creating / simulating scenarios for future and preparing plans to shape the future living environment on the other. Rather information is the tool for diagnosis and then suggesting curative measures for futuristic sustainability. The information must be current, complete, exhaustive and authentic to have better results of planning.

Presently, the whole exercise of data collection, processing, presentation and dissemination is done manually and information thus collected is liable to delays, inaccuracies on account of human errors, costly and never current. The contents of plans prepared on the basis of such information thus cannot be reliable as the same become obsolete by the time these reach to the level of real implementation. The information thus gathered is not maintained in some scientific manner, as there exists no database management system. This situation does not permit proper upkeep, updating and retrieval of information in the system and thus there prevail all sorts of problems of data quality, uncertainties, inconsistencies and duplicity leading to wastage of scarce resources.

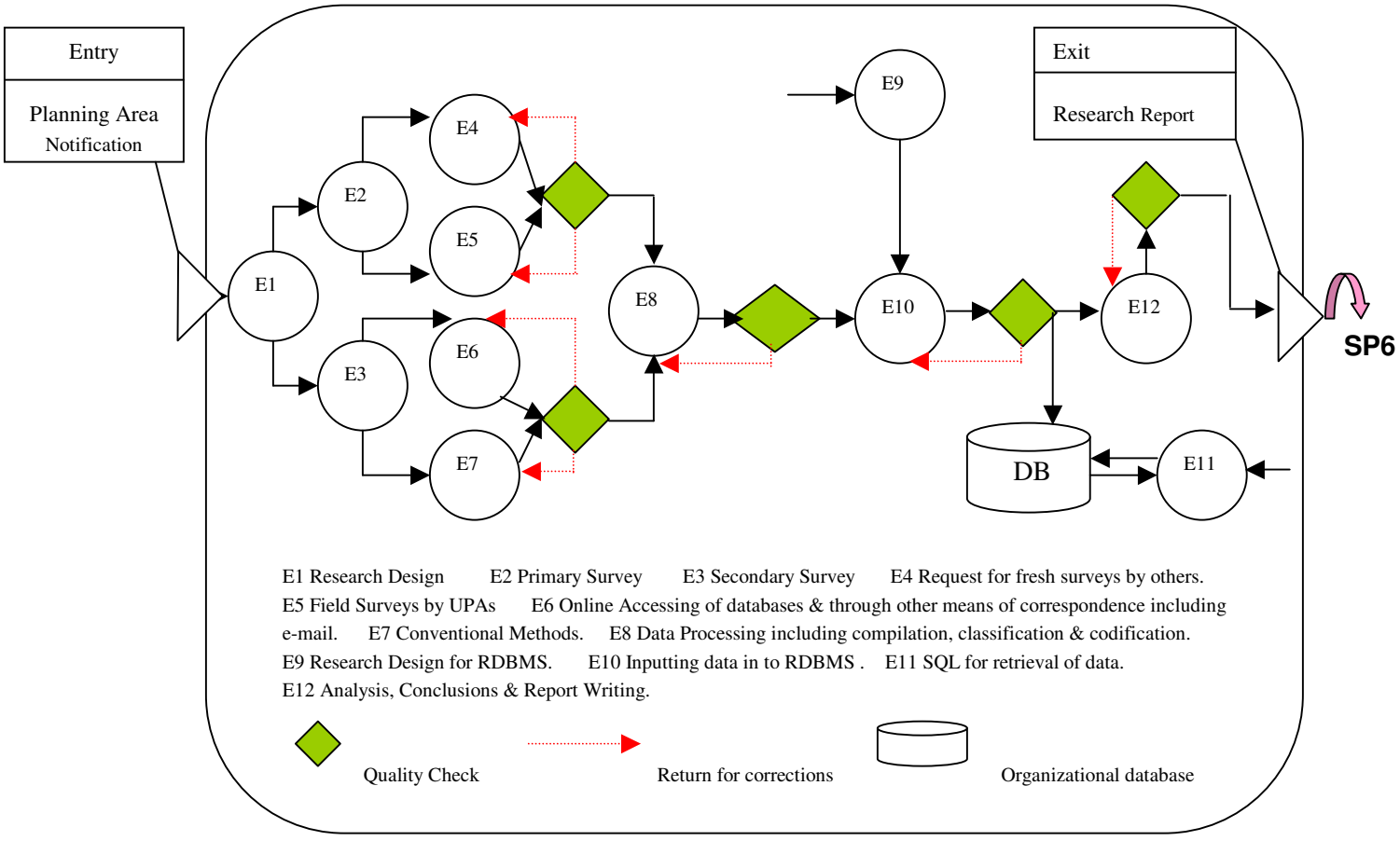


Figure 5.6 SP_5 Non-spatial data Acquisition & Management

There is dire need of making shift to take shelter of advances in the field of modern Geo-ICT, which have, potential to solve all these problems.
This sub process has thus been decomposed in to atomic functions incorporation of modern technologies at appropriate steps for adoption to achieve the Optimisation of the existing system of UPPBP is ensured.
Research Design (E1): The step involves formulation of schema to collect information from different sources according to the needs of the intended plan. Presently no such schema is formally in practice. Every time one has to start from scratch wasting resources. A standard questionnaire / format will be designed covering all aspects in details and preserved in soft copy for future use with inevitable alterations in view of local conditions of the area for which plan is to be prepared. This will bring objectivity to the working apart from saving time, money and efforts.

Primary Surveys (E2, E4 & E5) : Are conducted to have current and specific information on specialized aspects.

Some of these surveys are carried out by the Urban Planning Agencies (UPAs) themselves such as housing, traffic & transportation, facilities& services, urban design studies, façade studies for heritage conservation and many more. Modern technology including digital photography, voice recognition, mobile mapping, and pen computing and feature extraction from high-resolution satellite data can help partially to acquire such information at short notice, with high accuracy and authenticity. But initial infrastructure cost, trained manpower and compatible processing infrastructure are the limitation at the moment.
For some other primary surveys for which other agencies are to be requested modern means of communication and data transfer & dissemination techniques may help in sending requests, deciding terms& conditions, acceptance of contracts and information transfer on e-commerce / business lines and conducting online opinion polls like activities for speeding up the process and thus reducing plan preparation time. The limitation to this type of activities are institutional mainly rules and regulations of business in public sector institutions which need to be brought in to conformity to the modern enabling technologies.

Secondary Surveys (E3, E6, E7): Stands for extracting information already collected and preserved by some other agencies.

This sub- process can be benefited in a most befitting manner on adoption of enabling ICTs including Intra net, Internet for accessing distributed inter and intra organizational databases to have most current attribute data without or at reasonable cost and just in time. The problem with this technology is again that of requisite resources.

The conventional methods of data collection will also be benefited on adoption of digital communication techniques, which will help in transmitting questionnaires, returning the same after filling up by the respondents saving all time wasting clerical activities.

Data Processing (E8): The functions of compilation, classification and codifications will be done in the digital environment, which will save lot of time, stationery, labour, repetitions and possibilities of errors.

RDBMS Schema (E9): To design format its fields, domains, tuples and keys etc.

Inputting Data into Format (E10): To enter processed data in format for storage. One copy will be consigned to organizational database for future use while one will go to next stage.

SQL for Retrieval (E11): To develop method of retrieval of information from the database for other applications with in organization and outside.

Analysis, Conclusions & Report (E12):Introduction of GIS will help a lot in this function. The statistical, graphical and spatial analysis functionalities of GIS will be utilized to ensure efficient performance of this activity under client / server.

Problems:

- Presently, the whole exercise of data collection, processing, presentation and dissemination are done manually and information thus collected is liable to delays, inaccuracies on account of human errors, costly and never current.
- The contents of plans prepared on the basis of such information thus cannot be reliable as the same become obsolete by the time these reach to the level of real implementation.
- The information thus gathered is not maintained in some scientific manner, as there exists no database management system. This situation does not permit proper upkeep, updating and retrieval of information in the system and thus there prevail all sorts of problems of data quality, uncertainties, inconsistencies and duplicity leading to wastage of scarce resources. There is dire need of making shift to take shelter of advances in the field of modern Geo-ICT, which have, potential to solve all these problems.

Geo-ICT Improvement Actions:

- The functionalities of GIS & DBMSs providing opportunities for data storage, building of users' friendly interfaces, presentation, report generation as well as query and distribution will be fully exploited in this sub-process. The database system will be developed and populated in due course of time, so to increase availability of data, constant updating and intra as well as inter- organizational sharing.
- Use of mobile mapping devices, digital photography, voice recognition technology, pen computers for direct, quick, current and accurate attribute data inputting in to the database, computerised computations, SQL for easy retrieval of information from databases, GIS environment for data processing, handling, analysis and presentation may revolu-

tionise the research work in planning and thus helping in making the UPPBP faster, cheaper, accurate, just in time, customers' favourite and professionally satisfying.

5.2.1.6 SP_6 Preparation of Development Plan Sub- Process Model and Activities De-scription:

In this sub process inputs from sub-processes 3,4 & 5 are used for value addition clubbing domain knowledge of Urban Planning. There is vast scope of introducing geoinformation environment in the performance of tasks in this sub-process. The detailed steps in this process are as given below:

Working out Requirements (F1): Based upon research conclusions, requirements for land by different activities and corresponding level of infrastructure, to be realized by a population size, projected for a specified time period and applying planning norms and standards are worked out. This job involves lot of calculations iteratively on in numerous aspects, which will be done in more efficient manner with adoption of computerization in functioning.

Conceptualisation of Plan Proposals (F2): The requirements worked out needs test checking by superior authority. If it qualifies the quality check the process may remain continued. This is the stage of evolving planning strategies / plan proposals matching with the requirements, available resources and the principles and techniques of urban planning.

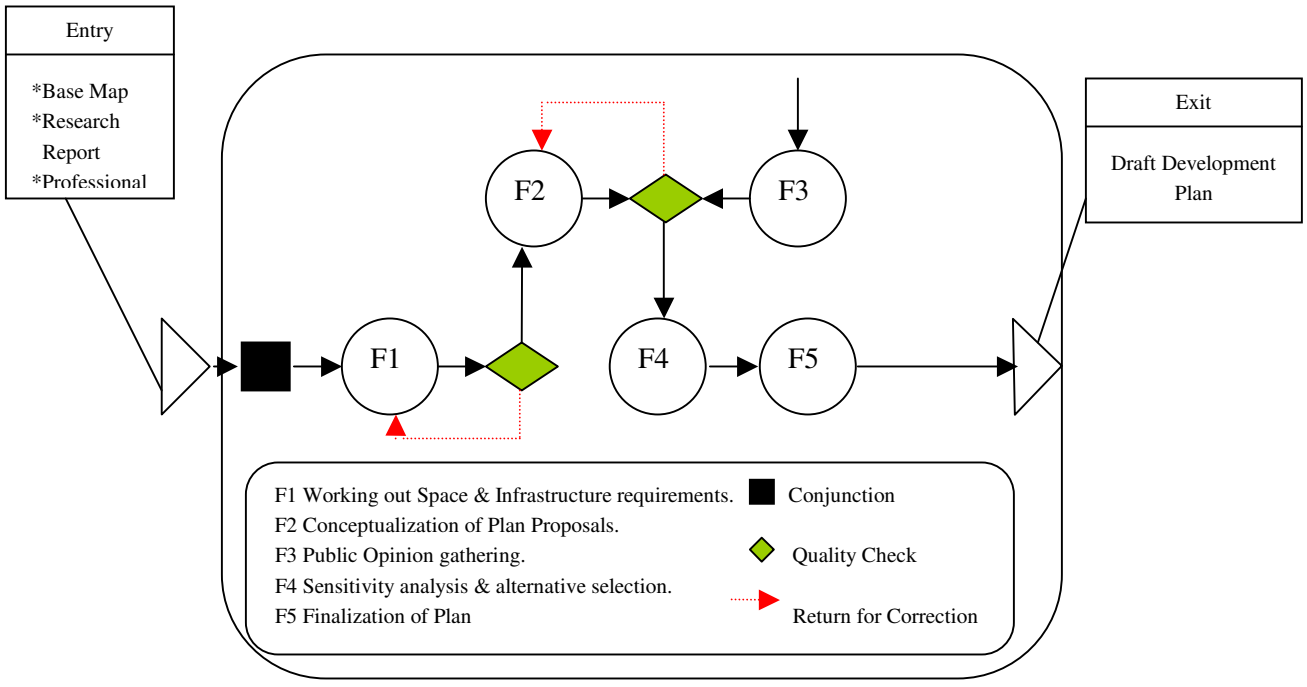


Figure 5.7 SP_6 Preparation of Development Plan

Public Opinion Gathering (F3): Means involving the beneficiaries in the process of planning. To make the planning process participatory for increasing its effectiveness among community for which it is meant

Sensitivity analysis and alternative selection (F4): In view of scarcity of land resources to assign the best use on every parcel of land is the objective of planning.

Finalization of Plan (F5):It includes finalizing the spatial proposals their depiction on map and preparing report justifying the space earmarked for each and every activity and reasoning for spatial location of such specific land uses.

Problems:

- The computational work is done manually which takes very long time and always remains subject to human errors.
- Manually it is not possible to draw many alternatives and go for extensive simulation exercises, cost & benefit analysis, and sensitivity analysis to make plans more realistic and socially acceptable as well as practically feasible and if it at all is done it consumes huge resources including time, which makes the plans fractious and ineffective.
- Experts based upon their knowledge and experiences make the judgments to this effect, but those are always subjective and liable to external pressures, which sometimes deny justice. This manual decision-making breeds delays costing upon plan preparation time and also limits the number of alternatives.
- The public participation process is formal, slow and rudimentary ,which costs on effectiveness of the plans

Geo-ICT Improvement Actions:

- Modern Geo-ICT will play a vital role by reducing communication gaps, which segregate the planners and the stakeholders. Web technology, Internet, multimedia visualization techniques can help in disseminating information and convincing masses and receiving their opinions on line. Such a situation will certainly help in reducing overall plan preparation time by eliminating number of procedural formalities.
- The software now available may help a lot if put to use in this decision-making process and assist planner to judge their proposals from numerous angles and work out the best alternatives. The quality check in such a situation will also be easy, which in turn will bring transparency in the decision- making.
- The DBMSs will be utilized for report generation purposes as these have tools to produce printouts that select, sort, join and list various fields from the database and format output with headers, footers, sub- totals and the like.
- At this juncture e-conferencing may provide vast opportunities to planners to share their ideas with their counterparts in any part of the globe. Benchmarking can be done with reference to similar situations in any part of the world.

5.2.1.7 SP_7 Cartographic Presentation Sub- Process Model and Activities Description:

This step aims at making the product and services of UPPBP saleable. Till now analogue cartography and architectural presentation techniques are in use which are labour intensive, time con-

suming, static, liable to errors, difficult to manage / handle and incapable to meet with the present day requirements of users' of digital age.
Digital cartography, multimedia (audio, video & animation) and other computer graphics as well as visualization techniques have vast potential to make this activity of UPPBP more robust, dynamic, time effective and alluring, making the job of planners to convince stakeholders, policy makers and end users easy and effective enough.

The technology is not that costly but the real limitation is that of trained manpower to put new things to practice. The detailed activities in this sub-process are as follows:

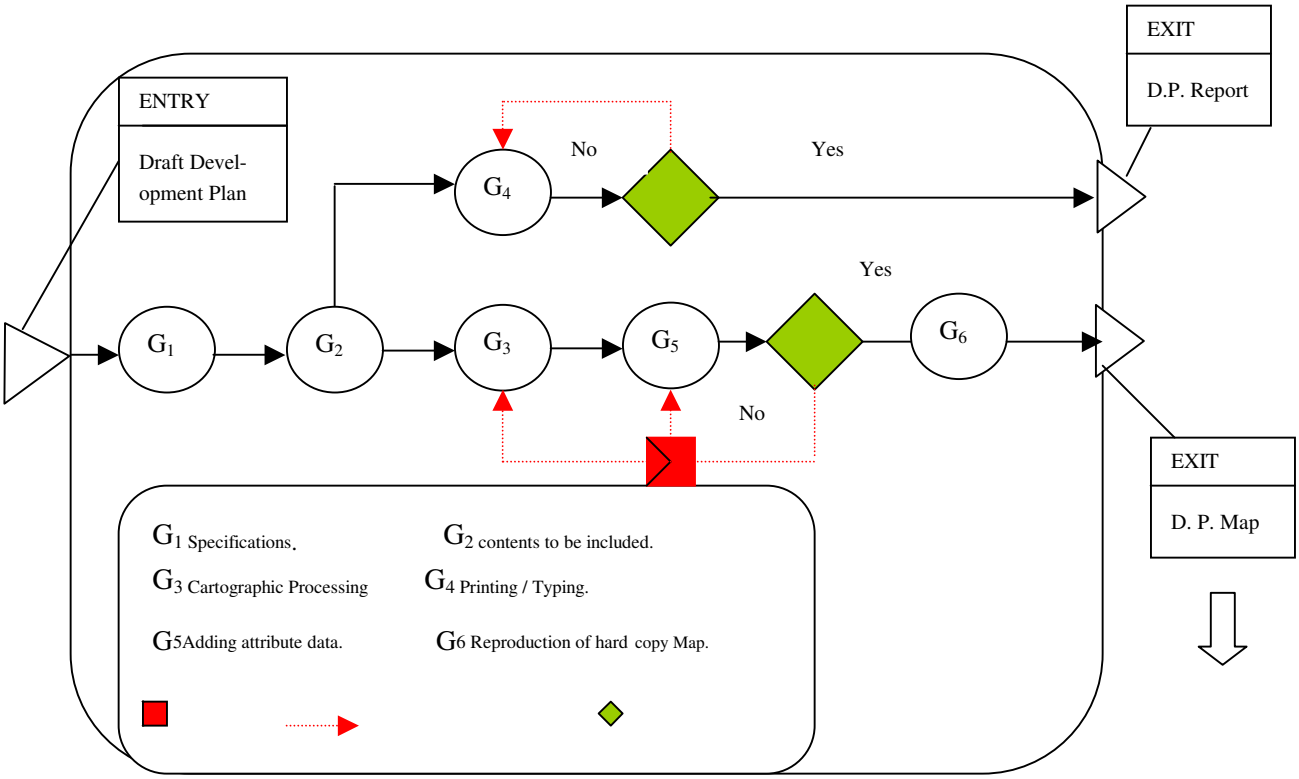


Figure 5.8 SP_7 Cartographic Presentation

Specifications (G1): It involves taking decisions regarding size of map, title, scale, north pointer, projection, map image, bibliographic information i.e., year, source & authority etc. In digital evironment a template to this effect covering all said aspects can be made once for all and can be used iteratively saving time and maintaining standard in the working, which is very much required for universal information sharing and comprehension. These small things otherwise takes much time adding to the overall plan preparation time.
Contents to be Included (G2): Decisions about visualization parameters like symbology, colours and texture for presentation, layers to be combined, hyper linking information, multimedia techniques to be adopted. This aspect is also proposed for standardization to save time in the new process design.

Cartographic Presentation (G3): It is the real drafting of plan proposals on the base map for graphical representation. It involves classification, aggregation, symbolization and displacement of features according to plan specifications. The digital cartographic techniques of graphic presentations may help in performing all these functions with minimum operator's interference once representation specifications are defined and fed in to the system. The drafting work of plan proposals using Auto CAD and Auto CAM technologies will save time and give better quality and standardization to the drawing work.

Printing / Typing (G4):It is simple textual presentation including charts, diagrams, tables, figures, photographs, sketches in form of a report document where technologies such as laser printing, scanning, computer graphics and electronic typing with the help of software like Micro soft word, excel, Access, Photo editor, Outlook, PowerPoint will give better and quick results in place of conventional manual operations.

Hard Copy Map (G5): To convert soft copy of plan into hard copies for completing further legal formalities after exercising quality checks to ensure correctness of the plan as well the written document. The output in form of a draft plan will go to the last stage of the process as below.

Problems:

- Analogue cartographic techniques are time consuming, labour intensive hence very costlier, have limitations to create dynamic / interactive mapping, can show limited amount of information with limited combinations & permutations.
- Processes like reproduction, security of information, updating and dissemination are cumbersome and time consuming.
- Coordination and interaction with stakeholders and end users is least and time taking delaying the whole process of plan preparation on account of non-introduction of modern networking technology in practice.
- Interaction with global professional know how also limited for want of proper communication technology

Geo-ICT Improvement Actions:

- Introduction of GIS working environment is essential for reducing time and cost on one hand and increasing public participation, quality & quantity of planning services on the other.
- Automation on adoption of digital cartographic presentation technology will optimise the process as a whole with respect to all criteria.
- Modern communication techniques will also speed up the process and help in making planning a participatory social process.

5.2.1.8 SP_8 Legalization of Plan Sub- Process Model and Activities Description:

The last yet the most important, most time consuming and absolutely unpredictable step in culmination of the UPPBP is to provide legal sanctity to the plan. The situation needs to be given special attention by bringing certain innovative legal reforms but the modern Geo-ICT may also play vital role to improve the as is situation, if exploited in right perspective. The activities in the process are as under:

Publication of Draft Plan (H1):It is a declarative action to make the executive idea public to gather opinions of the masses for which it is being developed.

Collection of Objections / Suggestions (H2): will also be allowed on line to save time.

Objections / Suggestions (H3): will be done simultaneously on receipt as in the new system field units will have on line access for communication with headquarter and other supervisory levels.

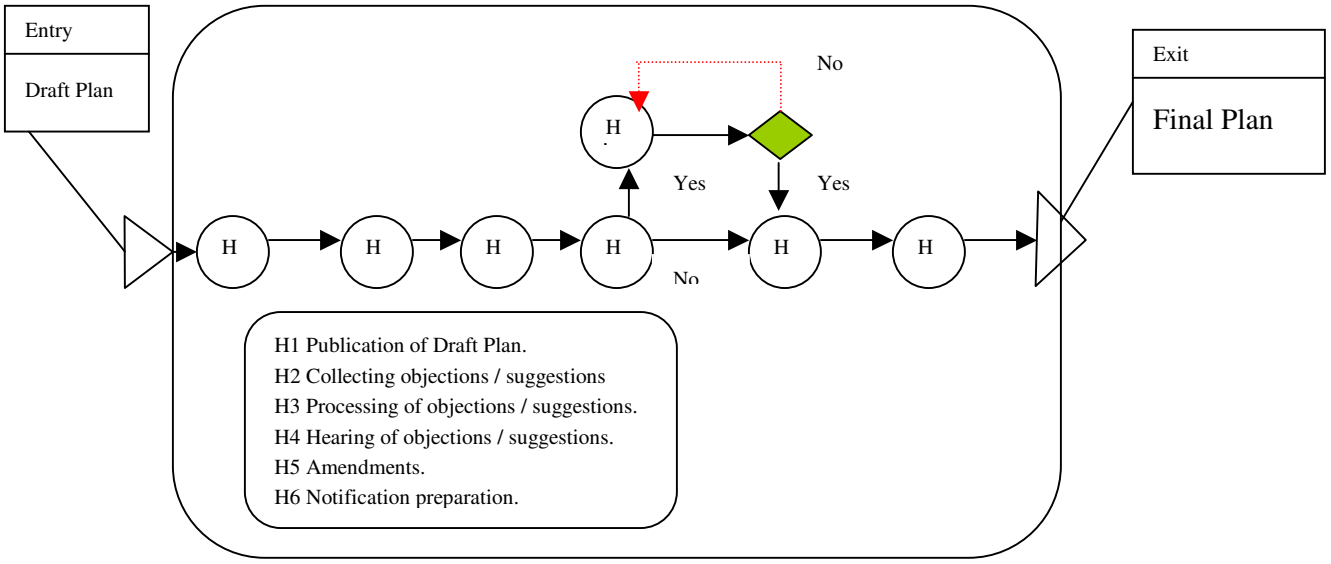


Figure 5-2 SP_8 Legalization of Plan

Hearing of Objections / Suggestions (H4): will be just on completion of publication period to avoid any delay in plan approval.

Amendments (H5):If any will be carried out with in a week's time as insertion, deletion and alteration processes are very quick in digital environment.

Notification Preparation (H6): no extra time will be required for the purpose, as it will be a simultaneous action with amendments in digital environment.

Government Approval (H7): As in the new process everything will be in digital form and all multimedia techniques will be applied to prepare best presentation to convince the decision-making authorities through visualization, provision in the Act will be amended to bind the Government to approve / disapprove the plan with in a fortnight after submission.

Problem:

- As per findings of the Survey conducted for this research the real fate of plan depends on the this sub process, which consumes as high as 60% of the total time of plan preparation. In no case it is less than 30%. Actually, it has no limits legally. Cases are not rare

where plans used to be approved or given legal sanctity after they are outlived their plan period.

- Present methods of publication in Official Gazette, newspapers and broadcasting means, which takes undue time increasing the plan preparation time.
- Communication delays in flow of information between public and planning agencies and further among different hierarchical levels with in agencies themselves also delay the over all process.
- Communication gaps on planning issues between planners, public and powers on account of inferior communicative techniques / skills being practised to create a consensus environment takes much time to get the plans through from power circles.

Geo-ICT Improvement Actions:

- Plan related documents for public opinions should also be uploaded on Government Web Site and such dates be taken valid for calculating time limits for publication periods. Public will thus be facilitated for inspecting the plan documents on internet and this will certainly increase the public participation ratio as compare to present situation.
- The Internet facility will be exploited for this purpose extensively so that any reaction of public is made available to decision makers immediately and public is relieved from botheration of going anywhere to submit their reactions or to inspect the plan documents.
- The time limit of 90 days after expiry of the notice period of draft development plan publication in the Act for hearing public is now required to be reduced to a week, because on introduction of Geo-ICT day to day information on public reactions on plan will be available to the authorities and thus processing such objections and suggestion will be a simultaneous action, which presently takes a very long time.
- For amendments in plan only one week should be given after hearing, as digital environment will make it a very time effective job because amendment in plans in digital environment will be very quick in comparison to manual methods in practice at the moment.
- Multimedia techniques can be applied to prepare best presentations to convince the decision-making authorities through visualizations enabling them to take decisions on fate of plan documents early. Provision in the Act may be amended to bind the Government to approve / disapprove the plans with in a fortnight after submission.

5.3 Optimisation of Organisation and Operations Management

The process modelling is done with any one of the three objectives namely designing a new process, making comparison between processes and evaluates the existing process. On evaluation of an existing process when it is established that there are some problems in the process affecting its performance the optimisation becomes essential. Optimisation may be done either by technological shift or improving the management of the processes as well as the resources related with functioning of the processes.

In order to achieve the objective of optimisation of the core process model, apart from technology, operations / resource management is also equally important. To accomplish this task there could be many options but the common options are:

- Organisational Model as framework for improved operations &
- Operations Management Optimisation

5.3.1 Organisational Model as framework for improved operations

In order to implement the optimised process the foremost requirement is to have restructuring of the organization suiting to the needs of envisioned optimised process model. Urban Plan Preparation Process being a task of multidisciplinary team of professionals from very diverse fields of knowledge right from sociology to Geoinformatics and management. A professional Planner will provide leadership in view of coordination requirements of the process.

The guiding principle of the new organisational model is ***general function decentralization and specialized function centralization*** because financially it is not viable to make all expertise and costlier technology with high performance capacity available in each and every local level office of the planning organization. Moreover, the workload also does not support the high performance capacity and disproportionately costly infrastructure everywhere.

The new structure will have three distinct branches under the control and administration of the Head of Department one of which will perform plan preparation process.

A Senior Town Planner assisted by four specialized units will head Plan Preparation Branch. The specialized units namely Spatial Data Acquisition Unit (SDAU), Non-Spatial Data Acquisition Unit (NSDAU), Public Relation Unit (PRU) and Quality Control & Research and Development Unit (QC&RD) will be located at the headquarter level but perform functions for all the Field Units on requisition of services these are entrusted with. These will be technology-handling components of the organization and perform only specific tasks enabling the Field Operational Units to accomplish the primary task of the organization i. e., of plan preparation.

It is pertinent to mention that the segregation of SDAU and NSDAU is just for the sake of functional convenience of accomplishing tasks of collection of both types of data from different data sources. The Database will be created in an integrated manner under overall coordination and control of The CTP / Head of Department integrating the said two units of UPPBP as well as the other two major business processes namely Plan Implementation and Administrative & Management, so to have an Integrated Information Service in the organisation in form of a distributed database. A distributed database consists of a number of sites interconnected through a communication network with each site running an autonomous DBMS [Groot, Richard and John McLaughlin, 2000].

These will be accountable to the Head of Department through the concerned STP. Their workflows will get triggered on request from Field Units through Head of the Department and services by these units will also be made available to Field Units through same channel.

The Field Units, which will be the real initiators of work and pivots in the plan preparation process, are kept under direct control of the Head of Department, since these units have to perform

duties and responsibilities of other two branches in the field simultaneously with plan preparation process work where there is no such division of work on account of economic viability thresholds and coordination required between plan preparation and plan implementation jobs.

Guiding Principle of The Proposed Organisational Model:

General Function Decentralisation and Specialised Function Centralisation

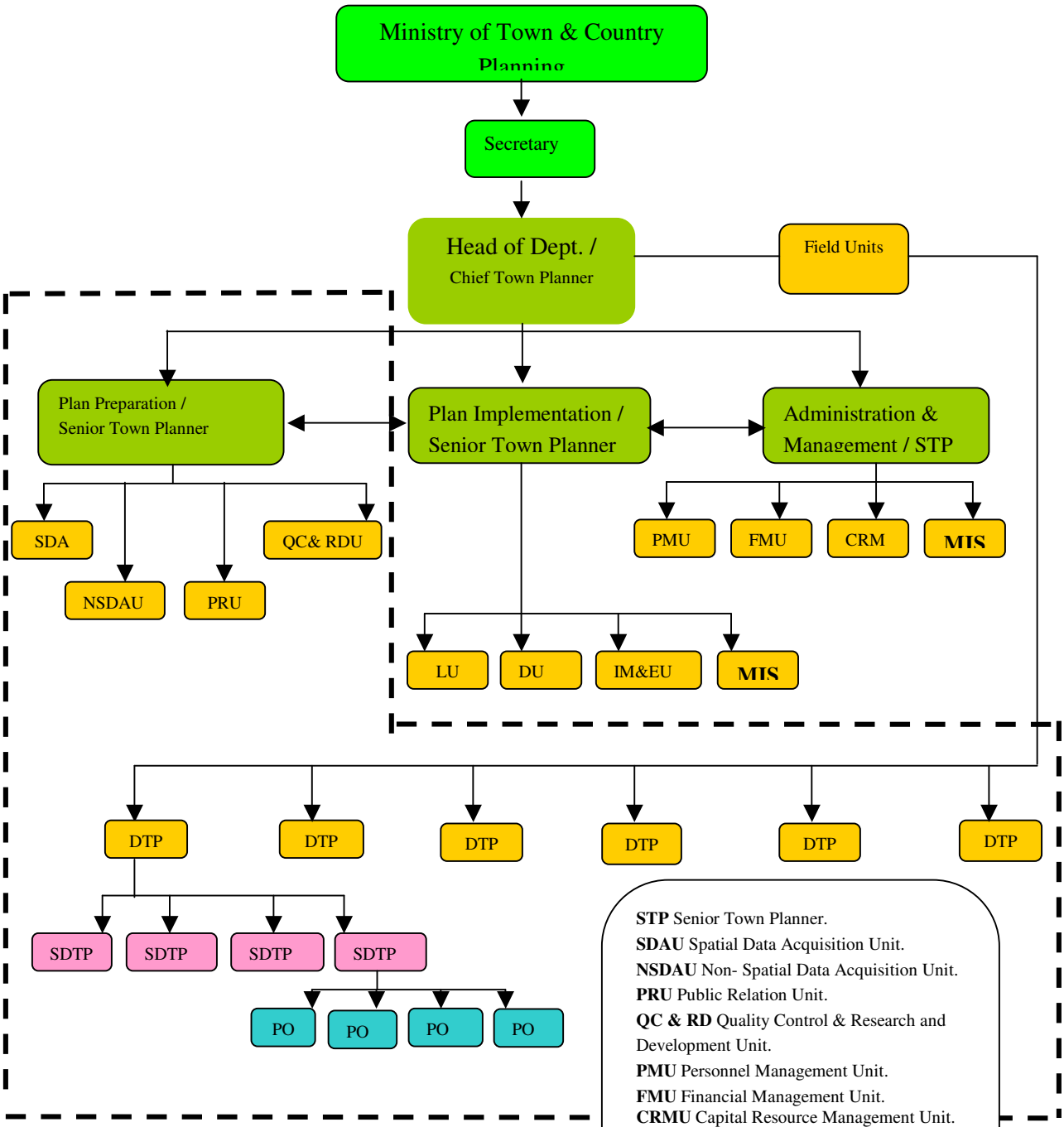


Figure 5-10. Organizational Model

Two new units namely Public Relation Unit and Quality Control & Research and Development Unit are created to emphasis on issues of making planning a participatory process and to ensure continuous improvement by keeping constant quality control on the performance of the process on one hand and dynamism i.e., sensible and flexible to the needs of the customers as well as requirements of the changing environment of the process on the other.

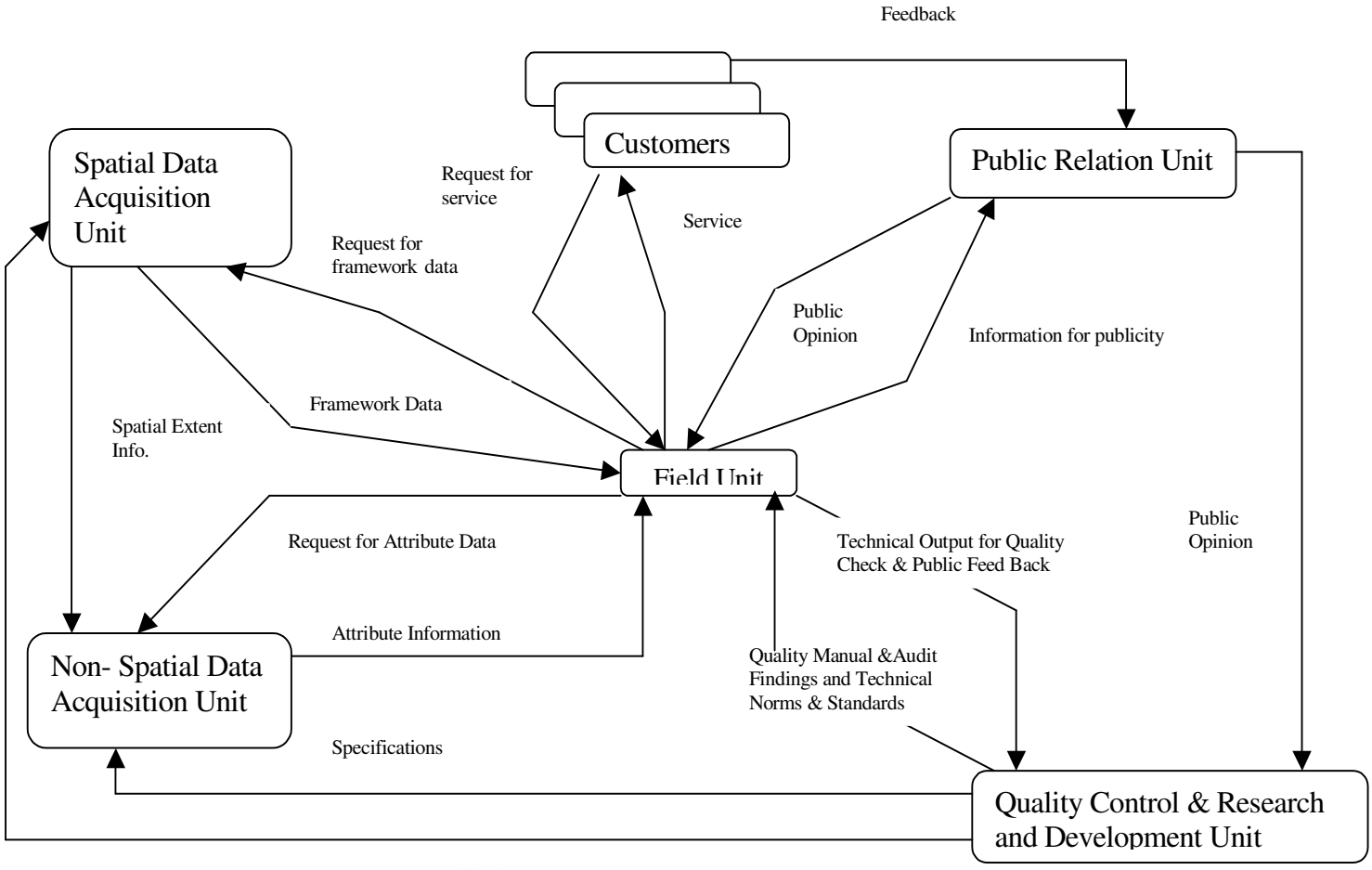


Figure 5-4 Flow of Information In the System

The PRU will carry missionary and professional propagation activities in close association with Field Units to create all-round awareness and achieving the objective of making planning a way of life, which in turn will eradicate many faceted resistance problems in the way of planning on account of ignorance among various sections of society. This unit will be fully equipped with all modern Geo-ICT including multimedia infrastructure.

The QC&RD Unit will play dual role of fixing objectives of planning, designing specifications for plan preparation, evaluation criteria, evolving new methodologies, and customers' requirement surveys on one hand and actual evaluation of the plans prepared by the field units.

The SDAU and NSDAU will arrange data from data providers at different spatio-administrative levels or from private agencies as per the requirements of the Field Units for plan preparation activities and also establish, maintain, populate, strengthen and keep up to date databases of the organization at headquarter level. These units will be fully equipped with all modern enabling technologies and infrastructure related to their specifically assigned jobs of data management. These units will have technical capabilities in terms of requisite manpower and equipments to ensure inter operability and data sharing with data providers and also to go for direct acquisition of specific types of data apart from manipulating and handling original data.

Lastly, all functional components of the system will be interconnected through modern means of communication and have bare minimum computerization related infrastructure and operating capabilities. The flow of information through networking in the system is explained in figure 5.11

5.3.2 Operations Management Optimisation

There are numerous operations management techniques like **Performance Modelling** to assess the effectiveness and efficiency of the process with reference to certain criteria; **Organisational Modelling** for rearranging the functional structural components of the system to suit to the changing requirements of the structured process; **Quality Management System** for ensuring continuous improvement for customers' satisfaction; **Workflow Management** for automation, reducing production cycle time, consistent and proper monitoring and optimum resource utilisation; **Activity Based Costing** to cost out business and process improvement; Technological Modelling to make comparison of available technologies and the ones in practice in the process and the repercussions of the same; **Engineering Modelling** to develop optimum linkages between the distributed system objects and **Information Modelling** to study structuring, dynamics in movement and flow of information in the system. In the present context only two improvement techniques namely Quality Management and Workflow Management are taken as illustration.

5.3.2.1.Quality Model:

A formal quality model is the utmost requirement of the UPPBP, as it is non-existent at the moment. Total Quality Management, which supports process improvement to assure of product quality, suits best in the present context. A quality manual explicitly specifying the manner of accomplishing processes like detailed description of the sub processes, responsibilities, contents, requisite inputs, outputs and accuracy levels is urgently required. The quality model should detail out even methods to perform functions, the aids to be used and the relevant / best individual or a group of personals to be entrusted with a particular activity / job. A formal system of quality checks / control at appropriate stages of processing in the process specifying the quantum of

sample test checks, periodicity, the manner with indicators and authentication will be mad an integral part of quality model.

Proposals in line with Total Quality Management (TQM) principles are as under:

Quality Policy: The Urban Planning Department is committed to meet with the spatial planning needs of the state today and in future timely, at an affordable cost as well as suiting to the requirements of both, value adding users and end users with respect to quality.

***Quality System*:** The quality system as adopted by the Institute of Town Planners, India will be followed along with ISO- 9000 series of quality system standards, as Urban Planning is also a system. It will have documented quality system in form of quality manual.

Quality Organisation: The organisation will have a structured quality roles assigned to authorities as shown in Fig. 5.11 along with their routine professional responsibilities. The Quality Control Board (QCB) & External Advisory Committee (EAC) will have members from outside the organisation also to ensure impartial evaluation.

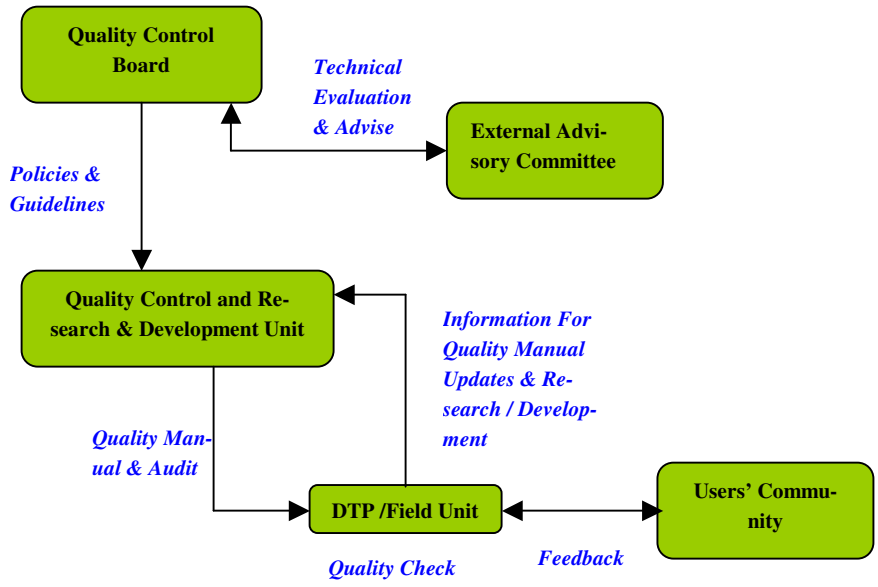


Figure 5-12 Quality Organization Structure

Responsibilities & Authorities:

The quality model envisages explicit function assignment to functionaries of the planning organization at different hierarchical levels along with their authorities for performance of assigned duties.

***Quality Control Board*:** Under the Chairmanship of The Chief Minister of the State shall have members including Secretaries of Departments like Finance, Law, Planning (Economic), Urban Planning, Public Works, Irrigation & Public Health, Industries, Forest & Environment, Transport, Tourism and Power & Communication. The Chief Secretary will be the Member Secretary of this committee.
It will see the quality of planning in terms of economic viability, practical feasibility, social implication and environmental impact. From this level the plan will go for Government approval and after such approval will become a legal instrument for regulating and controlling the development in concerned area.

External Advisory Committee consisting of members from external agencies including The Institute of Town Planners, India, School of Planning, Indian Institute of Remote Sensing, Indian National Trust for Art & Cultural Heritage, Indian Institute of Public Administration, Urban Art Commission and NGOs. It will evaluate and advise on planning policy, and quality of planning by the organization. The Secretary and CTP of the Department will be the Chairman and Secretary of this committee respectively.

Quality Control and Research & Development *Unit* will be responsible for efficiency, quality and timely completion of process including getting the plan through from Quality Evaluation Committee, High Power Board, General Public / users' community and ultimately from the Government under provisions of relevant statute. This specialised unit will be in the headquarter under the control of the CTP and will be responsible for preparing detailed Quality Manual for the organisation and also subsequent updates of manual in view of policies & guidelines from the QCB and feedback from the field units, which in fact applies the quality control measures while performing the job of plan preparation. The CTP will exercise control on this unit through STP in charge of plan preparation branch. The will also be responsible for working out technical norms and standards in consultation with field units and feedback from users' community through field / PRUnit.

Chief Town Planner (CTP) will be a link between Government and the Department. He will control the Department and will function as Quality Assuror for the Department.

Senior Town Planner (STP) will be responsible for plan preparation Branch of the organization. He will ensure smooth implementation of the plan preparation programme and coordinate with

other branches of the organization looking after implementation of plans and administration & management to the extent required for plan preparation process.
He will report to the Quality Assuror (QA) the progress of the program quarterly.
He will ensure execution of tasks delegated to him and decisions taken by the QA cum CTP / Control Board.

Divisional Town Planner (DTP)/ Field Unit: The DTP will function as Plan Preparation Project Coordinator and make arrangements of all plan preparation inputs from other functional units of the organization as & when requisitioned by the PO.DTP in charge of Field Unit will be accountable to the Chief Town Planner (CTP).
He will initiate, plan, execute, guide, supervise and control each action / activity in connection with plan preparation process in accordance with the provisions of law, principles & techniques of planning as well as directions & decisions of the controlling authorities.

He will furnish all ground information to the other related units of the organization dealing with plan preparation process. He will put all requisitions for data seek help from other units as and when required.

He will report to CTP periodical progress achieved with respect to each activity related to plan preparation in the manner prescribed with reasoning for better or lopsided achievement.

Provide all professional know how to the PO and fully responsible for completion of the process. He will give decisions on all technical matters raised by PO and exercise quality control on the on going process as prescribed in the quality manual. He will be responsible for adherence organizational policies, rules and regulations of applicable statutes and professional standards.

Direct, supervise, monitor and evaluate the progress of the process and will report progress to the CTP formally in the manner prescribed specifically mentioning progress on each activity of the process, problems encountered, alterations needed if any in implementation schedule or procedure along with personal comments.

Provide cooperation and requisitioned assistance to specialized functional units of the organization in performance of their functions in his jurisdiction as per prescribed terms and conditions.

Sub Divisional Town Planners (SDTP) / Planning Officer (P.O) the real backbone/ foundation building blocks of the organizational structure will work in cooperation with the subordinate staff complying with directions and decisions from the higher authorities. For each spatial unit brought under the ambit of the T&CP Law there will be one SDTP / Planning Officer independently in charge of such spatial entity. He will control and administer the local office.

Quality Work Instructions: The detailed allocation of duties ,responsible functionaries for each activity, time of action, location of performance and method of doing the activity to ensure quality performance are in table 5.1 below:

Table 5-1**Quality Work Instructions For Plan Preparation Business Process.**

Sl. No.	Action	By Whom	Place/ Where	When	How
1	Taking cognizance of fast urbanisation taking place at specific nodal or corridor location & preparing proposal for attracting attention of the Government.	The Planning Officer in charge of respective area.	Town level office.	On attaining maturity by the concerned area for requiring urban civic management.	By making an assessment of urgency of the action taking parameters such as population size, density, growth rate, land & rental values, economic base, built up / non-built up area ratio and so on.
2	Decision to extend law to the concerned area.	State Government.	State headquarters.	On receipt of case from the Director, T& CP.	By taking cabinet decision.
3	Preparation of Planning Area proposal.	Local Office custodian of area. Spatial & non-spatial data are to be collected by the Patwari-a trained revenue official from the revenue Agency. Drawing to be prepared by An Architectural Draughtsman. Report to be prepared by the Planning Officer. The quality checks are to be	Town level.	After Government decision & instructions from senior level office.	By preparing detailed proposal consisting of graphical & textual information.

		exercised by the Assistant / Divisional Town Planners by site visits and comparing the proposal with ground realities with respect to spatial extent, limits and other physical			
4	Planning area constitution notification.	State Government.	State Headquarters.	On receipt of proposal from the CTP, T& CP Department.	Cabinet decision.
5	Acquisition of spatial data.	The framework data from spatial data providers	Town level.	After cabinet decision to extend law to the area.	Conventional sources & data acquisition techniques.
6	Acquisition of non-spatial data & processing.	Do.	Do	Do	By conducting primary surveys and tapping all possible secondary sources of such data. Thereafter processing the data to convert it into information base.
7	Preparation of Existing Land Use Map	Local office.	Town level.	On availability of spatial data.	By conducting field survey
8	Publication of Existing land use map.	CTP, T& CP.	Directorate.	On receipt the said document from the local office.	By issuing a public notice in official gazette & local newspapers.
9	Hearing of public objections & suggestions.	Do.	Local level.	On expiry of notice period.	In person.

10	Adoption of & Freezing Existing Land Use Map.	Do.	Directorate level.	After incorporation of decisions of hearing in the documents by the field office.	By issuing a public notice.
11	Preparation of Draft Development Plan	Local office under guidance & supervision of higher offices.	Town level	On availability of base map, results of research and adoption of existing land use map.	By projecting infrastructure & space requirements and allocation of space for various urban activities as per norms & standards of the urban planning discipline.
12	Publication of Draft Development Plan for Public objections & suggestions.	State Government.	State Headquarters.	On receipt of the plan document from the office of the CTP	By giving public notice in the official gazette.
13	Collection & processing of objections & suggestions.	Concerned field office.	Local office level.	On expiry of notice period.	By validation of objections & suggestions along with technical commentary.
14	Hearing of objections & suggestions.	CTP	In concerned area.	On receiving Action report on objections & suggestions from the field office.	Hearing people in person & taking appropriate decision on each case.
15	Finalization of Plan.	Concerned Local office.	In Local office.	After formal confirmation of decisions form the Directorate.	By making necessary amendments in the plan, if any required.
16	Submission to Government for consideration.	CTP	State Headquarters.	On receipt of amended Plan document from the field office.	By submitting the plan document along with memorandum to the Government.

17	Approval as it is or conditional or return for some changes or refuse.	State Government.	State Headquarters.	On submission by the Director.	By taking cabinet decision & issuing a notification to this effect along with the actual plan document.

Quality Reports: The QA cum CTP will design standards for reporting on the quality procedures. Standard format will be designed for the purpose. The reports will be initiated by work in charge / PO.The contents shall cover aspects like activity wise progress, level of adherence to the quality standards namely time, cost and quality laid down for the purpose. The number of quality checks exercised by supervisory authorities their inspection reports showing details of observations, conclusions, shortcomings found and corrective measures suggested. Advisory committee's suggestions, advises and implementation of the same. All these reports are to be documented by the QA.

Quality Processes: As already dealt in chapter 4.2.In this research only UPPBP is to be covered.

Quality Manual Updates: All quality documents will rest in the headquarter in soft copy only .The QA / CTP will be empowered to effect changes in any such document after retaining the hard copies of the superseded quality system document for reference.

5.3.2.2. Workflow Management

"Workflow Management is the automated coordination, control and communication of work, both of people and computers, in the context of business process, through the execution of software in a network of computers whose order of execution controlled by a computerized representation of the business process."[Joosen, 1994]

On adoption of the proposed organisational structure and establishment of organisational databases in digital and GIS environment as envisaged in the optimised process model the next step for further optimisation will be adoption of workflow management in the UPPBP.Fig. 5.12 depicts workflow map. It will help to automate partially the plan preparation process. The structural components of the organisation involved in the plan preparation, which are Spatial Data Unit, Non-Spatial Data Unit and Planning Unit. These are independent entities but interrelated to each other in the process of performance of the functionality of the system for plan preparation.

The workflow management will help in reducing time taken in plan preparation as controlling, monitoring and assigning of various activities in the process will be well defined, which in turn will minimise the transfer time of the job in the system. The reduction in time will be on account of minimised transfer time plus easy depiction of queues / rerouting. It will also be easy to find

out problem spots, causes for the problem and suggesting remedial measures by the prescribed resource person. Sharing responsibilities, taking decisions, making evaluations and fixing responsibilities will also be easy and objective in workflow management of the process.

On the similar analogy workflow business maps can be drawn for each sub-process of the plan preparation process, since these are also processes in themselves at lower hierarchical level.

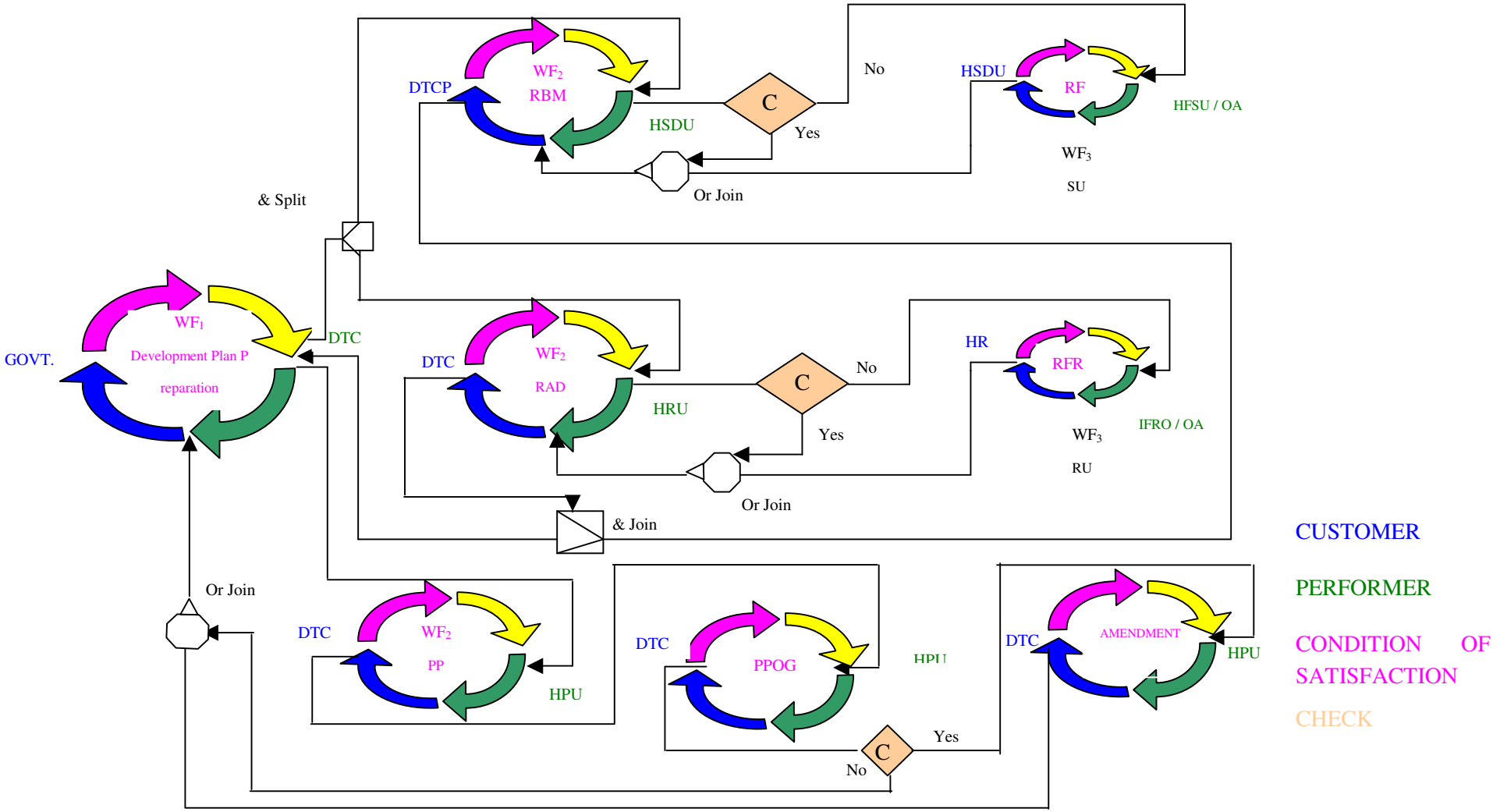
The workflow in UPPBP starts with a decision of the Government or on request from some Municipality for preparing a Plan for the town / planning area. The municipality is customer and the Department of Town & Country Planning (DTCP) is performer. Preparation or negotiation stages have no significance as the work has to be done in all circumstances.

DTCP on receiving the order immediately send the demand to Heads of Spatial Data Unit (SDU) and Research Unit / Non-Spatial Data Unit (RU / NSDU) for verifying the availability of respective data in their archives.

In case the answer is positive the respective Heads will immediately attend to the orders and send the requisite data to the Chief of the DTCP. In the secondary flow Chief DTCP becomes internal customer and the heads of the concerned Units internal performers and attend to the condition of satisfaction i.e., supply of data.

If the requisite data is not available with the performers of the secondary workflows i.e., SDU & RU / NSDU they will take up matter with their field units for fresh surveys to acquire fresh data. The field units will function as tertiary work flows and the performers of secondary flows will become internal customers.

The secondary workflow performer may go to acquire data from some outside agency also by becoming external customers to some other organisation in case their own organisation has no capabilities for performance of the same job. On acquiring data from some source the authorities responsible for archiving concerned data will make that available to the customer of primary workflow i.e., Chief DTCP, who further forwards it to another secondary workflow called Planning / Field Unit enabling the same to prepare plan.



WF: Workflow. **HNSDU:** Head Non-Spatial Data Unit**. H SDU:** Head Spatial Data Unit**.RBM:** Request for base map **RFS:** Request for Field Survey **C:** Check **SU**: Survey Unit **DTCP:** Director Town & Country Planning **RFR**: Request for Research **RAD:** Request for Attribute Data **PP:** Plan Preparation **PPOG:** Publication for public opinion gathering **AP:** Amendments in plan. **HPU:** Head Planning Unit**. HRU**: Head Research Unit. **PO:** Planning Officer

Figure 5-13. Business Map Of Urban Plan Preparation Business Process

The plan then goes through another parallel workflow for obtaining public opinion and then through next parallel workflow for amendment if there are some suggestions from the public on the plan proposals. The customer and performer remain the same in the parallel workflows.
Lastly, after incorporating necessary changes giving effect to the decisions arrived at in hearing the plan goes to the performer in the primary workflow i.e., Chief DTCP, who passes it on to the external customer, may be some municipality or State Government and the workflow terminates.

5.4 Conclusion:

In this chapter the UPPBP is structured to address the performance problem of delays in plan preparation to have clear understanding of the nature of problems, their exact location in the process and causes of the same. It has been observed that the problems are either on account of obsoleteness of technology on the process or structural shortcomings including missing application of modern management techniques. To overcome these problems and to enhance efficiency of the process proposals for optimisation of process by induction of new Geo-ICT enabling technologies in appropriate activities of the process are made. Further to ensure continuous improvement of the process, proposals for organisational optimisation and application of operations management technologies are also formulated with special reference to Quality Management and Workflow Management optimisation techniques. It is anticipated that technological changes on process will reduce the processing time by increasing the efficiency, where as Quality Management and Workflow Management will address customers' satisfaction and reduction in transfer / queuing time of job in the process. To what extent this is really bound to happen on implementation of optimised process is now to be seen in the next chapter.

6. CHAPTER

Evaluation of Optimized Plan Preparation Process

6.1 Introduction

In the previous chapter 5, design for optimisation of the UPPBP is evolved, wherein the said process is decomposed in to sub-processes and activities to find out technological and structural including both, institutional and organisational shortcomings and then suggesting remedial measures to optimise the process. The objective guiding this change is to enhance the efficiency and effectiveness of the process, but has it really become or is likely to become possible is now to be seen in the present chapter by evaluating the proposed optimised process.

6.2 Evaluation Objective

It will be assessed whether the changed process is really addressing the performance problems mentioned in chapter two and will help in achieving the strategic goals fixed in the same chapter. The evaluation will establish to what extent the proposal conceptualised in chapter 5 will solve the identified performance problems. As the strategic level is not going to register any change, the evolution will remain confined to operational level of the process. The results, even at this level are not possible to be quantified on account of different nature of this process as compare to some other processes like that of National Mapping Agencies or Cadastre Organisations whose products / outputs are purely objective, identical, repetitive and of smaller temporal duration.

6.3 Evaluation Metrics

The evaluation of a business process can be done with respect to the aspects of efficiency and effectiveness. The former is related to the production line of process and measured in terms of throughput time of the process and resources consumed for generating the output, where as the latter to the plan implementation process, which depends upon acceptability by the customers. Efficiency means balancing cost and resources with product quality and throughput time, where as effectiveness means popularity of the product among users on account of contents i.e., quality provided by the service provider.

However, a few parameters identified and listed below may be possible indicators on the basis of, which performance of UPPBP can be measured quantitatively to some extent subject to data availability.

Efficiency

- Throughput time for plan preparation.
- Cost involved in data acquisition & base map preparation.
- Level of public awareness for plans. (No. of Objections & Suggestions received on Plan)
- Level of standardization (scale, spacing, contents & presentation).

Quality

- Plan revision or updating frequency.
- Success level of plans (proportion of unauthorized development
- No. of change of land use cases permitted.
- No. of amendments carried out in planning regulations.
- No. of land transactions without consent of planning agencies.

Effectiveness

- No. of consultation requests from customers & end users.
- Quantum of sale of planning documents.
- Population Growth Rates for Urban & Rural areas.
- Land & Rental values.

In the present context, as the main concern of the research is efficiency enhancement of the UPPBP the first set of parameters that is meant for measurement of efficiency is

- Throughput time for plan preparation.
- Cost incurred in plan preparation.
- Public participation involved in plan preparation.
- The level of information provided in the plan.
- Quality of contents and presentation.

All these measures are highly subjective in case of plan preparation process as the subject matter with which the process deals is highly time, space, socio-economic dynamics and technology variant. The data on these parameters needed for evaluation must be very exhaustive and up to the lowest / finest level to build some hypotheses, which is not possible in the present context. However, all these parameters are interrelated and complementary to each other.

Time is the most important parameter as it effects the other parameters as well as proved to be the main cause of performance problems with the UPPBP at the moment as found out in chapter 3.But reduction in time of plan preparation alone is not the sole essence of optimised process discussed in chapter 5. Because time can be reduced either by incurring excessive and unreasonable utilisation of resources or compromising with quality of the services or products. It actually aims at attaining an optimum balance between the utilisation of resources and the quality of the product required to satisfy the customers' expectations and aspirations. As such, the evaluation of process will be done to see how much reduction in plan preparation time may be achieved on implementation of the optimised process.

Cost based evaluation is also quite difficult for want of exhaustive data with respect to various variables involved in the processes like UPPBP, which are very complex and dynamic spatially, temporally, technologically and socially as well. For an instance let spatial data be viewed from cost perspective, as it is the major cost-effecting variable in the UPPBP. The cost of spatial image data depends upon the size, shape, terrain conditions, scale whether small scale or large scale, currency of data required, accuracy level required, nature i.e., topographic or elevation, quality of image data, availability in archive or required to be acquired afresh and so on. As such cost of different types of image data can only be compared when calculated for a specific project with specific data requirements [Principles of Remote Sensing. ITC Educational Textbook series, 2001]. The comparison of data cost therefore cannot be done in generalised way without going to in-depth data collection to the possible micro level of activities involved in data generation.

Similar is true in case of remaining three metrics, which are dependent on cost and time and can not be measured quantitatively.

In view of above discussion, an attempt is made to evaluate the optimised process by developing an improvement scenario involving all five parameters. The assessment is purely qualitative, subjective very broad and just a rough idea to establish that the adoption of optimised process will certainly bring improvement in the working of plan preparation business process by reducing time usually being taken in plan preparation and thus improve the effectiveness of the process.

The improvement is assessed with respect to five criteria mentioned in Para- 6.3 above. The levels of improvement are decided as Low (1 to 30%), Moderate (31 TO 60%) and High (> 60%). The assessment of improvement with respect to each activity of the optimised process on account of suggested optimisation actions is made in comparison to the prevalent scenario, purely on the basis of personal experiences. An overall improvement in each activity in the process with respect to all five criteria together is worked out by averaging the assessment of all the parameters. Similarly number of activities improved with level of magnitude with reference to a particular criterion is also worked out to see the overall impact of that criterion on the process as a whole. The metrics are in table 6.1

In order to assess the impact of optimisation actions proposed in the optimised process with respect to activities in terms of improvements, due consideration is given to the following aspects:
The cost of raw data or information, time usually being taken manually to perform a specific job using analogue methods of processing, material / resources being utilised for job performance, incidental charges involved including travel expenses, tariffs, taxes etc., cost of wages of staff, quality of service achieved in a particular method / technology and possibilities of involvement of masses in the planning process to make the process participatory movement.

Table 6-1 **Improvement Scenario For Evaluation of Optimised Urban Plan Preparation Business Process**

Sl.No	Sub-Process	Activity	Change Suggested in Optimised Process	Expected Improvement in (%)																		Remarks
				Time			Cost			Public Participation			Contents			Quality			Overall (Mean)			
				L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	
1	Extension of Law	Feasibility Study	Visualisation & Diagnosis with the help of digital spatial data & modern Geo-ICT to have holistic view of spatial characteristics of area.	-	*	-	*	-	-	-	*	-	*	-	-	-	*	-	-	*	-	
		Urgency Study	Do	-	*	-	-	*	-	-	*	-	-	-	*	-	-	*	-	*	-	
		Memorandum Preparation	Standardised in soft copy form	-	*	-	*	-	-	-	-	-	-	-	-	-	*	-	*	-	-	
		Government Decision	Legislative change fixing time limit	-	-	*	-	-	-	-	-	-	-	-	-	-	-	-	*	-	-	

Sl.No	Sub-Process	Activity	Change Suggested in Optimised Process	Expected Improvement in (%)																		Remarks
				Time			Cost			Public Participation			Contents			Quality			Overall (Mean)			
				L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	
2	Constitution of Planning Area	Reconnaissance Survey	Visualisation & Diagnosis with the help of modern Geo-ICT to have holistic view of spatial characteristics of the area.	-	*	-	-	-	-	-	-	-	-	*	-	-	*	-	*	-	-	
		Decisions	Formal & standardised	*	-	-	-	*	-	-	-	-		-	--	-	-	--	*	-	-	To be prescribed in Quality Manual
		Collection of Spatial Data	By accessing database or even downloading from internet.	-	*	-	-	-	*	-	-	-	-	*	-	-	*	-	-	*	-	Provision in Act to be made.

Sl.No	Sub-Process	Activity	Change Suggested in Optimised Process	Expected Improvement in (%)																		Remarks
				Time			Cost			Public Participation			Contents			Quality			Overall (Mean)			
				L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	
		Collection of Non-Spatial Data	Intensive use Internet, e-mail for on line collection by accessing databases. ICT will help quick settlement of formalities.	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	*	-	-	
		Project Report	Computer Graphics & with the help of soft wares. Use of GIS & DBMS functionalit ies for data processing, analysis, presentation and report generation	-	-	*	-	-	*	-	-	-	-	*	-	-	-	*	-	*	-	

Sl.No	Sub-Process	Activity	Change Suggested in Optimised Process	Expected Improvement in (%)																		Remarks
				Time			Cost			Public Participation			Contents			Quality			Overall (Mean)			
				L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	
		Preparation of Notification	Standardised & in soft copy form	-	*	-	-	*	-	-	-	-	-	-	--	-	*	-	*	-	-	To be prescribed in Quality Manual
		Quality Check	In GIS environment it will be very easy & time saving	-	*	-	-	*	-	-	-	-	-	-	-	-	-	-	*	-	-	To be prescribed in Quality Manual
		Approval by Government	Fixing time limit by amending Act	-	-	*	-	--	-	-	-	-	-	-	-	-	-	-	*	-	-	
3	Spatial Data Acquisition	Decision Making	One time Decision	*	-	-	-	*	-	-	-	-	-	-	-	-	-	-	*	-	-	To be prescribed in Quality Manual
		Demand Request	Standardised format in soft copy form	-	*	-	-	*	-	-	-	-	-	--	-	-	-	-	*	-	-	To be prescribed in Quality Manual

Sl.No	Sub-Process	Activity	Change Suggested in Optimised Process	Expected Improvement in (%)																		Remarks
				Time			Cost			Public Participation			Contents			Quality			Overall (Mean)			
				L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	
		Receiving Dataset & Quality Check	With total station. & GPS	-	*	-	-	*	-	-	-	-	-	-	-	-	*	-	*	-	-	
		Updating Dataset	Do.	-	*	-	-	*	-	-	-	-	-	-	-	-	*	-	*	-	-	
		Quality Check	In GIS environment it will be very easy & time saving	-	*	-	-	*	-	-	-	-	-	-	-	-	-	-	*	-	-	To be prescribed in Quality Manual
4	Preparation of Existing Land Use Map	Designing Format	Schema to be standardised once for all & included in the Quality manual.	-	*	-	-	-	*	-	-	-	-	-	-	-	-	*	*	-	-	To be prescribed in Quality Manual
		Project Planning	Standardised.	*	-	-	*	-	-	-	-	-	-	-	-	-	-	-	*	-	-	To be prescribed in Quality Manual

Sl.No	Sub-Process	Activity	Change Suggested in Optimised Process	Expected Improvement in (%)																		Remarks
				Time			Cost			Public Participation			Contents			Quality			Overall (Mean)			
				L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	
		Recording Physical Objects	By visual interpretation of H.R. data like IKONOS to a larger extent and also with the help of software like eCognition to speed up the process. Digital Surface Model minus Digital Terrain Model is equal to height of object.	-	-	*	-	-	*	-	-	-	*	-	-	-	*	-	-	*		

Sl.No	Sub-Process	Activity	Change Suggested in Optimised Process	Expected Improvement in (%)																		Remarks
				Time			Cost			Public Participation			Contents			Quality			Overall (Mean)			
				L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	
		Entering Attributes	Computerisation. Pen computers will be used to directly record data to main database.	-	*	-	-	-	*	-	-	-	*	-	-	-	*	-	-	*	-	
		Quality Checks	In GIS environment it will be very easy & time saving	-	*	-	-	*	-	-	-	-	-	-	-	-	-	-	*	-	-	To be prescribed in Quality Manual
		Preparation of Map &Register	Digital Cartographic presentation techniques & Use of software like Oracle and MS Access.	-	*	-	-	-	*	-	--	-	-	-	-	-	*	-	*	-	-	
		Publication of Documents	On internet or local cable network	-	*	-	-	-	*	-	-	-	-	-	-	-	-	-	*	-	-	Amendment in Act Required

Sl.No	Sub-Process	Activity	Change Suggested in Optimised Process	Expected Improvement in (%)																		Remarks
				Time			Cost			Public Participation			Contents			Quality			Overall (Mean)			
				L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	
		Processing of Objections	Simultaneously with receipt as there will be no time lag between submission & receipt of any communication by public. All postal and handling delays will be no more.	-	-	*	-	*	-	-	-	-	-	-	-	--	-	-	*	-	-	Do
		Hearing	Just on expiry of publication period as all possible procedural delays will be over on adoption of on line system	-	-	*	-	-	-	*	-	-	-	-	-	-	-	-	*	-	-	Do

Sl.No	Sub-Process	Activity	Change Suggested in Optimised Process	Expected Improvement in (%)																		Remarks
				Time			Cost			Public Participation			Contents			Quality			Overall (Mean)			
				L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	
		Quality Check	In GIS environment it will be very easy & time saving	-	*	-	-	*	-	-	-	-	-	-	-	-	-	-	*	-	-	
		Amendments & Finalisation	Easy & quick enough in GIS environment	-	*	-	-	*	-	-	-	-	-	-	-	-	*	-	*	-	-	
		Adoption Notification	Standardised	-	*	-	-	*	-	-	-	-	-	-	-	-	-	-	*	-	-	To be prescribed in Quality Manual
5	Non-Spatial Data Acquisition & Management	Research Design	Standardised design in soft copy subject to suitable area specific amendments will be put to use	-	*	-	-	*	-	-	-	-	-	-	-	*	-	-	*	-	-	

Sl.No	Sub-Process	Activity	Change Suggested in Optimised Process	Expected Improvement in (%)																		Remarks
				Time			Cost			Public Participation			Contents			Quality			Overall (Mean)			
				L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	
		Primary Surveys	Extensive use of mobile mapping, pen computing, voice recognition technology	-	-	*	-	-	*	-	-	-	-	*	-	-	*	-	-	*	-	
		Secondary Surveys	Networking Technology	-	-	*	-	-	*	-	-	-	-	-	-	-	*	-	-	*	-	
		Data Processing	Computerisation	-	-	*	--	-	*	-	-	-	-	-	-	-	*	-	-	*	-	
		RDBMS Schema	Data base model be designed with the help of some Unified Modelling Language once for all	-	-	*	-	-	*	-	-	-	-	-	-	-	-	-	-	*	-	

Sl.No	Sub-Process	Activity	Change Suggested in Optimised Process	Expected Improvement in (%)																		Remarks
				Time			Cost			Public Participation			Contents			Quality			Overall (Mean)			
				L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	
		Inputting Data into Format	With the help of data inputting devices or directly from field with the help of Pen computers.	-	-	*	-	-	*	-	-	-	-	-	-	-	-	-	*	-	-	
		SQL for Retrieval	To be built using software e.g., MS Access or Oracle	*	-	-	*	-	-	-	-	-	-	-	-	-	-	-	*	-	-	This is meant for other application
		Analysis, Conclusions & Report	Use of GIS & DBMS functionalit ies for data processing, analysis, presentation and report generation	-	-	*	-	-	*	-	-	-	-	-	*	-	*	-	-	*	-	

Sl.No	Sub-Process	Activity	Change Suggested in Optimised Process	Expected Improvement in (%)																		Remarks
				Time			Cost			Public Participation			Contents			Quality			Overall (Mean)			
				L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	
6	Preparation of Development Plan	Working out Requirements	Computerisation will make computation easy & quick	-	*	-	-	*	-	-	-	-	*	-	-	-	-	-	*	-	-	
		Conceptualisation of Plan	Help of some expert systems will be possible in GIS Environment and I C Technologies. Literature consultations and e-conferencing. Will also be possible	-	*	-	-	*	-	-	-	-	-	-	-	-	*	-	*	-	-	
		Public Opinion Gathering	Extensive use of Multimedia techniques to publicise plan contents	-	*	-	-	*	-	-	*	--	-	-	*	-	-	*	-	*	-	

Sl.No	Sub-Process	Activity	Change Suggested in Optimised Process	Expected Improvement in (%)																		Remarks
				Time			Cost			Public Participation			Contents			Quality			Overall (Mean)			
				L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	
		Sensitivity Analysis & Alternative selection	With the help of software like IDRSI, DEFINITE	-	*	-	-	*	-	-	*	-	-	*	-	*	-	-	-	*	-	
7	Cartographic Presentation	Specifications	Standardised and to be fed to system only once	-	*	-	-	*	-	-	-	-	-	-	-	-	--	-	*	-	-	To be prescribed in Quality Manual
		Contents to be included	System is to be trained once.	-	*	-	-	*	-	-	-	-	-	-	-		-	-	*	-	-	Do
		Cartographic Presentation	Digital techniques to be adopted for dynamic, interactive and animated presentations	-	-	*	-	-	*	-	-	-	-	*	-	-	*	-	-	*		
		Printing / Typing	Laser printing, scanning	*	-	-	*	-	-	-	-	-	-	-	-	*	-	-	*	-	-	

Sl.No	Sub-Process	Activity	Change Suggested in Optimised Process	Expected Improvement in (%)																		Remarks
				Time			Cost			Public Participation			Contents			Quality			Overall (Mean)			
				L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	
		Hard Copy Map	Large sigeModern Automatic colour Plotters	*	-	-	*	-	-	-	-	-	-	-	-	*	-	-	*	-	-	
8	Legalisation of Plan	Publication of Draft Plan	No Change (one month)	-	-	-	-	-	-	-	-	-	--	-	-	-	-	-	-	-	-	
		Collection of Objections / Suggestions	On line acceptance to be made legal	-	*	--	-	*	-	-	*	-	-	-	-	-	*	-	*	-	-	Amendment in Act is required.
		Processing of Objections / Suggestions	Simultaneously with receipt	-	*	-	-	*	-	-	-	-	-	-	-	-	*	-	*	-	-	Do
		Hearing of Objections / Suggestions	With in a week after publication date expires	-	-	*	-	-	-	-	*	-	-	-	-	-	-	-	*	-	-	Do
		Amendments	With in one week after hearing	-	*	-	-	*	-	-	-	-	-	-	-	-	-	-	*	-	-	Do
		Notification Preparation	Simultaneously with amendments	-	*	-	-	*	-	-	-	-	-	-	-	-	-	-	*	-	-	Do

Sl.No	Sub-Process	Activity	Change Suggested in Optimised Process	Expected Improvement in (%)																		Remarks
				Time			Cost			Public Participation			Contents			Quality			Overall (Mean)			
				L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	
		Government Approval	Time limit is to be fixed as two weeks	-	-	*	-	-	-	-	-	-	-	-	-	--	-	-	*	-	-	Do
		Publication	Time limit of one week after decision to be made mandatory	-		*	-	-	-	-	-	-	-	-	-	-	-	-	*	-	-	Do
		Total Activities	53	6	31	16	6	16	14	1	5	-	4	7	3	4	20	2	39	14	-	

6.4 Results of Evaluation

The inferences derived from analysis of the evaluation metrics evolved for evaluating the optimised process are as below:

6.4.1 Time & Cost:

- Time and cost are the two major criteria registering improvement in terms of reduction, in all the 53 activities of the optimised process.

- The improvements in time and cost have positive correlation, which shows the complementarities of these parameters.

- Out of 16 activities expected to record highest reduction in time maximum i. e., 6 activities belong to one sub- process namely Non-Spatial Data acquisition and Management. This improvement will be on account of adoption of GIS environment in the functioning of this sub-process.

- Highest number of activities 53(100%) has shown likelihood of improvement with respect to time criterion varying from Low 6 (11%), Moderate 31(58%) and High 16(31%) that shows the impact of time in the performance of UPPBP.

- Reduction in time is on account of adoption of WFMS, which is a tested time reduction instrument without much financial involvement.

- Legalisation sub-process will also contribute in time reduction in a big way on account of institutional changes proposed in the optimised process as almost all activities are expecting moderate (4) and high (3) improvement /reduction in time.

- Cost stands at number two with 36(68%) activities showing tendency towards improvement with Low 6(11%), Moderate 16(30%) and High 14 (27%). The remaining 17(32%) without any improvement. The lower percentage of 68% of activities likely to register improvement with respect to cost in comparison to time may be attributed to the fact that improvement in time on account of some institutional changes have no involvement of any financial investments.

- Out of 14 activities expected to record highest reduction in cost maximum i. e., 6 activities belong to one sub- process namely Non-Spatial Data acquisition and Management. This improvement will be on account of adoption of GIS environment in the functioning of this sub-process.

- Highest reduction in cost is worked out in case of sub-process of Existing Land Use preparation, where out of 12 activities high cost reduction is expected in all the 5 activities involving technical operations both, in the field and office. The major reduction can be attributed to suggested feature extraction from high-resolution satellite data and digital inputting and presentation of data.

6.4.2 Quality:

- The Quality of services is expected to get moderately improved with respect to 26(49%) of activities in the process with 22 activities falling in moderate (up to 60%)improvement category.
- The improvement in quality is expected to be on account of automation and adoption of digital cartographic presentation techniques and adoption of quality management system.

6.4.3 Over All Improvement:

All 53 (100%) activities are likely to witness improvement with reference to selected criteria on putting the optimised process into practice.

The overall level of improvement with reference to all five parameters together is Low i.e., up to 30% in comparison to the existing situation. This may be attributed to the tradeoffs between the various activities, since there are 14(27%) activities, which have chances to witness High improvement of (>60%).

All these 14 activities relate to sub- processes namely Spatial Data Acquisition, Non-Spatial Data Acquisition & Management, Existing Land Use Map Preparation and Cartographic Presentation, in which maximum changes in technologies is suggested in the optimised process model.

6.5. Conclusion:

The above discussion shows that loading new information and communication technology on the process will beyond any doubt make improvements in the performance of the UPPBP, which may be of a lower magnitude say around 30% or so initially, as the costs on capital assets and human resources development will be higher but the same will pick up with time. Further the application of organisational optimisation and operations management technologies including TQM and WFM will add to the efficiency and thereby effectiveness of the process by improving quality for constant customers' satisfaction, reducing queuing time and increasing throughput and ensuring optimum utilisation of resources. The evaluation of all these improvements may be possible more quantitatively applying analytical methods but subject to availability of exhaustive data on all performance measures with respect to all activities of the process. The following chapter details out the requirements of optimised system for operationalisation.

7. CHAPTER

Implementation Strategy Guidelines

7.1. Introduction

The last chapter dealt with evaluation of an optimised UPPBP developing a scenario on the basis of optimised process in comparison to the existing process. It is observed that on implementation of the optimised model there will be reduction in plan preparation time as well as cost, which in turn will satisfy the customers and the end users as well. But the million-dollar question is the implementation of the optimised business process that needs capital investments for ensuring and effectuating corresponding changes in the supporting organizational structure and institutional resources including manpower, legislative framework and a specific type of knowledge base.

The present chapter is going to address the implementation issues taking in to account the findings of the AS-IS Situation analysis chapter 3 and the requirements of optimised business process in chapter 5.The effort is to prepare guidelines to create an environment for smooth taking off of the optimised UPPBP in chapter 5.

7.2. Implementation Issues

Implementation issues refer to the requirements of the process with respect to:

Strategic Management issues: policies, rules, regulations, legislative background, administrative & organizational set up and financial status.

Operational Management issues: quality management, workflow management, human resources, information, technology, processing and engineering.

7.2.1. Strategic Issues

The issues which are impeding the plan preparation process and to be tackled at Government level are:

7.2.1.1 Multiplicity of laws: to deal with planning is to be got removed through legislative review at Government level to go for only one comprehensive law for spatial / physical planning. The new law invariably shall have mandatory provisions for formulation of State Urbanisation Policy, Regionalisation Policy & emphasis on Regional Planning and establishing linkage between Economic Planning & Spatial Planning to achieve comprehensiveness and inbuilt coordination mechanism among various agencies looking after development.

7.2.1.2 Plan Legalization Delays: The provisions in law related to time limits for legalization of plans at various stages of plan preparation, which at the moment are with open end and breed delay are to be cut short and put with reasonable limits.

There should be provision of sending plans to the Government only once for final approval and that too with bare minimum time limit. Rest of the formalities should finish at technical or to the maximum administrative levels, as the whole process is performed under law duly enacted by the legislature showing the implied consent of democratic authority for consequences on application of provisions of such law. This will help in reducing the plan preparation time drastically otherwise instances are not rare when plans are never approved or approved after outliving their plan period / life. The law needs to be amended accordingly.

7.2.1.3 Leadership: Urban Planning being a highly complex multifaceted technical and scientific discipline must be provided with innovative, dynamic and professional leadership to increase efficiency. The generalist and frequently changing leader cannot take right and timely decisions on professional issues. The political level is to be convinced on this issue.

7.2.1.4 Rules and Regulations: The Town & Country Planning Act, 1977 and Rules, 1978, have become outdated in view of changed development, information, and technological scenarios and thus need revision to match with ICT with respect to issues of procedures of conducting business to make these flexible, simplified, transparent and adaptable to modern technological environment.

7.2.1.5 Financial Status: The continuous improvement of the UPPBP to keep optimization process including human resource development and infrastructure capacity building ever alive an uninterrupted flow of funds is the prime requirement. The major support shall have to be got assured from the Government, as Planning is a social service and the whole development activities

of the Government for economic growth need plans prepared by the planning organisation. However, ways and means to mobilize resources by rationalizing the business potential of the Urban Planning Business as a whole in forms of fees, levies, capital appreciation, consultancy charges and sale of document etc. need to be exploited. Apart from these efforts to muster fiscal resources from external funding at International level by preparing special projects and programs in collaboration with donor agencies need no emphasis.

7.2.2. Operational Management Issues: Include the Following Issues:

7.2.2.1 Human Resource Development Needs: The optimized / new process needs specialized manpower having expertise in modern enabling technologies including Aerial Photogrammtry & Remote Sensing, Geoinformatics, Management Sciences, Computer Engineering. The existing staff may not take up the new assignment, so it would be appropriate to go for restructuring of manpower resources.

A policy for Human Resource Development will need to be prepared, which will explicitly suggest evaluation of the existing staff in view of new technology based optimized process. The need for filling up of new specialized positions can be fulfilled by redesignating some of the existing vacant posts but it may generate resistance from staff.

The eligible incumbents after screening may be sponsored for improvement of their professional capacities in a phased manner. This could be materialized by linking advancement in career to such improvement and by giving some other monitory benefits to the innovative staffs.

Provisions for induction of people with specialized backgrounds in modern Geo-ICT may need to be added in the service rules to inject new blood in the organisation.

The officers and other staffs must be kept abreast with the latest professional know how by organizing workshops, seminars, refresher courses, exposure visits, short trainings, good library facilities & multimedia demonstrations as per formal policy.

In view of the socio-economic dimensions of the urban planning business process and liable pressures on the performing professionals / actors in developing democratic set ups, the process either should be handed over to the autonomous authorities or if at all is to be dealt in by the public agencies then some national level service of professional planners must be founded to ensure just, innovative and professional dealing of this important business process.

The business-implementing organisation shall develop thick liaison with institutions producing professional planners by rendering constant feedback on changing requirements of profession, to get right sort of professionals produced to manage the profession in field efficiently

7.2.2.2 Information Requirements: The data available with the organisation will have to be transferred to digital form to establish databases at headquarter and in the field units. To ensure inter and intra organisational data sharing, implementing federated & distributed database systems and proper access as well as updating of such databases the bare minimum infrastructure related to information and communication technologies is required to be provided at different levels of the organisation. This change will increase the efficiency and transparency in the process, which ultimately will enhance the effectiveness of the process for which change is envisioned.

7.2.2.3 Technology Requirements: The optimised process needs modern equipments of surveying, data processing and handling hardware & software and communication. The introduction of ICT and information management system is very costlier proposition at the initial stages but change is automatically coming in attitude of the decision-making authorities in favour of all this and now it is a question of time and convincing power of the professional class.

7.2.2.4 Process Requirements: These will give directions to the structure and functionality of the UPPBP system. The processing needs certain specifications, which are to be written in the quality manual. After setting up of a system for digitalisation of data and foundation of organisational databases along with restructuring of organisation the plan preparation process will automatically become quite efficient and facilitate the adoption of workflow management system. Workflow Management System will help in monitoring, controlling and managing various subprocesses / activities that follows a predefined path. Automation can also be possible but partially on adoption of workflow management that will save time.

On availability of exhaustive, just in time and up to date data on various aspects of plan preparation process the organisation may go for some other detailed level and of diverse nature specific planning and designing projects to strengthen the economic base. In addition data may be sold to the private consultancies and institutions.

7.2.2.5 Engineering Requirements: The Urban Planning system is already a distributed system. The main functionalities include plan preparation and implementation, which involves handling of geo-spatial data making value addition to the same in forms of additional planning related thematic layers. A constant, quick, reliable and uninterrupted communication with headquarter and other functional units / components of the system is prime essentiality to exchange share, update and arriving at professional consensus on technical and policy / decision making related issues. Every field unit will have virtual database related to its jurisdiction but the main databases will be at the headquarter in the specialized units of the organisation. Updating the databases at local level will be the responsibility of field units and concurrent updating of main databases will take place automatically and simultaneously. For this purpose the databases will have to be inter-

linked through Internet facility. In fact an Integrated Organisational Information Service needs to be developed to meet the future requirements of the optimised process.

7.2.2.6 Quality Management: To make the optimisation of UPPBP an everlasting phenomenon and ensure adaptability of the process to changing environment and customers' requirements as an inbuilt mechanism, adoption of QMS is an essentiality. It requires involvement of whole organisational management right from top-level management to grass root level workers. The whole organisation needs to be documented with respect to all aspects of its structure and functionalities in shape of comprehensive manual as proposed in chapter 5,but surely with detailed elaboration on each aspect. It will help in exercising formal quality and audit checks on all functional levels. A culture of self-adjustment to changes in task and societal environments will automatically emerge and the organisation will remain always alive to the feedback from users' community through its functional components dealing with public. This situation will be a step towards Continuous Process Improvement, which is the sole aim of this research.

7.2.2.7 Workflow Management: This tool also needs to be applied vigorously to enhance the efficiency of the UPPBP by reducing the queuing time in the process and facilitating the TQM.It is required to analyse, compress and automate the plan preparation business. All sub- processes of the UPPBP, which is a core process, need to be modelled for applying WFM in each on the lines the one developed for the whole process in chapter 5.

7.3. Conclusion

In this chapter a broad outline of various requirements to put the optimised UPPBP Model in to practice is detailed out. The strategic issues are not going to involve any financial resources so are easy to get through from the Governments just with consistent persuation and realisation. The issues at operational level related to technological issues need capital investments of enormous dimensions in the shorter run but definitely will be reduced in longer run and also be compensated with improved performance of the process. Above all, costs are to be borne later or sooner on this account and nothing is more important than the living environment of public and there is tendency of the society to pay attention and spare resources for management of urbanisation in a planned fashion.

The operations management techniques are not going to cost much and can be introduced immediately to optimise the process in view of their capacities to optimise processes by reducing the throughput time, which is of the utmost importance to UPPBP. Regarding technological optimisation actions organisation may take up implementation in a phased manner suiting to availability of financial resources. As per a rough estimate about 5% of the total running cost of an organisation of about 500 staffs is needed to implement Quality Management System for that organisation. The following chapter will address to a few pin pointed actions for creating an environment for managing the requirements of the optimised process and to indicate a broad direction for future research in this field of application.

8. CHAPTER

Summary, conclusions and Recommendations

8.1 Introduction

The last chapter highlights the summary and conclusions of the present research attempt along with recommendations for implementation and in the end a few suggestions for future research.

8.2 Summary

The present research started with an objective of optimisation of UPPBP, in view of performance problems on account of technological obsoleteness and non -application of modern management tools on one hand and the emerging challenges on the process on the other. To accomplish the objective a few research questions were thought of along with a methodology to address the same, which are dealt in chapter one. An overview of research highlighting the research problem and structural outline of the thesis is also an integral part of chapter one. Some literature on relevant concepts of Geo-Information & Communication Technology and Geo Information Management Technology along with their applications, which generally were related to either some National Mapping or Cadastral Agencies, was reviewed to draw an outline to extend present work ahead

The first two-research question defines the prevalent Urban Planning scenario in a part of northern India consisting of four States for which a primary survey was conducted to take stock of the prevailing situation of the UPPBP. An outline of UPPBP was made with the elaborate study of the system architecture with special reference to one state i.e., Himachal Pradesh.The system was

analysed by formulating different special purpose models / perspectives /viewpoints on the lines of RM-ODP (Reference Model- Open Distributed Processing) an system architecture design technique. These perspectives portrayed the internally scanned picture of the system with emphasis on plan preparation process. The external environmental scanning was also done on the basis of primary survey conducted for this research. It was followed by SWOT analysis, which gave ground to formulate specific strategic outline for optimisation of UPPBP.

In order to address an other research question about efficacy of Geo-ICT and Information Management techniques a short literature based review is made in chapter 4 listing out the technologies and techniques and high lighting their potential and limitations with an eye on optimisation of UPPBP.

The third research question regarding optimisation of the UPPBP is addressed in chapter 5 by structuring the UPPBP as envisaged in the Himachal Pradesh Town & Country Planning, Act, 1977, into various sub-processes and further activities to the atomic level. Pinpoint suggestions were made to make technological shift at appropriate steps in the process to make changes in technology on process, which is a mean of optimisation. Further an attempt to draw mere conceptual models of a few Geo-Information Management techniques namely Organisational Model, Quality Model, Workflow Model, which have not been applied in UPPBP yet in Indian situation is made, so to incorporate these too as means of optimisation of UPPBP.

The aspect of evaluation of the optimised process, which constitutes a part of research question number three is addressed in chapter 6,by developing an improvement scenario comparing the activities in optimised process with respect to time, cost, quality, public participation level and contents of plans to that of existing situations on the basis of professional experience only, in the absence of structured and relevant data on the possible parameters. However, by devoting more time on data digging the evaluation may be made more authentic but in the present attempt it was just a matter of touching the methodology for doing the same on account of time and vastness of subject matter as limitations.

The last but the most important research question regarding operationalisation of the optimised UPPBP is addressed in the seventh chapter, where implementation requirements as emerged from strategic goals formulated in chapter three after SWOT analysis and optimisation process designed in chapter five.

8.3 Conclusions of Research

It is evident that UPPBP, which is the prime job of Urban Planning Organisations in India, inevitably requires change in its means to speed up the process for coping with emerging challenges on it on account of changing customers' needs, magnitude of anticipated urbanisation in times

ahead as well as advancements and availability of modern enabling technological, communicational and management techniques.

The problem with the process is of delays in service on account of conventional technologies on process, which are slow, manual / labour intensive and less precise. The consequence of such inordinate delays is customers' dissatisfaction and thus failure of the system to achieve its mandated goals / objectives. Another reason to which the problem of delays can be attributed is structural including organisational plus institutional clubbed up with missing application of management techniques in the process.

Now this research establishes that performance of process will certainly be better in case implementation of optimised process gets materialized subject to availability and fulfilment of the requirements enlisted in chapter 7.The plan preparation time will be reduced in comparison to the existing situation and that will definitely reduce the cost also. In addition, the process will get exposed to the beneficiaries and thus gain popularity, which is very helpful to make the process participatory and socially acceptable.

The introduction of Geo-Information Management Technology will go a long way to help the process in improving its efficiency and subsequently maintaining the continuity of improvement. The process will become more sensitive and flexible to the changing task and societal environments, since this technology increases involvement of whole organisation in achieving goals, exercises periodical external evaluations, stakeholders' involvement, advocates crispness in allocation or monitoring duties / responsibilities /accountability, system for rewards and reprimand.

Similarly, adoption of Geo-Information and Communication Technology including Net Working and modern presentation & visualisation techniques will help in filling up the communication gaps between the ones who plans and the ones for whom the plans are meant .In short, all technologies speed up the process, fill up communication gaps, increase awareness, brings exactness and transparency to the business and all these together in turn, enhances effectiveness of the business, which solely is the need of UPPBP.

Adoption of Information Management Technology including GIS and DBMS will make information handling processes like storage, updating, retrieval, analysis and dissemination more time and cost effective apart from improving quality of information with respect to aspects of redundancy and currency as well as ensuring safety and security of information.Consequently,UPPBP ,which revolves around these activities is certainly bound to be benefited to a greater extent in terms of responsiveness, transparency and efficiency.

The timely preparation of plans will firstly, arrest the problem of unplanned or ad-hoc development scenario in the absence of comprehensive plans, secondly, reduce temporal escalation in development costs and lastly increase social acceptability of plans, which is the ultimate goal of

any social planning. Thus the process will certainly be in position to achieve the objectives of planned development, which will without any doubt be balanced and help in providing social justice and a liveable environment to the masses. The success in achieving objectives in turn will make the process favourite of all and the restoration of its glory may be possible.

8.4 Recommendations

In view of findings of research, the requirements of the new process and to ensure continuous optimisation of UPPBP the following recommendations are made, which may be applicable in case of any Urban Planning Organisation / Department / Agency in India or elsewhere having similarities in task and societal environment. These recommendations are clubbed under heads namely structural, technological and further research aspects.

8.4.1 Structural Aspects:

Organisational Restructuring: Constitution of a High Power Review Committee to evaluate and prepare restructuring plan of the organisation in view of new process design requirements.

Policy for Human Resource Development: Frame a comprehensive human resource development policy suggesting:

Amendments in recruitment and promotion rules incorporating qualifications related to new enabling technologies.

Empanelment of staff for capacity building activities including qualification improvement, training, refresher courses, exposure visits, seminars and on job training;

Develop a quality manual for all processes on ISO-2000 to make the organisation a quality organisation.

Leadership: make provision to provide right and permanent leadership to the organisation.

Legislative Reforms: Prepare a comprehensive proposal for legislative amendments for removing present problems like multiplicity of laws, obsoleteness in legislative pieces, conflicting & overlapping provisions on one hand and encouraging data sharing, coordination, linkages on the other.

Review existing laws. Rules and regulations to make them sensible, flexible, socially acceptable and imlpementable enabling the process to prepare plans at faster speed.

8.4.2 Technological Aspects:

- Establish ICT network at headquarter level.

- Equip the specialized units proposed in the new organisational structure with all modern technological infrastructures and requisite manpower.

- Prepare phased plan for implementation of computerization of whole organisation starting from the headquarter level.

- Establish organisational databases for both spatial & non-spatial data and other information in an integrated manner to develop an Integrated Organisational Information Service and convert available data into digital format.

8.4.3. Research Aspects

The present research is a prelude to initiate some serious and in depth deductive research in the field, as during the course of this study it has been felt that the data required for analytical hypothesis formulation, validation and performance evaluation of new system design / modelling alternatives is very scanty, unstructured, obsolete, scattered and unreliable. The new areas requiring immediate attention may revolve around identification and testing criteria for system performance, quantification, methodologies for evaluation and information system on costs, time requirements, accuracy levels, improvement assessment techniques and potential / constraints with respect to different technologies in the context of UPPB Process to make the same ever vibrant.

8.5 Conclusion

Urban Planning is the most complex, dynamic and critical process dealing in highly subjective and spatially, culturally as well as temporally variant phenomenon of human society. The tools, techniques and skills to manage this process are also equally dynamic on the path of development and scientific advancements. As such, to ensure efficiency, sensitivity, adaptability and effectiveness the process inevitably needs introduction and consistent application of modern concepts of process optimisation and operations management in its task environment in addition to adaptation of modern Geo-ICT and domain knowledge of Urban & Regional Planning discipline to shape better physical environment for society.

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Appendix - 1

QUESTIONNAIRE FOR PRIMARY SURVEY OF URBAN PLANNING DEPARTMENTS TO COLLECT DATA FOR M.Sc, THESIS IN GEOINFORMATICS AT IIRS DEHRADUN

1. BACKGROUND / HISTORICAL PROFILE:

- Name of the Department:
- Year of Establishment :
- Administrative Status : Independent / Attached.
- Head of Department : Beaureucrat / Technocrat.
- Legal Status : Advisory / Mandatory.
- Linkage between Physical and Fiscal Planning: Formal / Informal
- Reasons :……

……

……

……

……

2. PRESENT URBAN SCENARIO:

- Total Population (2001): Person.
- Urban Population (2001): Person.

- ***Class wise distribution of Towns / Cities with Population:***

Class	Population Range	No. of towns & cities with population ( ) persons			Remarks.
		1981	1991	2001	
I	>100000				
II	50000-99999				
III	20000-49999				
IV	10000-19999				
V	5000-9999				
VI	<5000				
Total					

- Decadal Urban Population Growth Rate:
  - 1981-91
  - 1991-01
- Decadal Rural Population Growth Rate:
  - 1981-91
  - 1991-01

3. *LEGAL BACKING:*

- Urbanization Policy Status: Existent / Non-Existent.

  In case it is Non-Existent reasons for the same:
  - ……
  - ……
  - ……
  - ……
- Comprehensive Urban Planning Law Status: Existent / Non-Existent.

  In case of Non-Existent reasons:
  - ……
  - ……
  - ……
  - ……
- List of other related applicable Laws:
  -
  -
  -
  -
  -

4. TECHNOLOGY:

- What are primary functions of the Department:
  - ……..
  - ……..
  - ……..
  - ……..
  - ……..

Status of Regional Planning:

- Regionalization done……. Yes / No.

- Regional Plans prepared: ……Nos. Scale& Details…….
  ……..

- Development Plans:
  - Prepared:…….Nos. Scale & Details…….
  - Approved:……(,,) ……
  - Revised:……...(,,) ……
  - Frequency of updation / modifications……..
  - Monitoring mechanism……..
    ……

- Sources of Spatial Data for Plans:(tick mark)
  - Survey of India…… ☐
  - Revenue Department……... ☐
  - Other……..... ☐Name:…….

- Scales of Spatial Data:

	Required.	Available.
Regional Plan:		
Development Plan:		

- Contour Intervals of Spatial Data (m.):

	Required.	Available.
Regional Plan:		
Development Plan:		

- Projection of spatial data:…….

- Spatial Data availability for towns / cities:
  - Analogue form: Nos.
  - Digital form: Nos. Format- (Raster / Vector).

- Average cost of Basemap (BM) / Spatial Data preparation / SQ. Km. in (Rs):
  - Analogue:
  - Digital:

- BM Preparing agency: Self / Other agency.

- Time taken for BM preparation / Sq. Km. of area in (Days):
  - Analogue:
  - Digital:

- Average time taken for Development Plan preparation in (Months):

- Stagewise distribution of time taken for Development Plan preparation in (%):

  - Base map preparation: %

    - Acquisition of spatial data.
    - Scale adjustment by enlargement & reduction.
    - Mosaicing.
    - Updation.
    - Presentation.

  - Non-spatial / Attribute data: %

    - Research Design.
    - Collection (primary & secondary).
    - Compilation.
    - Classification &codification.
    - Analysis &
    - Projections.

  - Planning: %

    - Working out requirements (infrastructure)
    - Space needs.
    - Suitability analysis.
    - Space allocation & presentation.

  - Legitimatization: %

    - Stakeholders' opinion gathering.
    - Affording opportunity through hearings.
    - Amendments.

- Approval.
- Publication.

- Success rate of Development Plans in relative terms: %.

- Possible reasons for high / low performance:

  - …….
  - …….
  - …….
  - …….
  - …….
  - …….
  - …….
  - …….
  - ……..…

- Suggestions for improvement:

  - …….
  - …….
  - …….
  - ……..
  - ……..……
  - ……..……
  - ……..……

- List of foreign aided projects, if any:

  - ……..……..
  - ……..……..
  - ……..……..
  - ……..……..
  - ……..……..
  - ……..……..

- List of hardware available in the Department: (Please supply a copy).

- List of software available in the Department: (,,)

- List of available books, journals / periodicals: (,,)

- Copy of recruitment & promotion rules of professional staff categories: (,,)
- Organizational structure (spatial) vis- a-vis. Decision making process: (,,)
- Work manual, if any: (,,)
- Conduct of business rules: (,,)
- Budget allocations for the last five years in (Rupee).

Sl. no	**Item**	**Years**					Total
		1998-99	1999-00	2000-01	2001-02	2002-03	
1.	Non-Plan Budget.						
2.	***Plan Budget:***						
a.	Spatial Data						
b.	Non-Spatial Data.						
c.	Computerization.						
d.	Public Awareness.						
e.	Planning						
f.	Publication.						
g.	Library.						
h.	H.R.Development.						
j.	Tools & Plants						
k.	Miscellaneous.						
3.	Total						

Note: - Computerization includes hardware & softwares required.

5. MANPOWER RESOURCES:

- Grade wise distribution of staff strength:

Grade	Total posts	Nature		Filled in	Vacant (Time in year)					Remarks
		Adm.	Tech.		1	2	3	4	5	
I										
II										
III										
IV										
Total										

- Nature wise distribution:

  - Administrative: %
  - Technical: %
  - Supportive: %

- Professional competence at officers' level:

Level → / Field ↓	F O R M A L				INFORMAL	
	Postgraduation	Graduation	Diploma	Certificate	Training	Awareness
Urban Planning						
Architecture						
Engineering						
Statistics						
Remote Sensing &GIS						
Computer Application						
Law						
Public Administration						

- How many officers have improved their technical qualifications during last five years:
- How many officers have got exposure to Remote Sensing & Aerial Photogrammetry and GIS during the last five years:

- No. of officers attended professional National level congresses / seminars in Urban planning and other related disciplines during last five years:

- No. of officers attended technical training / refresher courses of more than three months duration during last five years as mandatory requirement of their carrier:

- How many officers have served on ex-cadres posts in other organizations with in and outside the State during the last five years?

- No. of technical / research papers published by the departmental officers in professional journals during last five years:

- No. of technical exposure visits organized for officers during last five years:

- Training Policy of Department……

- Promotion Policy: Seniority based / Performance based.

- Departmental Policy of Data sharing with other organization…….

……

6. *PUBLIC PARTICIPATION IN PLANNING:*

- Status: (tick mark)
  - Obligatory…….. ☐
  - Mandatory…….. ☐

- Levels:
  - ……..
  - ……..
  - ……..
  - ……..

- Methods:
  - .....……..
  - …….
  - …….
  - …….
  - …….
  - …….
  - …….
  - ……..……

- Success rate / response in relative terms: …… ……

7. OPINIONS ON SUCCESS OF PLANNING IN OBJECTIVE ACHIEVEMENT: *(*Please reply in relative terms).

In your opinion to what extent planning has successed in:

	25%	50%	75%	100%

- Curbing rural-urban migration in state:
- Balanced development / urbanization:
- Socialization of urban land:
- Sustainable development:
- Improvement in environmental quality:

8. SUGGESTIONS:

- Legislation:
  - .....
  - ……...
  - ……
  - ……
  - ……
  - …….
- Administration:
  - …….
  - ……..
  - …….
  - …….
  - …….
  - ……
  - ……..
  - …….

- Education:
    - Regular:
        - ……
        - ……
        - ……
        - ……
        - ……
        - …….
    - Continuing / In-service:
        - …….
        - …….
        - ……
        - ……
- Professional practice:
    - Public sector:
        - ……
        - ……
        - ……
        - ……
        - ……..
    - Private sector:
        - ……
        - ……
        - ……
        - ……
        - ……
        - ……
- Public participation:
    - ……
    - ……
    - ……

- ……
- ……
- ……
- ……
- ……
- ……
- ……
- ……
- ……
- ……

9. QUALITY WORK INSTUCTIONS:

Sl. No	Plan Preparation step	**Performer**	**Place/ Where**	**When**	**Method**	**Time In Days**	**Remarks If Any**
1							
2							
3							
4							
5							

6							
7							

10. <u>QUALITY CONTROL MECHANISM:</u>

Sl.No.	**Stage.**	Authority.	Method.	Remarks

Appendix – 2

Conclusions of the Primary Survey of Town & Country Planning Departments of State Governments for the present Research.

General Administrative:

- Plan preparation is the basic function of Urban Planning Departments.
- Almost all the States of the Union of India established full-fledged Departments for looking after the Urban & Regional Planning affairs by mid sixties.
- The headship of such technical Organizations in some States is still in the hands of ex-cadre generalists.
- The Urban Planning in all States is a statutory social service being performed by public institutions.
- The linkage between Fiscal Planning and Physical Planning is non-existent everywhere, which is the root cause for non-implementation of Urban Development Plans. The situation is on account of missing mandatory provisions for the purpose at the moment.
- The urbanization is faster in plain areas as compared to hilly states / areas. Nevertheless, from management and ecological sensitivity points of view even the lower proportion of urban population in fragile mountain eco-system is equally important.

Spatial Distribution of Urbanisation:

- The class wise distribution of towns evidently shows polarization of urbanization towards class-I cities as an increase of 100% is registered during 1981-2001 period in number of towns in this top class.
- The growth of smaller towns especially class- VI shows almost 100% decrease over the same period of twenty years. It shows that towns from this class have crossed over to class-V but new growth points experiencing urbanization were not notified as towns. This indicates towards a state of neglect prevailing with respect to urbanization taking place at grass root level in rural parts of the country.
- In all sample states the decadal urban population growth rate during 1981-2001 has shown steady rise, where as decease in rural growth rate. It is an indication towards im-

balanced regional economic & infrastructure development development, which used to remain allurement for masses and encourages migration. The higher urban growth rates are on account of population migration not the birth rates.

- In spite of legal provisions available none of the sample states has taken initiative and got comprehensive urbanization and rationalization policies approved from the government. This situation can be attributed to adhocism prevailing in functioning of the Governments, which is favourite among the authorities in power, since it suits to their interests well.
- Negligible efforts have been made for taking up regional planning projects which is the top most level where economic planning policies have to be taken for translating into physical realities. Whatsoever exercises in this context have been done too are not the regional plans in real sense.

Multiplicity of Law:

- Co-existence of many pieces of legislation to deal in management of planning & development of land, which is the basic resource for all sorts of developmental activities, is also one of the reasons for lower success in implementation of urban development plans. The legislative multiplicity causes problems related to coordination, functional overlaps and delays. The involvement of Urban Planning Departments is restricted only up to plan preparation in all the states.

Spatial Data:

- The present survey reveals that none of the states has achieved 100% coverage, so far as the issue of Development Plan preparation for towns is concerned. Even lapse of about 50 years of their existence the highest coverage is of 62% in case of Haryana and lowest of 1.27%in case of Punjab.Himachal & Uttaranchal are around 25 to 30%. The situation conspicuously tells the tale of piecemeal approach to deal with urbanization management by the States.
- The non-availability of spatial data on requisite scale may also be another possible reason for the dismal performance, since the findings of survey tell that Developments are prepared on maps having scale varying from1: 800 to 1:25000 against the technically required scale of 1:5000 for the purpose (as per UDPFI Guidelines).
- No revision of Development Plans by the 75%of the sample States indicates towards rigidity of plans and authoritarianism in planning on the part of concerned agencies.
- The common frame work Spatial data is procured by all states either from Survey of India or Revenue Agencies and then processed at their own level as per specific requirements of scale, contour interval, spatial extent and content details. In some cases the spatial data is generated by the Departments themselves or through private agencies that

dose not have any appropriate projection and even contour lines. These shortcomings in the spatial data cost on orientation & positional/ planimetric accuracy of the plans.

- The data providers are not fulfilling the scale and contour interval specifications of spatial data for preparation of Development Plans.
- Availability of spatial data in digital format is a rarity in the present situation. Only in Himachal it is true with digital data available for two towns.
- The cost of preparing spatial data both analogue and digital on requisite scale of 1:5000 with contour interval of 5m works out to be almost same i.e. Rs.85, 807 & 84,568 / sq.km. area is almost same in case of Himachal where terrain condition is hilly. In case of data without contours it work out to be Rs.29, 300 / sq.km. for plain area of Uttaranchal State. In case of Punjab & Haryana States contours have-not much significance as topography is flat. Even smaller scale maps up to1: 25000 are also used to prepare Development Plans.
- Base maps are available only for a very limited number of towns. Himachal 25%, Haryana 52%. Other two states have no base maps at all on the requisite scales.

Plan Preparation Time:

- The process of Development Plan preparation takes on an average 18 to 24 months but in some cases 48 to 60 months is not uncommon.
- The maximum time i.e. 30% to 60% of the total time for preparation of Development Plan is being taken for legitimatization of the same and least for planning which is not > 30%in any case. The data acquisition & processing together consume around 25 to 40% of the total plan preparation time.
- The success rate of Development Plans nowhere is >40% with the lowest level of 20% in the hilly areas where difficult terrain conditions and scarcity of developable land affect the situation.

Public Awareness:

- Lack of awareness, commitment both political & professional, timeliness, flexibility in plans to adapt to fast changing scenario, coordination and linkage with fiscal planning are common reasons spelt out for low % of success of Development Plans.
- Continuous and vigorous awareness drive, formal policy for capacity building, time bound plan preparation schedule, Effective implementation, flexibility in plans and adoption of modern enabling technologies are a few consensus suggestions for improving the success of Development Plans.
- Out of four States surveyed only one is making efforts to reap the benefits of the opportunity of foreign funding.
- Except Himachal where basic infrastructure for adoption of modern technologies in forms of hardware & software is available no other state possesses anything of the sort. It

shows the level of obsoleteness of technology might be prevailing in the planning process.

- 50% Departments have no library at all.75% have no subscription for any technical / professional journals. The remaining 50%, which have their own libraries are also having books of general or routine administrative subjects only.
- The recruitment & promotion rules of all the Departments are very old, more in favour of indirect inductions, having no scope for induction of people with professional background in the modern enabling technologies.
- All the Departments surveyed have hierarchical administrative structure.

Resource Development & Capacity Building:

- None of the Departments has work manual and conduct of business rules.
- The budgetary provisions of all the four Departments for the last five years do not show any substantial increase as this increase in relative terms is just6%, 3%and 14% and even decrease in case of Uttaranchal to the tune of –9%. This trend shows that these provisions are just for subsistence and are inadequate to meet with increasing needs of the Departments.
- The share of pay & allowances of the staff in total funds available to these Departments is as high as 88%. It shows that the organizations are labor intensive&, conventional technologies based and have no resources to go for switching over to modern enabling technologies.
- The foreign funded projects have great potential for encouraging modernization and public awareness activities as has been experienced in case of Himachal.
- Environment is building in favour of adoption of new enabling technologies as is apparent from a one time budgetary provision of Rs. 24 million for computerization of the Department in Haryana during 2002-03 financial year.
- Non-availability of plan budget in case of 75% Department proves that the funds are not available for the planning of new projects but just for routine recurring nature non-productive activities.
- Just 5 to 10% of the total funds are becoming available to all important profession building sub –heads of expenditure including public awareness, human resources development, infrastructural capacity building and research & activities. It paints the gloomy picture of professional future and role & place in society.
- On an average there is one planner for population of 2.5 lac to 3.0 lac, which is highly inadequate.
- The vacancy position is more critical in case of class-I services being manned by professional planners adversely affecting the efficiency of planning agencies. It is as high as 42% in case of Himachal.

- Higher Proportion of technical manpower, which is around 60%, & as high as 70% except Haryana State where it is just 40% indicates towards imbalanced hierarchical structure of staff.
- The analysis of technical competence of officers in sample states reveals that there exists complete vacuum of personals with backgrounds in fields of specialization in enabling technologies.
- The in-service improvement of technical qualification is not done even by a single officer of the sample states during last five years.
- 50% of the states have not given any exposure to their officers in remote sensing & aerial photogrammetry and GIS. The percentage of officers with such exposure in case of the remaining 50% states is also very low i.e. 1 to 4%.
- 75% States have not conducted any professional exposure visit for the technical officers.
- Only two states i.e. Punjab and Uttaranchal have sent a reasonable number of officers (8% to 10%) for refresher courses.
- None of the sample States has any formal training policy.
- Data sharing policy is also still an unheard thing in urban planning departments.
- R&D is neglected area since the officers of all departments in the last five years published not even a single research paper.
- Deputation of officers with in state is common but outside is totally absent.
- Attendance of officers in seminars & congresses is only satisfactory in case of Punjab from where about 8 to 10% of the officers were sponsored every year for said purpose.
- Merit-cum-seniority is the base for the career progression everywhere.

Public participation:

- Public participation is mandatory in all the states.
- The methods in practice to have public opinion gathering are same and conventional except one state where initiation has been made to use modern audio-video means.
- The success rate in public participation is highly variable but nowhere >35% which is not quite satisfactory.
- Public opinion is taken at advanced stages of plan preparation process except Punjab, which usually create resentment among masses on some occasions.
- In general opinion of experts the planning efforts made so far have not succeeded in achieving objectives of planning beyond 25% mark barring rare exceptions.
- In all the Departments surveyed, there exist no formal quality work instructions or quality manual. However, quality control is definitely exercised through convictional methods including various checks and balances.