LAND MANAGEMENT INFORMATION SYSTEM: DDA-A CASE STUDY

A DISSERTATION

Submitted in partial fulfilment of the requirements for the award of the degree

of

MASTER OF TECHNOLOGY

in

INFORMATION TECHNOLOGY

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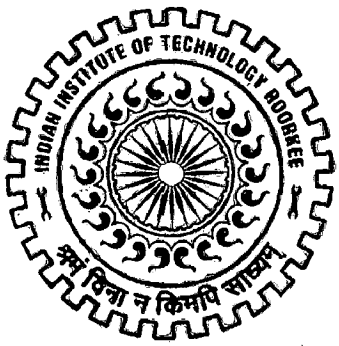

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CANDIDATE'S DECLARATION

I hereby declare that the work presented in this dissertation titled **"LAND MANAGEMENT INFORMATION SYSTEM: DDA - A CASE STUDY"**, in partial fulfillment of the requirements for the award of the degree of **Master of Technology** in **Information Technology,** submitted in **IIT, Roorkee – ER&DCI Campus, Noida,** is an authentic record of my own work carried out during the period from August 2002 to February, 2003 under the guidance of **Mr. V.N.SHUKLA** Director(Special Application), Electronics Research and Development Centre of India, Noida.

The matter embodied in this dissertation has not been submitted by me for award of any other degree of diploma

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CERTIFICATE

This is to certify that the above statement made by the candidate is correct to the best of my knowledge and belief.

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ACKNOWLEDGEMENT

The work presented in this report would not have been completed without the guidance and support of many people.

In first place, I would like to thank **Prof. Prem Vratt,** Director, IIT Roorkee and **Sh. R.K.Verma,** Executive Director, ER&DCI, Noida.

I would also like to thank **Prof. A.K.Awasthi,** Dean PGS&R, IIT Roorkee. I would also like to thank **Prof. R.P.Agrawal,** Course Coordinator, M.Tech.(IT), IIT Roorkee and **Mr. V.N.Shukla,** Course Coordinator, M.Tech.(IT), ER&DCI, Noida.

I would like to thank my guide, **Mr. V. N. Shukla,** for his constant support, incredible enthusiasm and encouragement. I am grateful to Mr. Satyajit Rath Senior Project Engineer at ER&DCI for his support and guidance. I am also grateful to Mr. Munish Kumar for the cooperation extended by him in the successful completion of this report.

Finally, I would like to extend my gratitude to all those persons who directly or indirectly helped me in the process and contributed towards this work.

(Ashwini Kr. Gautam)

Enrollment No.- 019010

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ABSTRACT

This Dissertation work gives an account of the Land Management Information System conceived and designed for Delhi Development Authority, Delhi. The dissertation also outlines a brief account of back ground history.

The subject Land Management Information System has been developed as an application software and is designed to achieve an accurate and smooth functioning of day-to-day work pertaining to land development. Designed in consideration to the sphere of activities of Land Management wing of Delhi Development Authority, the system facilitates analysis and browsing of information. Further, the web-enabled module enables the user community to access the information irrespective of location.

This concept of LMIS is the first of its kind being implemented in urban development activities. It is aimed at effective management of land resources in Delhi, under the officiating agency, the Delhi Development Authority.

The Dissertation describes the above work in detail.

Chapter 1

INTRODUCTION

1.1 Objective

Land is the habitat of man and its wide use is crucial for the economic ,social and environmental advancement of a country. So ,there is a need to develop a system which can be used for detailed land information for land management which will help the policy makers, resource planners and administrators who make decisions about land.

1.2 Scope

The land management information system will maintain the detail information about the various aspects of the land i.e. who is the owner, how much land is available for development etc. This will help in the acquisition of the land for development as well as in the safety of the land under various categories such as possession taken under acquisition or falling under development plan.

Functional scope of the project :

- Capturing of spatial or non-spatial data of villages
- Design and develop database consisting of village information
- Update sazra / khasra with acquisition status
- Information regarding compensation
- Reconciliation of land records i.e. award no. with whose land acquired possession taken ,if not then what are the reason
- To develop a system of searching/sorting and other similar activities for database developed
- To make it web based application

1.3Overview

Land being the general habitat of human being, its effective use forms a crucial aspect for the economic, social, and environmental advancement of all countries. Although it forms part of nature's bountiful resources, access to land is

controlled by ownership patterns. The process of defining and determining l in favour of an owner is called registry of land. Municipal Corporatic Development Authorities and other Govt. bodies also use the owners information for various aspects such as revenue collection, yielding forecast land development etc.

Increasingly it has been recognised that policy makers, planners, l administrators, and individual citizens all have a need for information about land and make significant use of spatial data on a day to day basis. Adeq knowledge of natural resources and accurate description and record of s knowledge forms the essential pre-requisite to their rational use and conservati Land information is prime requisite for making decisions related to l investment, development and management. In this regard, the Town and Cou (Planning & Development) Act, 1979 was introduced and the developm authorities were designated as the custodian of the Act. The Act provides preparation of not only existing land use maps and registers, but also formulat of land use and development control plans that seek to provide a healthy liv environment within the authority area.

Land, which is a scarce natural resource has been regarded as a measure wealth, status and power, from time immemorial. Any developmental activity nearly impossible to conceive without taking land into consideration. And in t context since time immemorial, it has been a constant endeavor of human bei to pursue various aspects of such activities with ease. Therefore, though a prin map is useful, computerized systems offer improved ways of acquiring, stori processing and retrieving such information.

Planning plays a crucial role in every sphere of life, be it day-to-day nuances any long-term aspects. One such aspects is settlement of habitat, where planning has its own importance. This has been well demonstrated & seen throu the history of human civilization.

An overview of the ancient civilizations speaks for itself on various aspects of planning. Be it, the lined up houses, the network of roads, the under ground sewerage system etc. In recent times this is also seen in our villages, cities and also in properly planned townships. In fact, the actual planning commences during the land acquisition stage of any such activities.

In the above context it is aimed at automating the Land Records and also speeding up process of land acquisition and further development of the same.

1.4 About ER&DCI

Electronics Research and Development Center of India (ER&DCI) was established with the mandate to undertake and promote state-of-the-art scientific research and development in electronics and to design and develop electronics equipment and systems for the growth of electronics industry. It has three units, located, at Thiruvananthapuram, Kolkata and Noida, employing over 450 trained technical professionals.

The functions of the units are coordinated and supervised by the governing council and executive committee. The units lay emphasis on translating the goal of Ministry of Communications and Information Technology (MoCIT), Government of India, to enhance the competitiveness of the Indian industry.

Objectives

The main objectives of the organization are:

- To undertake Application-oriented Region-Specific Research, Design and Development and Engineering in a Mission-oriented and time-bound manner.
- To generate State-of-the-art, Producible, Marketable and field-Maintainable Products and systems.
- To promote accelerated growth of Electronics Industry in the region and to enhance self-reliance for Technologies, System Engineering, Industry Design, Pilot, and Production etc.

- To forge institutional linkages between Academia, R&D Institutions and Industries and to develop Commercial Technologies.
- To develop Human resources in hi-tech areas.

1.5 About Delhi Development Authority

Delhi, the name by which this city goes, is derived from the legend of Raja Dillu, who is believed to have founded this city near present monument "Qutab Minar". Delhi became the focus of Government and political activities in 1911, when it was decided to create a national capital at Delhi. In 1937, the first phase of building of the city was completed and Delhi Improvement Trust was created under the Union Province Town Improvement Act of 1911 to regulate land usage and building activity. (DDA Brochure, 2000)

Till 1947, Delhi had manageable settlement and the population was around 7 lakhs. After independence, Delhi witnessed the influx of large number of refugees from divided areas of India (Pakistan) and within no time, the population grew up to approximately 14 Lakhs. The city was doted with clusters of settlements, monuments and gardens became transit camps, roads became congested and in fact the whole city was bursting at the seams. The chaotic situation left no alternative except to create an organisation, which would plan and execute the development of this growing metropolis in a systemised manner. An ordinance (Control of Building Operation Ordinance) was promulgated in 1955 and under it the Delhi Development (Provisional) Authority was constituted. This was replaced by the Delhi Development Act in 1957, under whose provisions Delhi Development Authority was created to plan and effect the development of Delhi in such a manner as to provide shelter, amenities and facilitate to its existing population and also to make provisions for future growth.

The Authority, under section 6 of the Delhi Development Act, 1957 has been given the following Charter:

"To promote and secure the development of Delhi according to the plan and for that purpose the Authority shall have the power to acquire, hold, manage and

dispose of land and other property, to carry out building, engineering, mining and other operations to execute works in connection - with supply of water and electricity, disposal of sewage and other services and amenities and generally to do anything necessary or expedient for purposes of such development and for purposes incidental thereto. "

In other words, the Charter of DDA, as notified by the Act of 1957, lists the objectives of the Authority as follows.

- To formulate a basic master information for covering the present and future growth of Delhi and to promote and secure the development of Delhi according to the plan covering all the possible activities.
- To acquire, hold, manage and dispose of land as a property.
- To carry out building, engineering, mining and other operations.
- To provide services and amenities incidental to the above.

1.6 Organization of Dissertation

Chapter1 gives the introduction and discusses the scope of the project. Chapter2 gives the literature survey, which discusses the historical background of land management. Chapter3 briefly discusses the working of the DDA. Chapter4 briefly discusses the design and implementation part. Chapter5 gives the result and discussion. Chapter6 discusses the conclusion of the project.

Chapter 2

LITERATURE SURVEY

Land management: It deals in the managing the optimal utilization of land and safety of land under various categories such as possession taken ,under acquisition or falling under development.

Land record: It provides information about villages, maps, roads, canal, river etc. It will take care of data attached to each and every plot.

Land management includes:

- Land development
- Optimal land utilization
- Land acquisition
- Protection of land

It has been universally accepted principle that the rulers of the State are entitled to a portion of the produce of the land from those who utilize it as a price for the protection of their life and property and also to meet the common expenses of the community. It is this concept of collection of revenue that necessitated the maintenance of land records, although in a rudimentary form, in ancient times.

The Arthsastra is the first Indian work to mention of the village officers known as "gopa" whose duties include preparation of various registers for the village fields, transfers, due taxes, etc. Attempt to reform the system were first made by Sher Shah whereby land was categorized, measured and a schedule of crop rates fixed. This was further developed during the regime of Akbar, who with the assistance of Raja Todar Mal, fixed cash rates on a more scientific and rational basis. Elaborate Methods were devised for determining the average produce of each class of land and for commuting grain rates into money rates. In fact Akbars's settlement widely resembles the later settlement effected under British rule. Subsequently during 1822 regulations were introduced for detailed surveys and regulations.[1]

The primary interest of the British rulers was the collection of land revenue and consequently the system of land records was also organized to serve that purpose. After Independence considerable importance has been necessaciated for reliable statistics related to crop, irrigation, land use so that they could form the basis of land development of the country. It in turn helped in strengthening the land record development process. This entire situation helped in development of the present day land records system. In any land records a number of records are prescribed to be, maintained at the village, tehsil and district levels and statements of land holdings, land revenue and rental cropped areas, land use pattern. There are more then 20 registers that are being maintained by Revenue Department. The number of registers again varies from State to State.

The rapid process of urban growth, or a faster urbanization in other words, if allowed to take place in an uncontrolled and unregulated manner, would lead to a less than healthy urban environment. Though some information is being utilized in planning for an over all perspective, sometimes the plans failed to use or incorporate the data or information available with the planners due to some reason or other. The basic deficiency has been to visualize the gap in the information system. The basic information includes the knowledge of location with its surroundings and ownership rights for the same. This further named as the Cadastral System.

2.1 Cadastral System

The word 'cadastral' is a Latin term that refers to the registry of lands, Which determines and defines land ownership and boundaries. In most of the states of India, the land records data are maintained at Taluk offices in the format of the said system. In this system there are two types of information viz. Map, the locality information and the attribute, the textual information. These are maintained in various registers and formats. [1]

- The locality information for each village is surveyed and maintained in a register village wise. These are known as the Field Books.
- Various data like Jamabandi, Khasra Girdawari etc. pertaining to each individual land holding is primarily classified into land details and the ownership details and is maintained in various registers

Cadastral System can be classified under three general heads :

2.1.1 Tax Cadastere

It is a system of survey where information is collected for land taxation. The tax is assessed based on area of land, type of land, value of land and produce of the land. The physical survey is represented by a sketch. Usually, accuracy of the survey is low as well as the determination of rightful ownership is not done since the main objective is tax collection. As long as some one agrees to pay taxes, it does not matter to the govt. who the rightful owners are.

2.1.2 Real Cadastere

In contrast, the real property Cadastere is executed mainly for the physical mapping of land holding boundaries and locating other properties for land inventory. Real property includes not only land, but also buildings, trees etc., which are permanently fixed to it. Minerals below the surface also form an integral part. However, in the legal courts of many countries, private ownership of mineral deposits does not necessarily follow from the ownership of the land.

2.1.3 Legal Cadastere

Under this system the survey furnishes information for the Registration of the land. Determination of legal ownership and Registration of legal transactions is called as legal cadastere. The requirements of physical survey of land boundaries preceding registration is not necessary since registration can be based on old documents. Thus, in general, the legal cadastere can be said to complement to both property cadastere and tax cadastere.

However the most efficient approach is to take all three objectives together and integrate the three types of cadasteres in one system. This will make the system systematic, sustainable and sensitive to local requirements, culture and needs. The key to the success of the cadastral system lies in its ability to protect the land rights and permits those rights to be traded. [6]

The principal records being maintained are as follows:

- ***Village map***: A pictorial form showing the village and field boundaries.
- ***Khasra*** : An index to the map, comprising of information such as changes in the field boundaries, their area, particulars of tenure-holders, methods of Irrigation, cropped area, other uses of land etc.
- ***Khatouni*** : Records of Right, which keeps information like names, classes and tenure of all occupants of land.

2.2 Survey Methods used in the past

Objective of a cadastral survey is the determination of village and field boundaries, preparation of village map showing such boundaries and area lists, and preparation of field registers. The maps and area lists give the physical boundaries and areas and the field registers give the land particulars like ownership, revenue assessment, land classification etc.

Numerous Survey methods were used in the 19th and 20th Centuries. Many of these systems led to inaccuracies and were modified time and again. However, the records of Bombay Survey System and Madras Survey System, which evolved after 1880, were accurate and were directly or with variations adopted as a standard in many States.

2.2.1 Bombay Survey System

This method involved running an imaginary line called G-Line or Baseline across the field and measurement of plot boundary vertex locations with respect to this line. Two distances, the distance along the baseline and the perpendicular

length from the baseline to the vertex are recorded in the form of a Ladder Table or Field Measurement Table (FMT). The Field Data for a village are maintained in a book with the ladder tables and a rough or fair sketch of each land holding.

Variations of this method include use of multiple baselines, adharline survey (where a number of plots were surveyed on a single long baseline, with the entire village surveyed on 1 to 4 baselines), punganur system (where entire village was surveyed on one baseline) etc.

2.2.2 Madras Survey System

In this system, the survey field is initially approximated by running triangulation lines across the field. These triangulation lines describe the basic shape of the boundary of the survey field. The detailed profile of the survey field is described by offsetting local boundary points on to the triangulation lines along the boundary. The system also uses multiple base line method occasionally in describing a complex shape survey field. Further, survey records are also sub-divided and represented in the field measurement sketch unlike in the case of Bombay survey system where sub-divisions are represented on a separate sheet from the main tippan (a sheet describing the boundary of the survey field).

2.2.3 Mapping

Village maps are prepared by using the individual survey field data. Such maps tend to be slightly inaccurate due to error in individual fields being accumulated across the village. Errors generally crept in due to measurement resolution being rounded off and also due to terraneous nature of the ground. Field sketches assume the ground to be flat, however, the same data when mosaiced across villages' results in sizeable.

The boundary of the village is traverse surveyed and is used to control the accumulated error in the village map. In traverse survey, the entire village is divided into more than one block called Khandam and known boundary points

(called traverse stations) in each Khandam are surveyed. The method involved starting from first station and recording the distance and the angle to the next station and so on till the circuit is closed. This circuit represented an accurate Khandam boundary, whereby plots belonging to that Khandam are manually adjusted in the past to fit into the Khandam boundary.

In Southern States, changes were made to plot boundaries only in making the village maps while traverse fitting were not reflected back on the original Field Data, i.e., only the original record of field measurement table or sketch are still legally acceptable.

However, in many Northern states, the individual field records were either lost or abandoned after preparation of accurate village map and this map became a basis for obtaining individual survey boundaries. [2]

2.3 Historical emergence of Land Policy

- Mughal system of land administration
- Adilshahi ,Nizam and Maratha system of deccan
- British system

Emergence of land policy through Plan periods

- *First Plan (1951-1956)* :Community Development. Area Under Cultivation Increase Land reforms.
- *Second Plan (1956-1961)* :Soil Conservation. Land Reforms.
- *Third Plan (1961-1966)* :Food Security Concerns. Area Development Programmes.
- *Fourth Plan (1969-1974)* :Second Phase of Land Reforms. Food Security Concerns.
- *Fifth Plan (1974-1979)* :Problems of Land Degradation, DPAP, DDP Area Programmes.
- *Sixth Plan (1980-1985)* :Land and Water Management under DPAP,
- *Seventh Plan (1985-1990)* :Watershed Development, Soil and Water Conservation, Waste Land Development
- *Eighth Plan (1992-1997)* :Emphasis on Watershed Development, Agro-climatic Region.
- *Ninth Plan (1992-1997)* :Need for Long term policy document, Land Policy and Sustainability, Land Records ,Rethinking Land Legislations, Decentralised land.
- *Tenth Plan (2002-2007)* :Bringing uncultivated land under cultivation and Economic Use, Increase in Cropping Intensity, Integrated Watershed Development, Emphasis on Forestry,Ownership and Institutional framework.

2.4 Five Phases of land Policy in India

- Land Reforms, Abolition of Intermediaries, Tenancy Reforms and land Re- distribution
- Bringing the Uncultivated Land under Cultivation. Area Expansion
- Soil Conservation, Land Records.
- Area Development Programmes
- Treatment of Waste Lands and Degraded Lands, Land Records

2.5 Operations of Land Records Department

- Preparation of field maps depicting boundaries & measurements and compilation of village maps from these data.
- Settlement and compilation of revenue assessment on lands based on classification etc.
- Maintenance of Data pertaining to land classification, ownership, revenue assessment, collections
- Creation of identifiable field boundary framework on ground by erecting designated marks on land junctions.
- Updation of land maps and land registers incorporating changes in boundaries, titles etc.

Chapter 3

CASE OF DDA

Delhi, being a state is divided in nine districts, five circles and four hundred fifty two revenue estates keeping its administrative operation smooth. The informations about the land parcels/ plots are being maintained by the Divisional Commissioners, which comprises of Jamabandi Register , Sazra Maps and Field Books.

The authority functions through various departments such as Land Management, Planning, Engineering, and Legal etc. The activities pertaining to Management of Land and its proper utilisation are categorised as -

- Maintenance of Land Records
- Acquisition of Land and its utilisation
- Compensation and enhanced compensation

3.1 Maintenance of Land Records

The state Delhi is comprising of about 452 villages. Out of which 23 nos. of villages were assigned to DDA at the time of creation of the authority. The record of rights and revenue/ tax collection are being maintained by DDA. These villages are categorised into two broad division viz. Sakni and Jarai. Sakni refers to residential village and Jarai refers to the agricultural village.

For each Sakni following information are listed.

1. Khewat No
2. Khatouni No/ Account No
3. Location / Block Name
4. Owner's Details (Name, Father's Name, Address)
5. Lessee's Details (Name, Father's Name, Address)

6. Tenant's Details (Name, Father's Name, Address)
7. Khasra / Field No
8. Area (in Sq. Yard) with category of land
9. Rent Amount
10. Lease Amount
11. Remarks (Lease renewal date, Mortgage if any, Mutation no etc.)

Similarly for each Jarai, following information are listed.

1. Khewat No
2. Khatouni No/ Account No
3. Numberdar
4. Location / Block Name
5. Owner's Details (Name, Father's Name, Address)
6. Lessee's / Farmer's Details (Name, Father's Name, Address)
7. Irrigation Type
8. Khasra / Field No
9. Area (in Bigha- Biswa) with category of land
10. Tax paid by farmer / Lease Amount
11. Mode of Tax Calculation
12. Revenue
13. Remarks (Mortgage if any, Mutation no etc.)

The dynamic relationship between human and land i.e. the changes in ownership of land parcel are being maintained in another register known as Mutation Register. Each village is represented by one mutation register, however for ease in handling these registers are made part wise. The mutation number for each village is maintained as unique number, that represents the sequence no. The Sakni and Jarai registers are being prepared with updated information in every four year.

3.2 Acquisition of Land and its utilisation

The process of development starts from the plan and is prepared by the planning department. A Master Plan is prepared showing the proposed land use patterns. Further to this zonal plans and layout plans are prepared on the basis of existing land use and as per provision of master plan. DDA collects the information about ownership, existing land use, and revenue/ tax collection etc. along with the village maps from the main custodian of data i.e. Govt. of National Capital Territory of Delhi (GNCTD) for the villages falling under the development plan.

These information are copied from the original and are maintained in respect of Aks Sazra and Land registers. Size of the paper for this type of activities forms one of the major constraints. In practice the number of textual information, written in a register exceeds the paper register size & thus the information is written in separate page with link of page number.

Similar is the case of the village map. All the villages are not of same size. In case of smaller ones, it becomes possible to prepare the aks sazra on a single sheet. For larger villages the total village map is prepared in multiple sheets with an index of Sheet No / Total No of Sheet. This results a problem of visualizing the total village at one time.

These sheets of village maps are prepared after a detailed survey made by the revenue officials. These maps prepared after regular survey are known as *Musabi.* During consolidation, the fields are measured and definite shapes are created so as to make the shape of the fields uniform such as rectangles. At the time of requirement, it is retraced and used for all purposes in the name of *Aks Shajra.* After consolidation in village, rectangle of 25 Acres is carved out and further divided into 25 smaller rectangles (kila) having area of I acre. For each rectangles, area is measured in Bighas – Biswas. For a village, both textual and graphical

information form two separate entities. While textual information is maintained in land record register, graphical information is maintained in musabi (map) /sazra sheet. This system of data storage has got the inherent problem of co-relation between the two, and thus makes it a time consuming process.

After preparation of the base plans, these plans are being retraced on the top of these Sazras. Usually the Sazras are of the scale of 1: 4000 and the prepared planning maps are of different scale. To bring them together, the revenue officials use triangular traversing method, which itself is a time consuming process.

Superimposition of the two maps facilitates establishing the Khasra numbers falling inside the plan and its area to be acquired. The list of these Khasra numbers along with its required area is prepared and sent to GNCTD for acquisition. After verification and approval by its standing committee, the Land and Building (L&B) Department of GNCTD issues notification. This notification empowers the revenue officials of DDA to verify the land at site for existing land use, built-up structure etc. The notification which is valid for a period of two years, if the acquisition did not take place within the stipulated time. The site verification takes place in a joint survey with Land Acquisition Collector (LAC) and L&B Department. This initiates a decision for acquisition with notification, and L&B department issues notice to the landowners. Subsequent to this L&B Department issues other Notifications and award the land to DDA there after. The award also specifies the amount to be paid in respect of the awarded land. DDA takes up the possession of the land and notification is issued for further development. A detailed layout plan is prepared and the land is transferred to user departments and / or organisation for further development.

In brief, the steps followed for land acquisition is spelled out as below

- Proposals from Planning wing
- Collecting required information/maps from Divisional Commissioner Office, Govt. of National Capital Territory of Delhi
- Superimposition of plans on to the maps
- Identifying the fields with required area
- Requesting for acquisition to Land and Building Department (L&B Dept.)
- Payment of compensation and enhanced compensation
- Transfer of acquired land to the user departments/organizations.

The Land Management Department of DDA keeps the following information of the fields/land being acquired:

1. Khasra Number
2. Area
3. Notification No U/S 4 with Date of Notification
4. Notification No U/S 6 with Date of Notification
5. Notification No U/S 17 with Date of Notification
6. Award No with Date of Award
7. Date of Possession
8. Notification No U/S 22 with Date of Notification
9. Land use
10. Transferred Dept. or Organization with Date of transfer
11. Category of use
12. Remarks

3.3 Compensation and enhanced compensation

During the process of acquisition and notification the Land Acquisition Collector notifies the existing Govt. approved rate per bigha of land. He also calculates the compensation amount to be paid for land acquired to the owner. Subsequent to this the owner also has the right to demand more compensation citing the reasons there off. After consideration of all such factors viz. locality, existing land use etc., LAC finalise the compensation amount and sends the Demand list to DDA for payment at the time award, which is considered to be the Compensation amount. This may not /may match to the demanded amount by the land owner.

The owner(s) submit a written application to the LAC requesting for enhancement of compensation amount and referring the case to the Court of Additional District Judge (ADJ). Thus Under Section 18 a case is registered with a Land Acquisition Case No. While making a reference to the Court, the Collector gives information about the persons requesting amount, the amount awarded, the grounds for the determination of compensation, the extent of land etc.

If the judgement of ADJ goes against the award of the Land Acquisition Collector, the same is examined by the L&B Department. The enhanced compensation ordered by the Court is calculated by the Collector and a demand is placed to DDA through L&B Department for release of funds in two separate Demand list i.e payable and appealable. Payable amount is the amount that L&B Department agrees to pay to the owner and rest amount is considered as an appealable amount. The matter is examined once again by the revenue staffs of DDA and agreeable amount is released to L&B Department subsequently the amount is paid to the owner. In suitable cases an appeal is filed on the appealable amount in the High Court and subsequently in the Supreme Court where need be.

Similar steps followed on the decision of High Court and Supreme Court but the decision of Supreme Court is accepted as final.

During the subject study it has been noticed that considerable delay is incurred in forwarding petitioners' requests to the court for enhanced payment, in cases where they are aggrieved by the award of the Collector. Similarly, in release of funds, sufficient delay is also incurred. This results payment of heavy interest on the said amount and a loss to the Govt.

Being a case study considered for the purpose of dissertation, the deliberated information's in this thesis are indicative in nature only.

Chapter 4
DESIGN AND IMPLEMENTATION

Absence of a current and accurate land information map has been posing a major hindrance in day-to-day functioning of DDA. Available cadastral maps are old and mostly do not contain any physically existing permanent point of location. Neither these maps contain any administrative boundary, which are physically locatable today.

Therefore a need for spatial planning with information integration has become necessity in every level of planning. In this regard, off late the requirement of a faster decision making has been realised and technologies are available in comparatively easier terms and planners of new generation are also willing to make a new beginning.

However this requires a sincere involvement from the decision-makers to implement technology so that a transparent and information based management system to be evolved. Demand for lands for any development has always been the primary requirement and to establish a utility oriented information system about such landforms to be an important criterion in our policy.

4.1 Problems in manual systems

4.1.1 Preservation

- Land records maintained on paper/ cloth are in a very bad shape as they could be anywhere from 10 years to 150 years old.
- Duplication on similar media is cumbersome and results in similar problems of maintenance after few years.

4.1.2 Updation

- Highly time-consuming.
- Error gets propagated to the village maps.

- Cross verification is required over records for a large period of time to ensure absence of inconsistencies after updation.

4.1.3 Retrieval

- Retrieval for redressal of any dispute is time consuming due to the large bulk of information.
- Every retrieval/use has an associated risk of further physical damage the old records. [2]

4.2 LMIS Application

The functionalities of Delhi Development Authority are analyzed and based on the categorization of activity the Land Management Information System is divided into three modules. The modules are as follows:

- Automation of Land Records
- Acquisition of Land and Utilisation
- Compensation and enhanced compensation

The flow of information in Delhi Development Authority through various departments is shown by Context Flow Diagram in Fig4.1.

4.2.1 Land Records

Automation of Land Record (LR) module of LMIS is aimed at serving primary function of DDA i.e. Land Management and will act as a multifunctional tool for supporting strategic planning.

This system is designed as a combination of human and technical resources, with a set of organizing procedures that produces information in support of managerial requirements. Data pertaining to land is captured and put digital format. In order to get required information, this data is processed, making the decision-maker to understand it easily and retrieve faster.

Land record Register gives support to Land Management Deptt. by providing information about the land, resources available and the improvements made to it. The focus is on determining organizational objectives and on the resources employed to achieve them. Features are designed for operational control so that specific tasks can be carried out effectively and efficiently. Each requirement dictates a special set of information and hence a special type of information system. Important issue of this system relates to piece of land with village name and field Number as a basic identity.

Land Record Registers are to be prepared on advance computer-based technology where information are organized, analyzed and presented with reference to location so as to maximize its potential benefits. This developed software has capabilities for data collection and processing, together with expanding requirements of users. This raises a direct attention to the need of improved land management strategies. These strategies could be, improvements in the coverage, content, compatibility and reliability of information with the possibility of integrating it with other data. The ultimate goal is to meet the needs of users more efficiently, effectively and equitably.

The Village Maps/*Sazras* or Musabi are assumed to be the principal source of information about village as provided by DDA. The basic unit of the Village is the Khasra, which is otherwise known as a field. Although fields may be subdivided into smaller units or amalgamated with adjoining fields into larger ones, the land, which they cover remains unchanged. Unit of area is in Bigha and Biswa and can be converted into hectare if necessary, Detail records of land within a Village sazra map with other corresponding information is required. The inadequacy of land information poses serious constraints. Land records is kept in most suitable form to implement various activities run by department. The unit of area required by various departments varies.

This software integrates the spatial and attributes, and offers a powerful tool for information dissemination and analysis to the user. The user have access to the attributes at its fingertips. After analysis, user can also prepare a thematically represented map.

Land record automation (LR) module is designed and being implemented with the objective of automating the manual operations. The data used in these manual operations resides in a centralized location. This data, as of now consist of records registers, which were not comprehensive, needs updation and are unavailable when required. The data, i.e fragmented and scattered across a number of documents and records, is brought together, correlated, corrected and compiled with respect to a land base. The spatial and non-spatial records are being manually maintained in different formats by the different departments located at different places.

This information is required in a wide variety of activities. The designed LMIS will extend the use of applications over the manual system and will open a new era in land management.

Salient benefits of the this module are as follows:

- Information is made available at glance for efficient handling of land title documents to the advantage of landowners also.
- This will enable better support for mortgaging and investment resulting therein better value of the property.
- Steady increase in the number of private and public users in routine enquiries about land ownership.
- Enhanced awareness about the quality of the environment;
- Greater attention to physical planning and land development programmes etc. resulting therein growth in number of users as well as variety of uses of cadastral information.

- Facilitated problem solving pertaining to land planning and management problems, which may arise in certain area for protection of agricultural land around the edges of cities.

4.2.2 Acquisition of Land and Utilisation

This module of LMIS is designed to automate the time consuming and cumbersome process like acquisition of land and proper utilization through various Govt. & Non-Govt. organization.The said automation is based upon following:

- Automation of Land Records
- Attachment of field attributes

The developed application selects the villages falling within the plan. The selected (completely / partially) village are superimposed further with the plan individually. The parcels/fields falling within the plan area and so also the parcels that are even partially covered by the proposed plan get selected.
The request report specifying the khasra number with its area and the required area can be prepared village wise along with the comprehensive one.

This proposal of acquisition request is the beginning of the acquisition process. This system also generates the report with the covering note. In due time L&B Department notify the notifications under section 4,6 & 17. These information can be captured as and when generated/ notified. Subsequently the award details, possession and notification under section 22(I) are captured by the system. The various checking of the data and relationship of master-details data has also been taken care off. This sequence of data feeding generates the full fledge Land Register report.

The award of the land and further notification under section 22(I) enables DDA for development of the land through various departments, organization. This designed module also keeps information about the transfer of land to the respective agencies.

4.2.3 Compensation and enhanced compensation

The compensation requested at the time of award by the Land Building Department, is fed in at the time of filling up the award details during the process of acquisition. The information of enhance compensation cases are also fed in to the database with the specified format as and when recorded and requested by the owner and demand list from L&B Department. The system analyses the stored information and facilitates the user to browse the information on fingertips, as required. Keeping the information in RDBMS, the system minimizes data duplicity, retrieving time, which is otherwise a time consuming process in manual system. Further to this the system integrates the information with the Land Records information and gives comprehensive land records information along with its compensation and enhanced compensation if any. The system helps to keep track of backlog for a particular case in order to avoid delay in payment or duplicity. The information of the existing rate and enhanced rate are fed in to the database for further analysis so as to calculate or conclude on the price of land.

This designed module is further capable of tracking the judgment of courts, and Pending cases. This avoids the delay in payment to owner and so also reduces the interest amount. A link is also provided to the existing Legal Automation software.

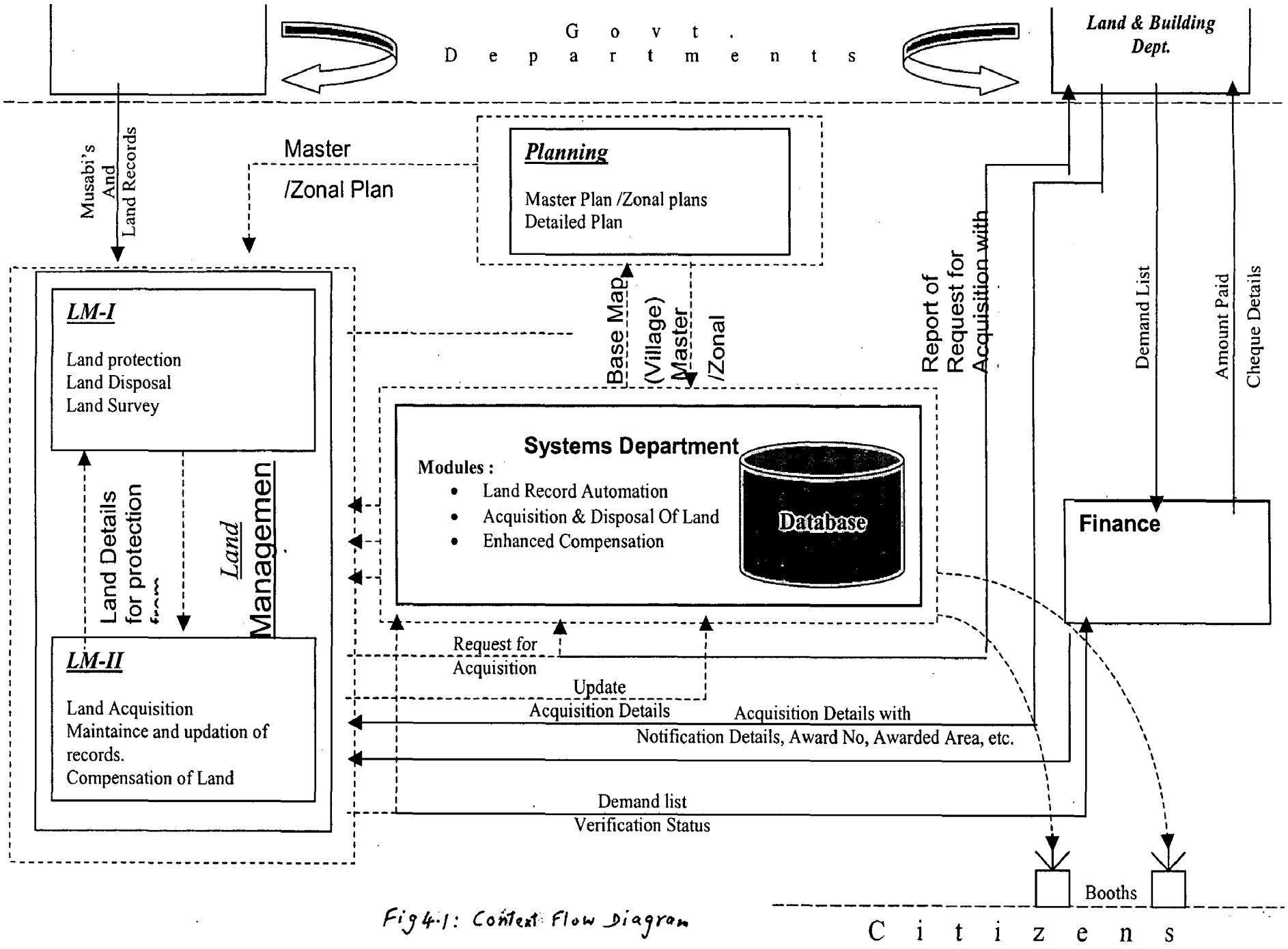

Fig 4.1: Context Flow Diagram

4.3 Architecture:

The system is to be designed keeping in mind the following function to be performed by the system :

- Storage of information in a manner so as to facilitates quick retrieval of information
- Provision of updation ,modification with ease
- Retrieval of selected information with ease
- System will be designed in a manner so that it could generate certain important in formation internally

System analysis will be done in order to understand the problem with the manual setup,followed by software development in order to replace the manual setup faults in more accurate and appropriate way.

The architecture of the system will be three-tier distributed database system. As application will be rich of spatial data i.e. Village maps, so it is proposed to put 0these drawing into database and data attached to thes entities will be maintained separately. S/w will reside on application server to coordinate various activities between the client nodes and the database server.

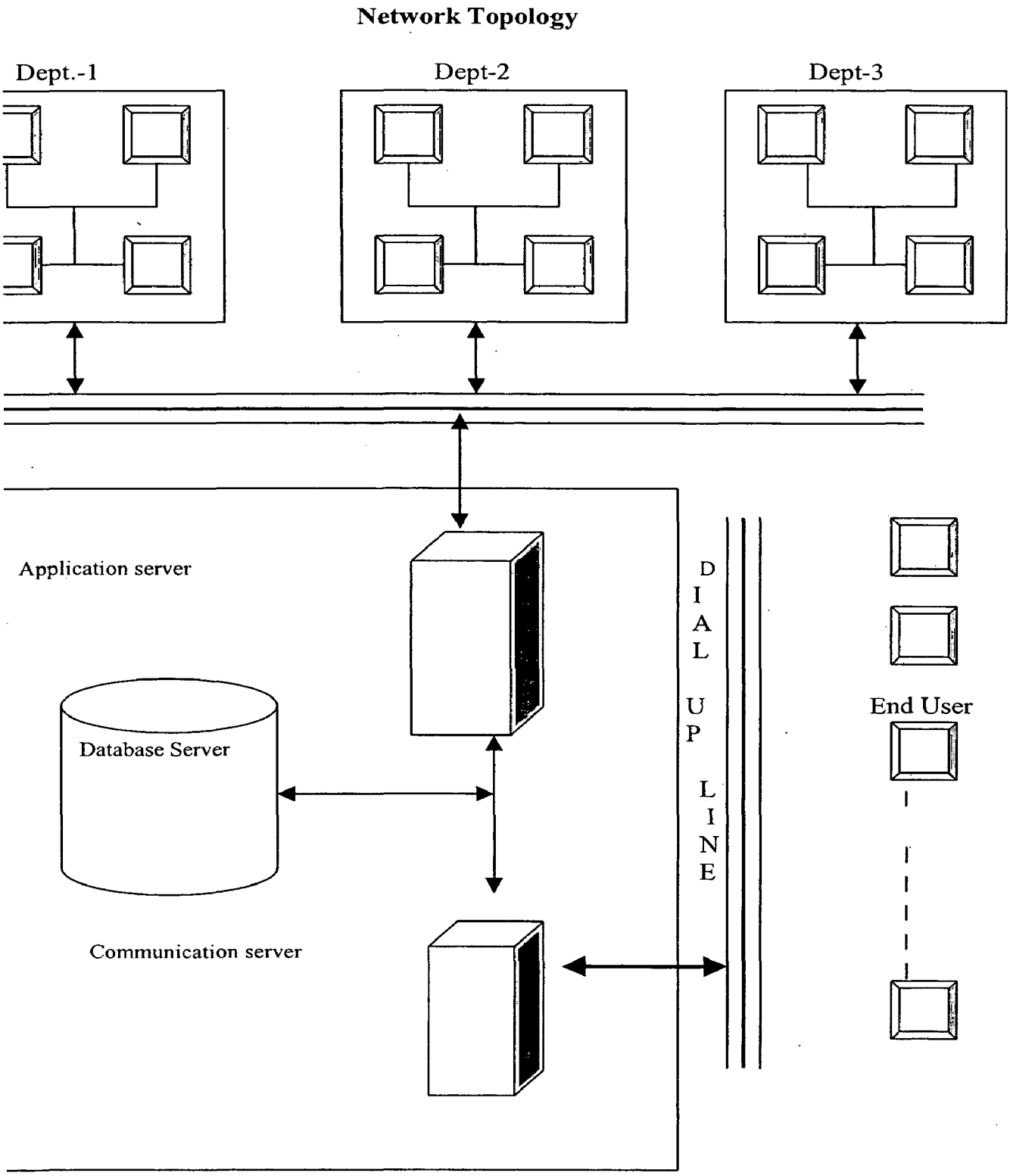

Fig 4.2 : Network Topology

Client server application is the user interface to an intelligent database engine i.e. the server. Well designed client applications do not hard code details of how or where data is physically stored ,fetched .and managed, nor do they perform low level data manipulation. Instead they communicate their data needs at a more abstract level ,the server perform the bulk of the processing and the result will be an intelligent answer.

4.4 Implementation Methodology

4.4.1 Steps followed for development:

- System study and Analysis of existing system
- Creation of attribute data set from existing register.
- Development of pilot schema for information browsing and analysis.
- Integration of pilot modules with user interaction.
- Testing and compilation of developed application software.

4.4.2 Database design.

Database will consist of following tables:

- VILLAGE_MST
- PARCEL_MST
- US4_MST
- US4_PLOT_DET
- US6_MST
- US6_PLOT_DET
- US17_MST
- US17_PLOT_DET
- US22_MST
- US22_PLOT_DET
- AWARD_MST
- AWARD_PLOT_DET
- POSSESSION_DET
- DISPOSAL_DET

4.4.3 Screen design

- Home Page
- Enquiry Page: This will give the details of the information available at the site.
- Village Details Page: Select the village name and click the submit button. All the details about the particular village will be displayed in the village detail page.
- Village Plot Detail Page: Select the village name and khasra no. And this will display the plot details on this page.
- Village US4 Detail Page: Select the village name and US4 no. All the details about the plot like Rec no., khasra no. ,Total area etc. will be displayed n this page.
- Village US6 Detail Page: Select the village name and US6 no. All the details about the plot like Rec no., khasra no. ,Total area etc will be displayed n this page.
- Village US17 Detail Page: Select the village name and US17 no. All the details about the plot like Rec no., khasra no. ,Total area etc will be displayed on this page.
- Village US22 Detail Page: Select the village name and US22 no. All the details about the plot like Rec no., khasra no. ,Total area etc will be displayed on this page.
- Award Detail : Select the village name and Award no. All the award details related to particular plot like Rec no., khasra no., Award Area, Award date, Award amt etc. will be displayed on this page.
- Possession Detail : Select the village name and this will display the possession details like Poss Date, Poss Area .etc.
- Disposal Details : Select the village name and this will display the disposal details like Disp Area, Disp Date, Rec no. , khasra no. etc.

4.5 Technologies Used

The subject, LMIS has been developed on the concept of a three-tier distributed database system architecture with provision of data security and web enabled. The database server is being used to store the attribute data as well as the spatial dataset. The front-end application resides on the application server. This provides better security by intermediating between the client node and the database server. This also helps in easier maintenance of the application software. The communication server is used to communicate with the external node accessing through Internet.

The System is a web enabled MIS application to handle data with the attribute information. Primarily this involves the following technologies.
Web technologies

4.5.1 Web technologies(Internet Information Server)

Internet Information Server:

Internet Information Server (IIS) is a web server that integrates into the windows NT Server. IIS allows to publish information on the web and to run multiple business applications using ASP.It might often be used synonymously with its scaled-down version, the personal web server.
Windows 2000/ NT Servers with Internet Information Services is the easiest way to share information and run powerful applications on the Web. IIS has many new features helping the web administrators in various aspects.
The features are as follows:

- Provides facility to create dynamic content by using server-side scripting and components to create browser-independent dynamic content.
- Provides faster transmission of pages between the Web server and compression-enabled clients.

Chapter 5

RESULT AND DISCUSSION

Detailed land information for land management which will help the policy makers, resource planners and administrators who make decisions about land.

The land management information system will maintain the detail information about the various aspects of the land i.e. who is the owner, how much land is available for development etc. This will help in the acquisition of the land for development as well as in the safety of the land under various categories such as possession taken under acquisition or falling under development plan.

5.1 Advantages of LMIS

The advantages of the "Land Management Information System" are as follows.

- Facilitating easy maintenance and updation of changes which occur in land database such as changes due to availability of irrigation/natural calamities/consolidation/ or on account of legal changes like transfer of ownership, partition, land acquisition, lease etc.
- Providing comprehensive scrutiny to make land records tamper-proof, which reduces the menace of litigation and social conflicts, associated with land disputes.
- Providing the required support for implementation of development programmes for which data about distribution of land holdings is vital.
- Facilitating detailed planning for infrastructural as well as environmental development.
- Facilitating preparation of an annual set of records in the mechanised process and thereby producing accurate documents for recording details such as collection of land revenue etc.
- Facilitating a variety of standard and ad-hoc queries on land data.
- Providing database for preparation of Master and Zonal Plans.
- Providing database transparency and accessibility of information by valid user irrespective of location through Internet.

5.2 Screen Shots of *Land Management Information system*

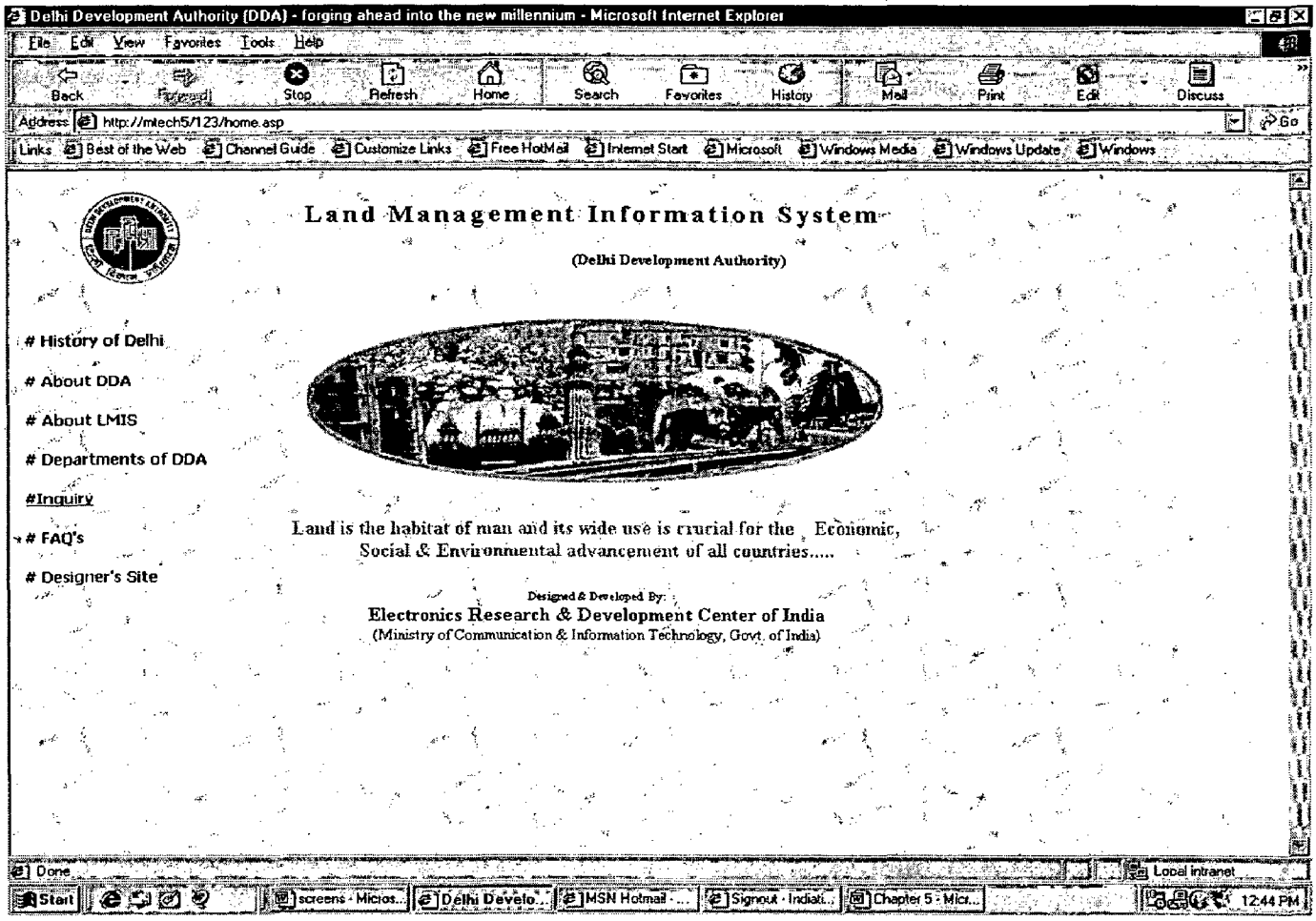

Fig 5.1: Home Page for Land Management Information system

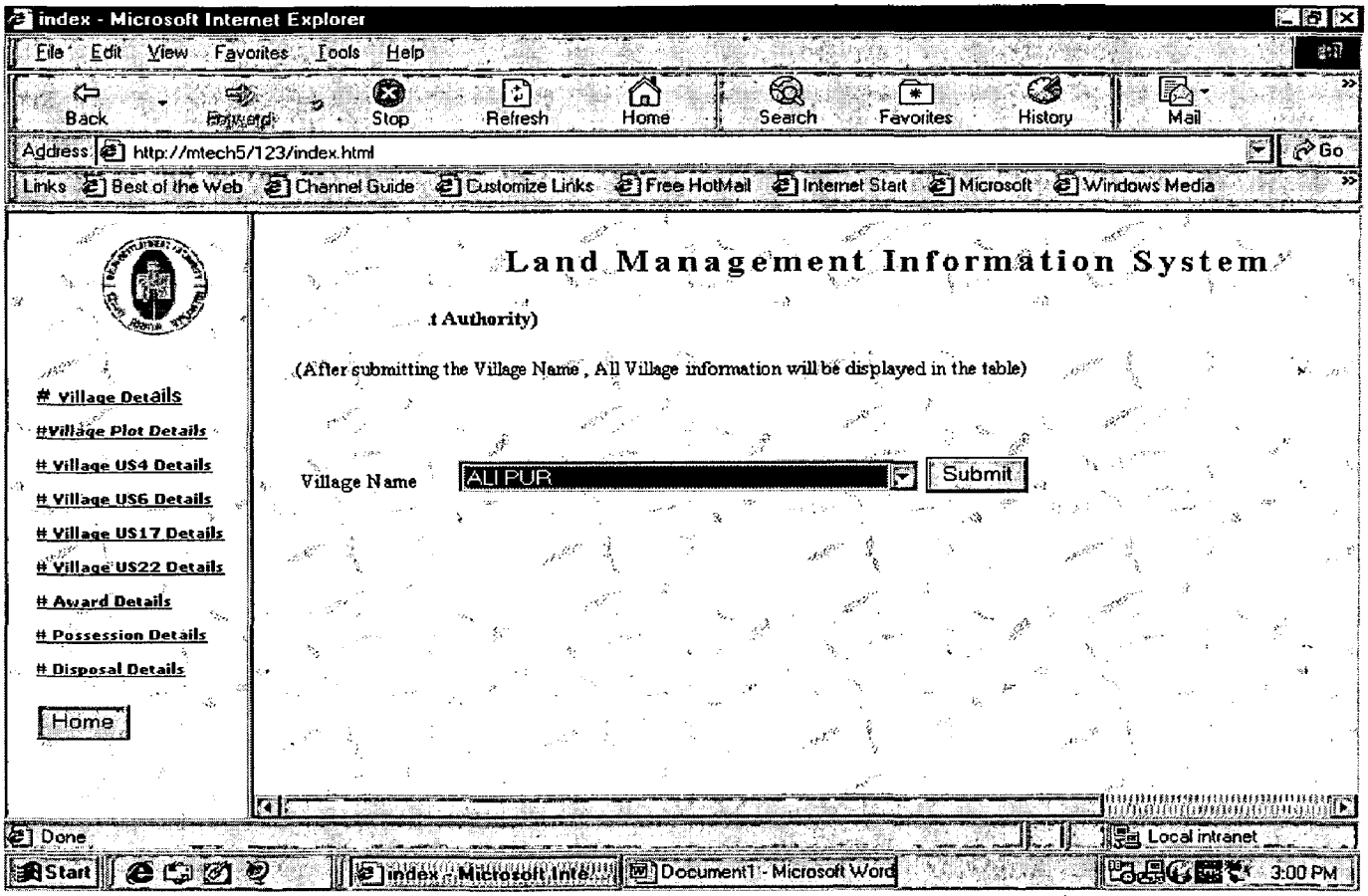

Figure5.2: Query on Village Detail

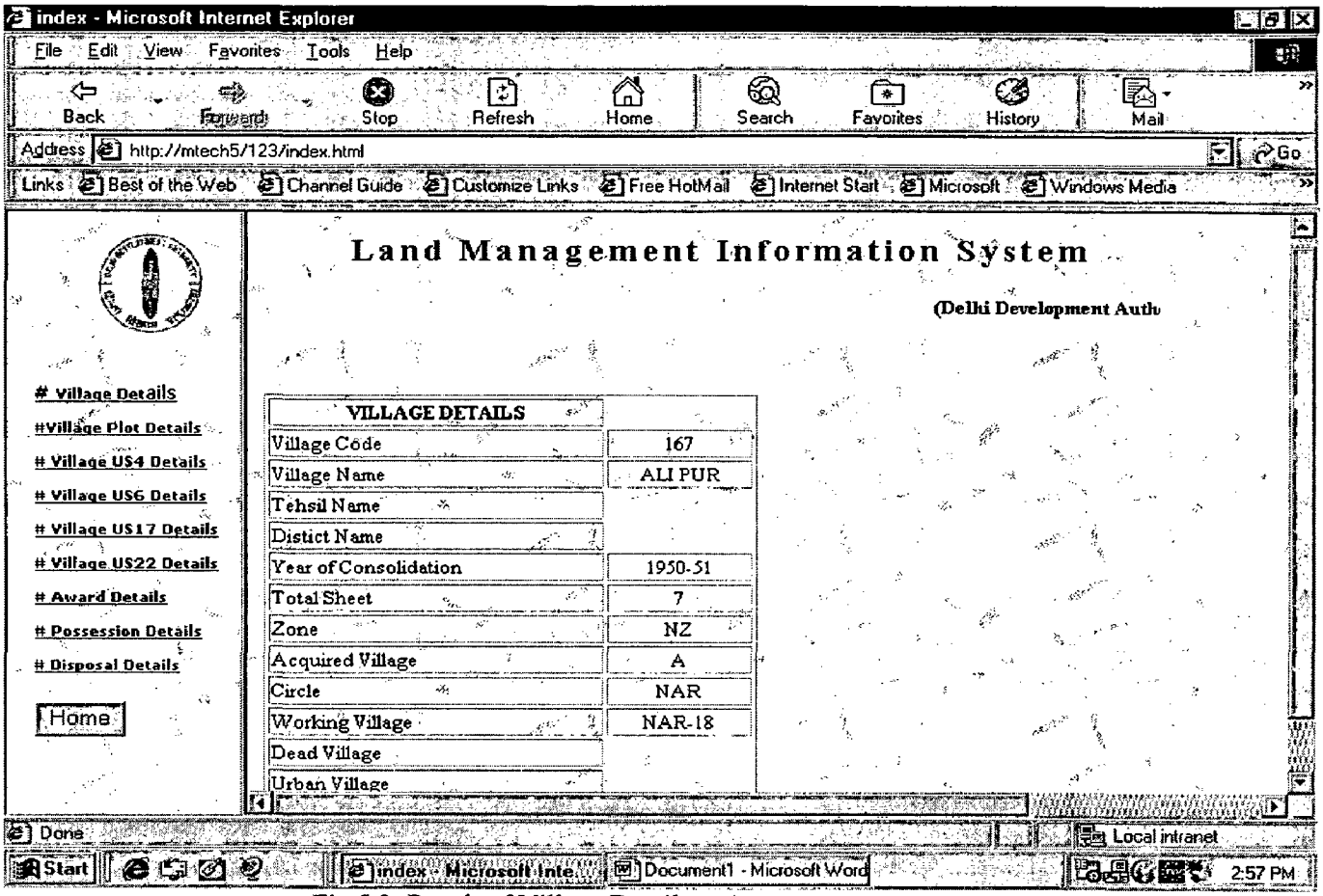

Fig 5.3: Result of Village Detail

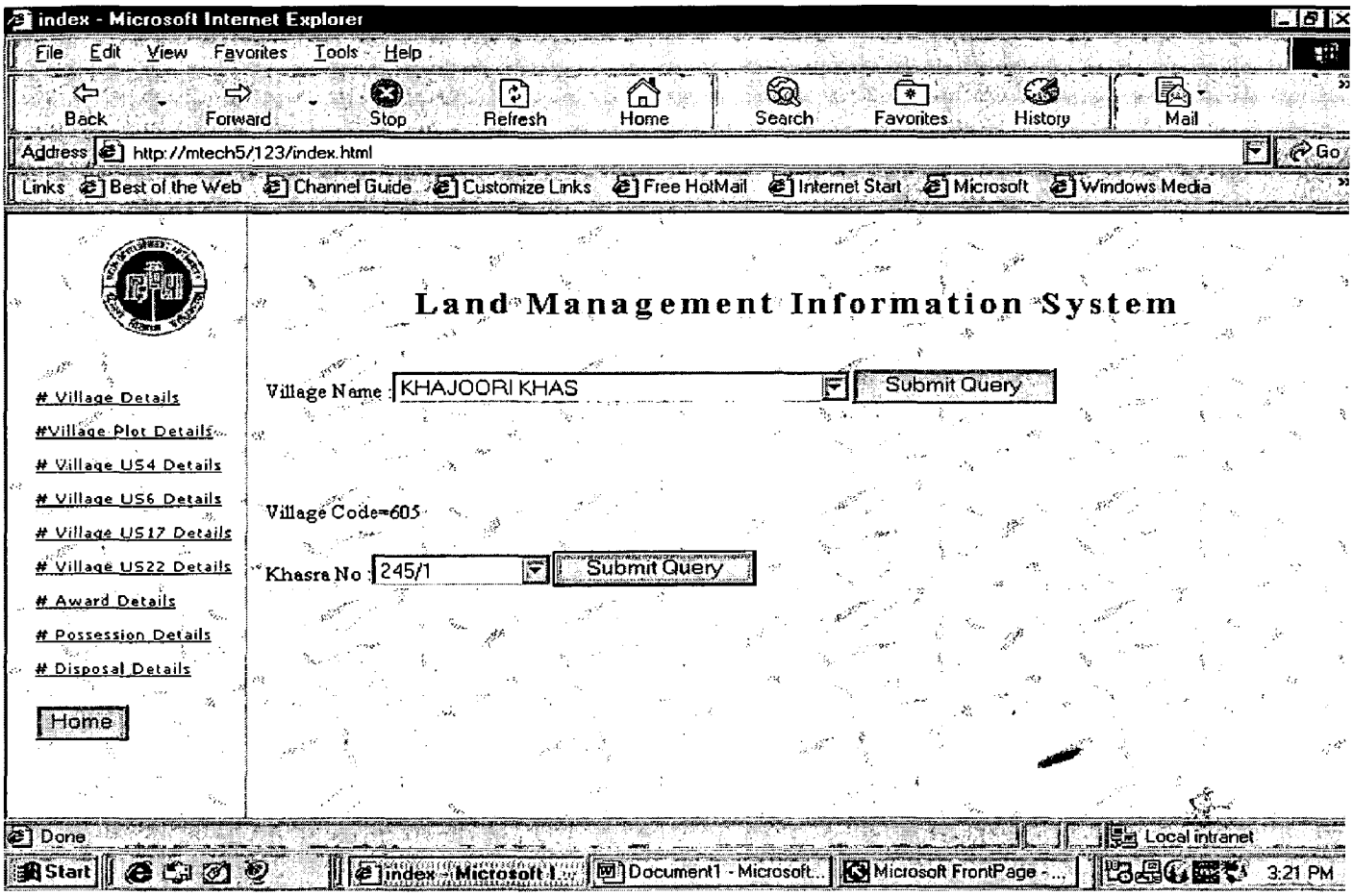

Fig 5.4:Query on Plot Detail

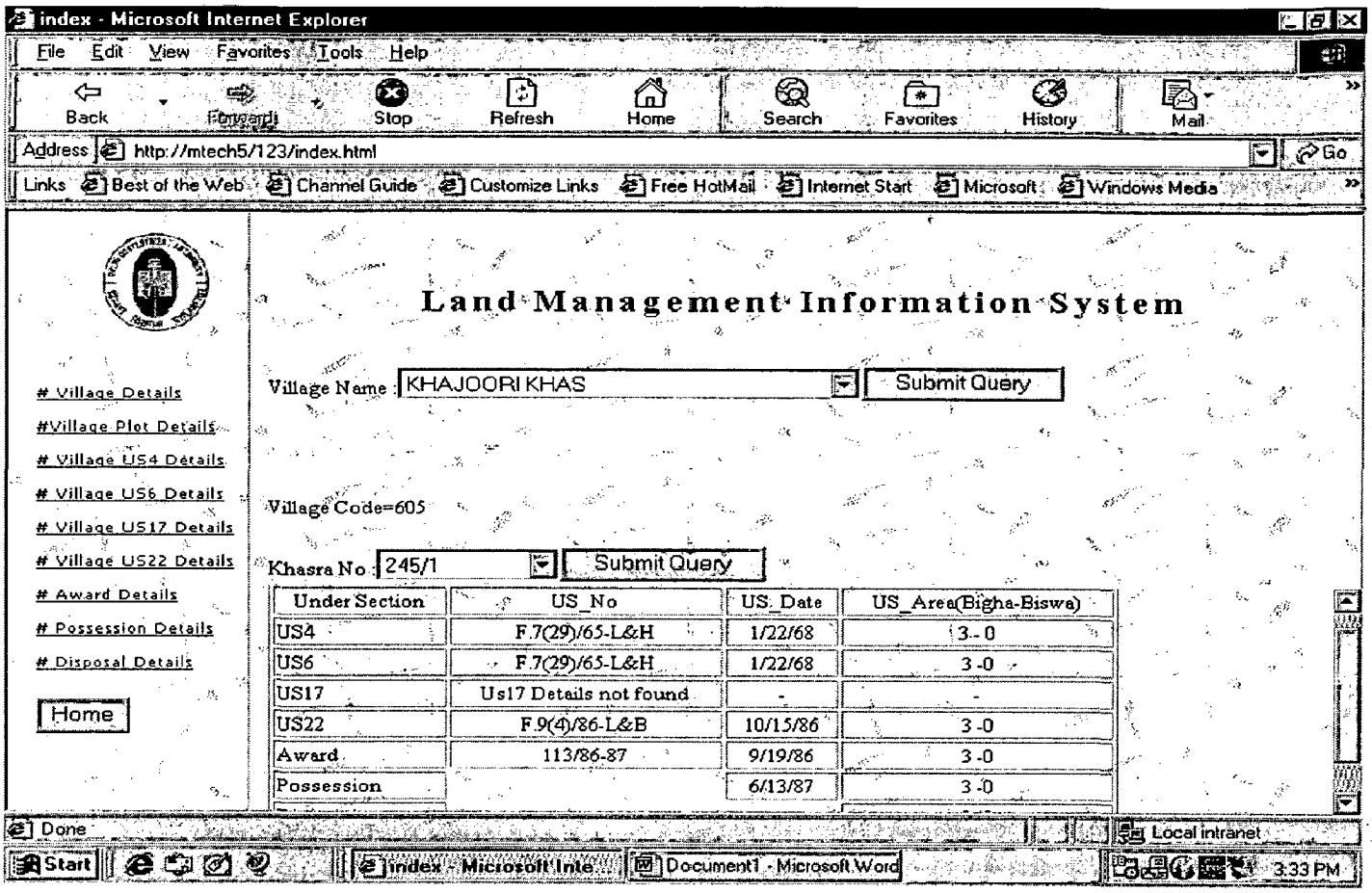

Fig 5.5: Result of Plot Detail

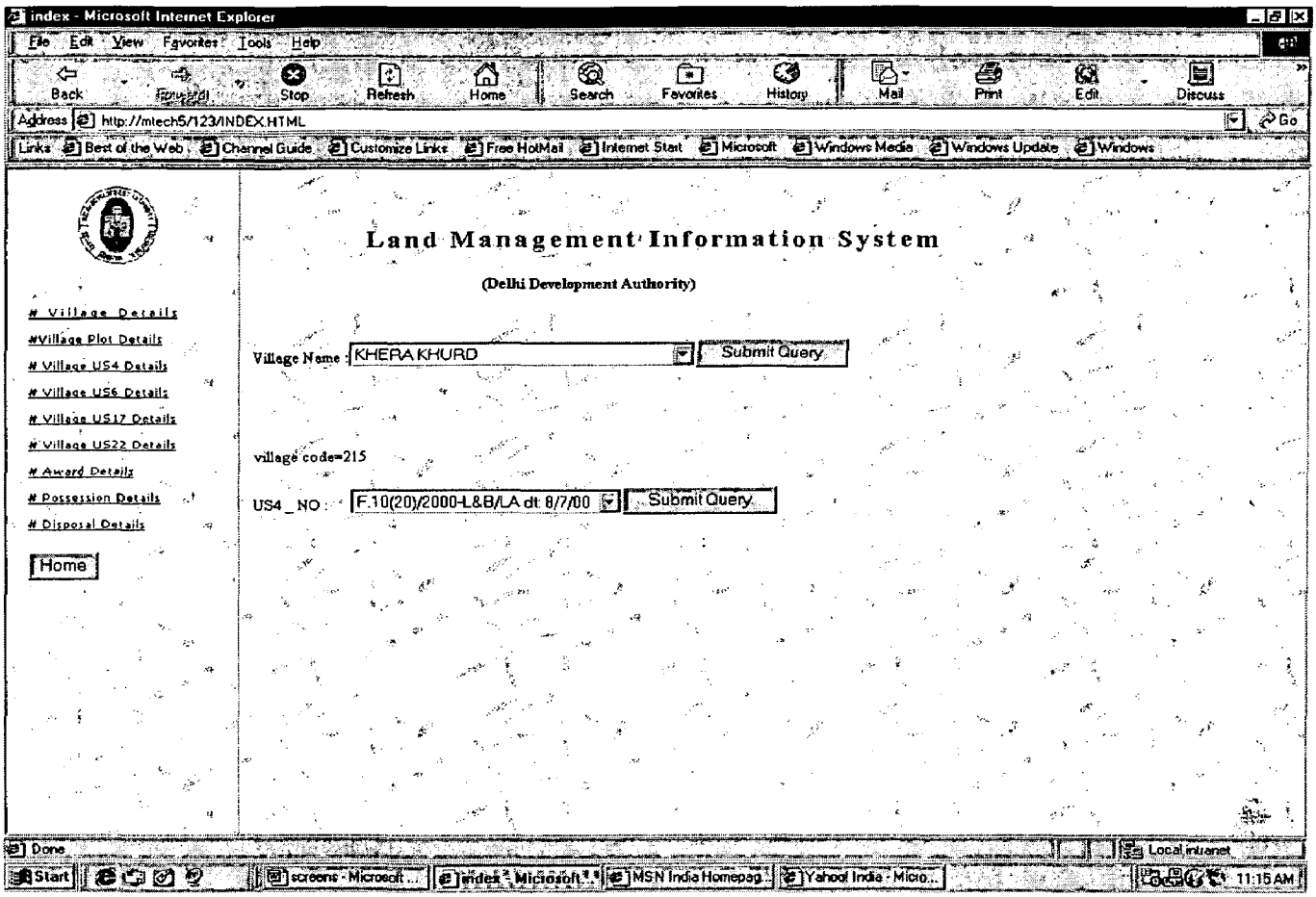

Fig 5.6: Query on Village US4 Detail

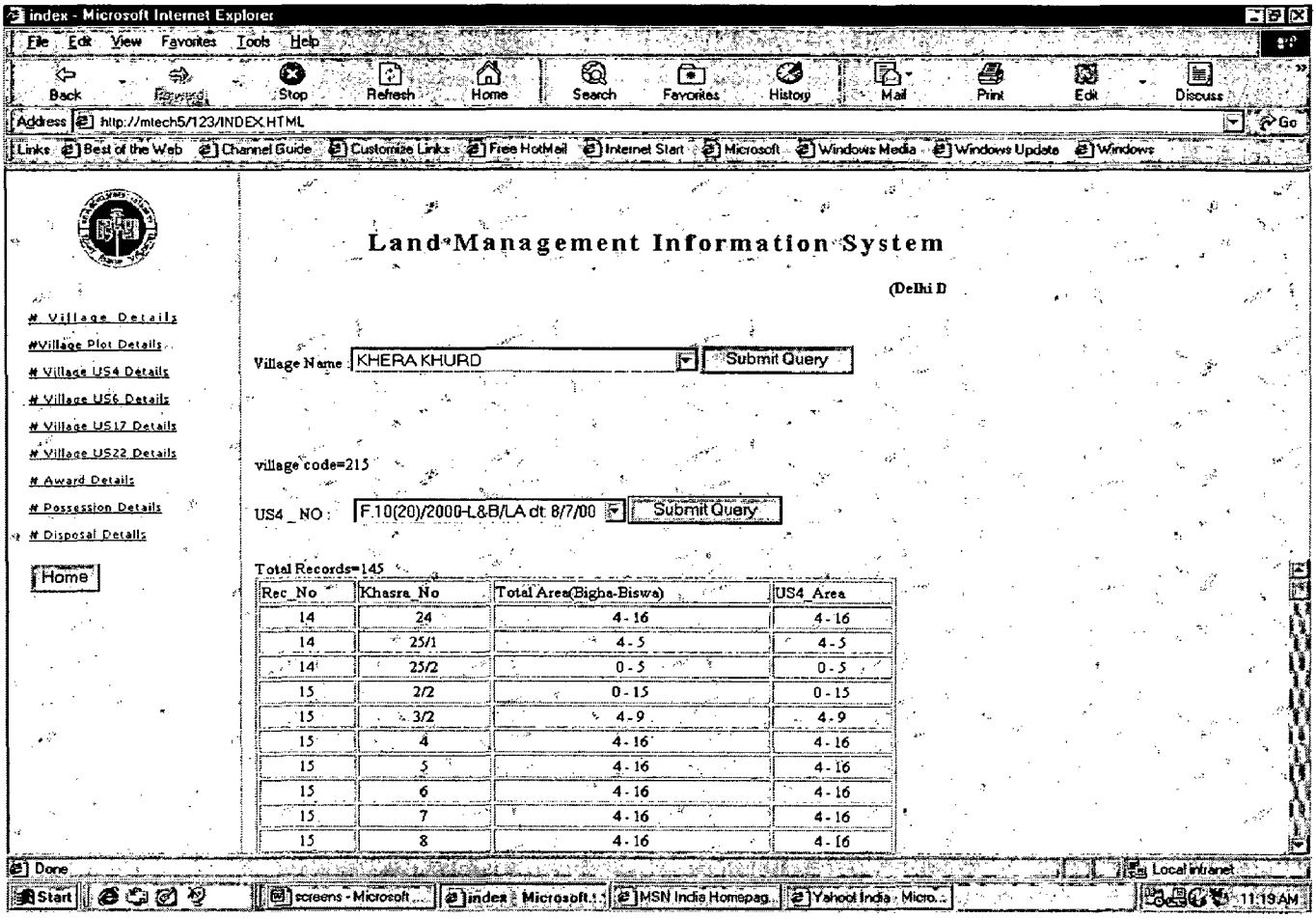

Fig 5.7: Result for Query on Village US4 Detail

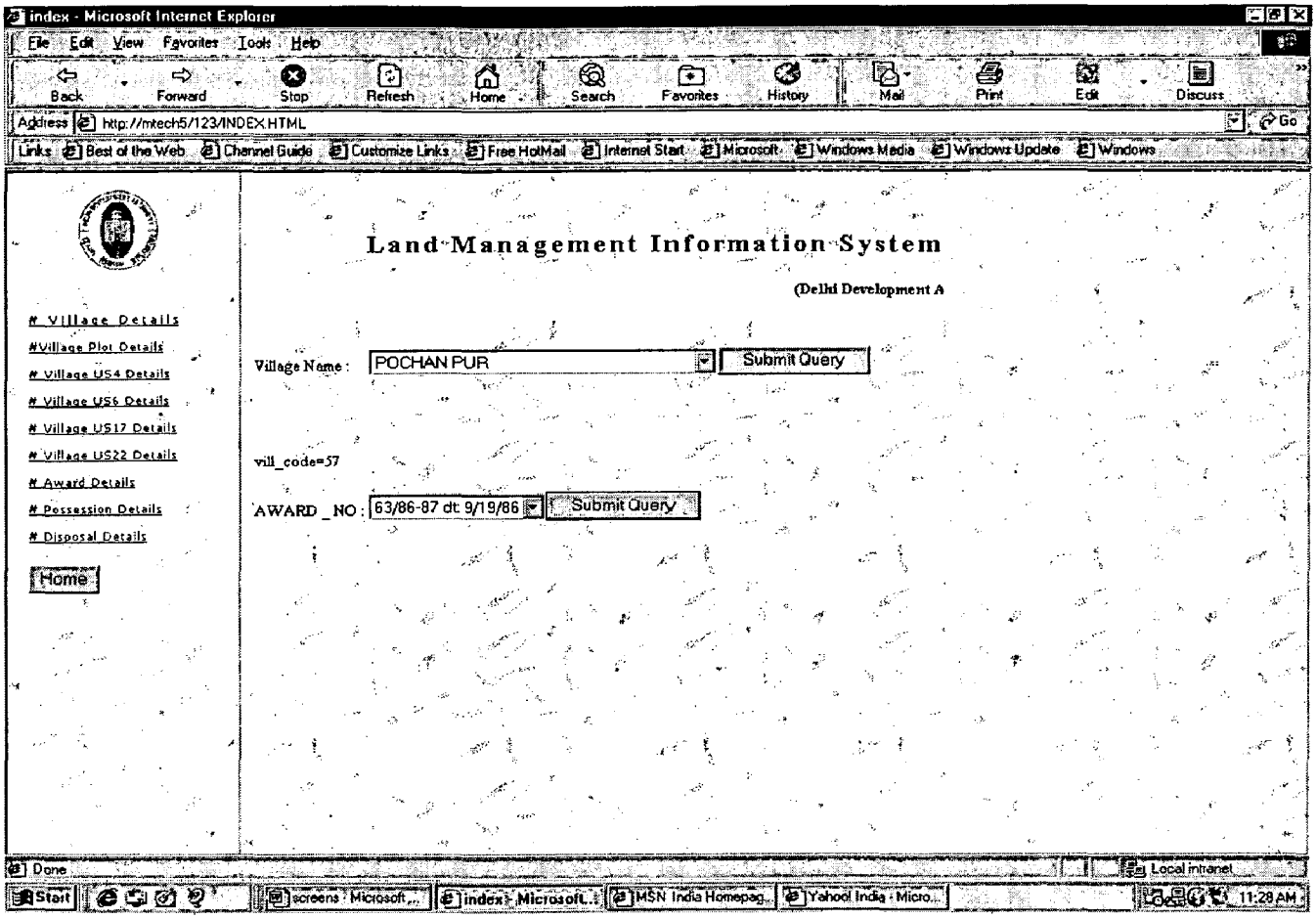

Fig 5.8: Query on Award Detail

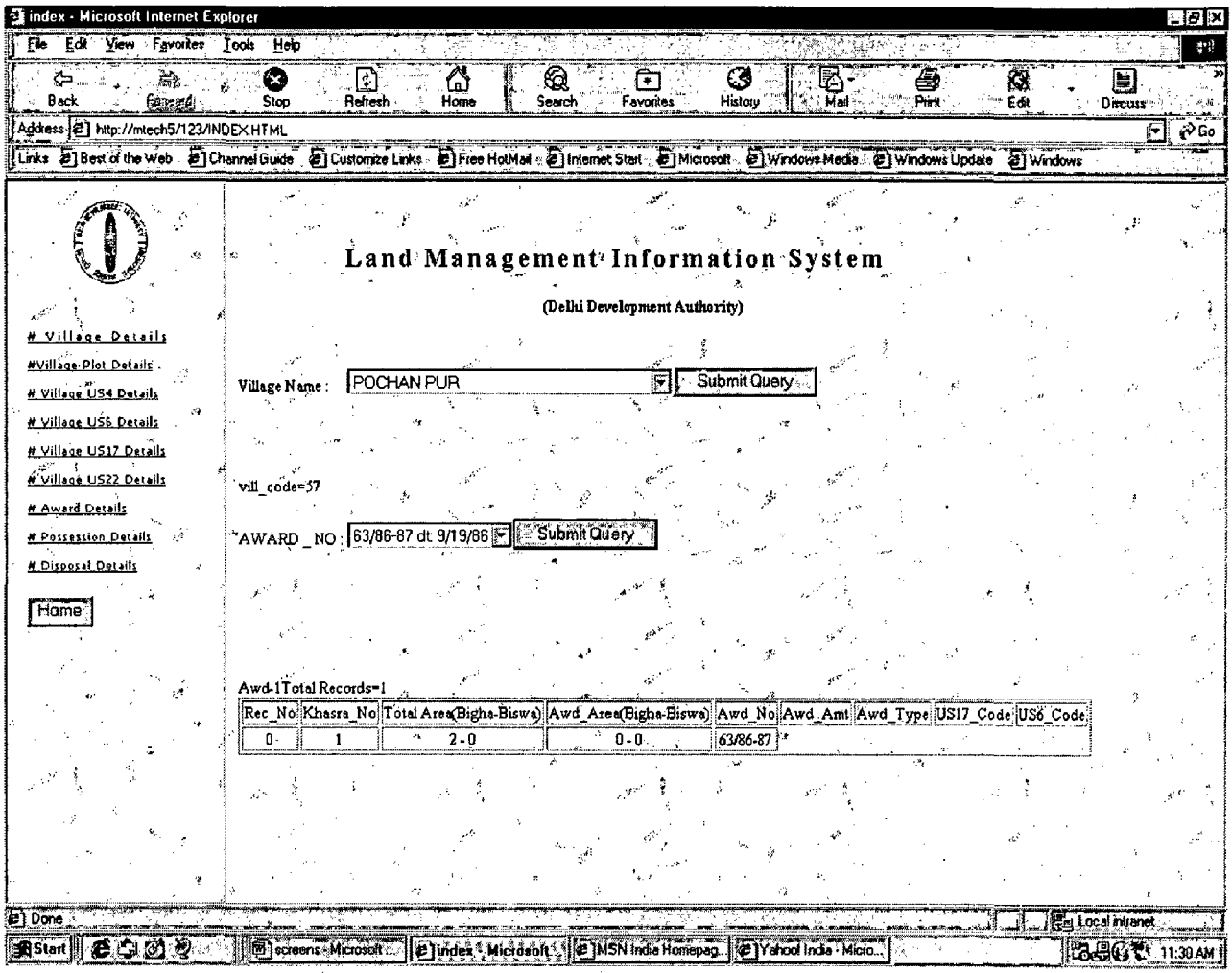

Fig 5.9: Result of Query on Award Detail

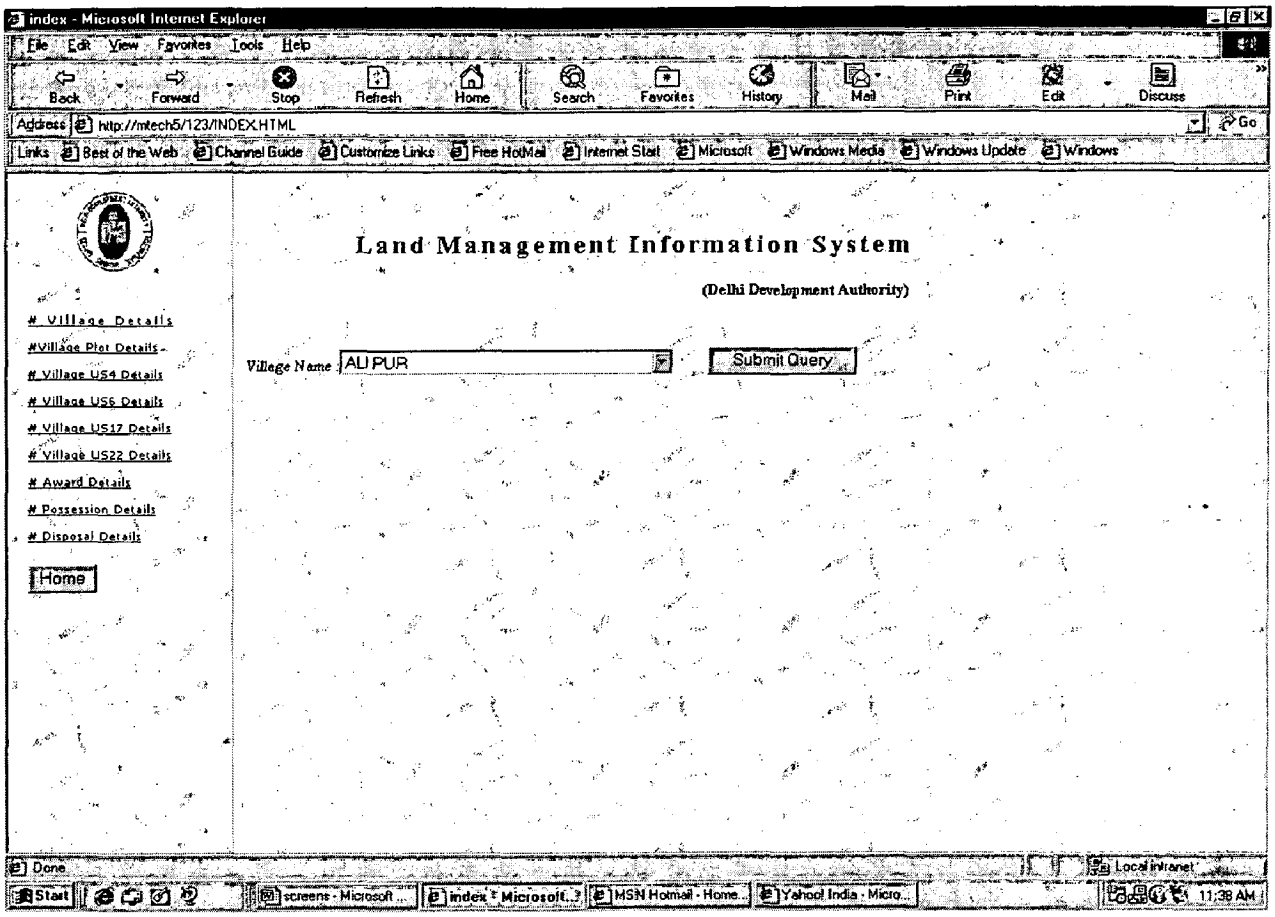

Fig 5.10: Query on Possession Detail

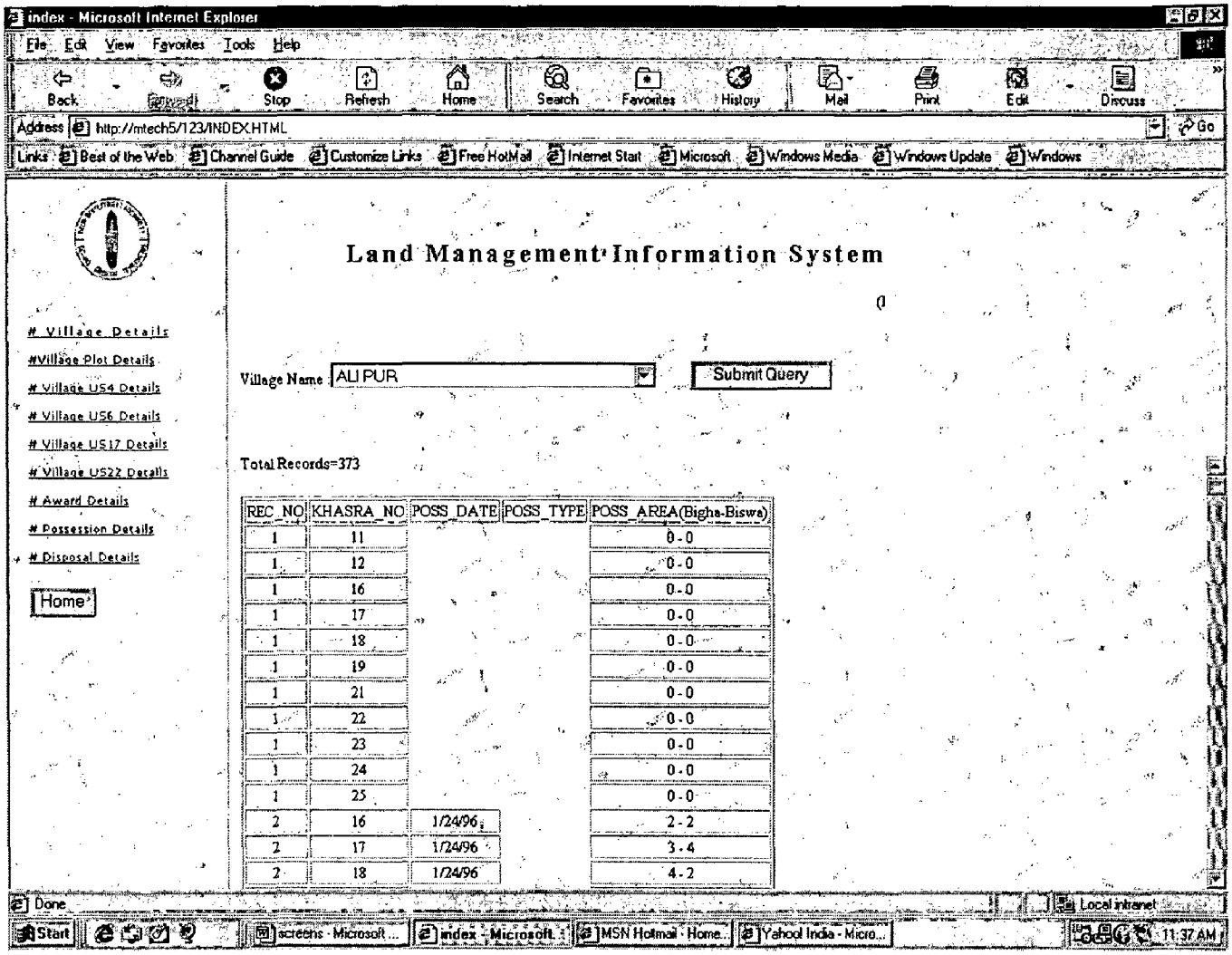

Fig 5.11: Result of Query on Possession Detail

CENTRAL LIBRARY
G 11303
Acc No.....
Date 20/5/03
I.I.T. ROORKEE

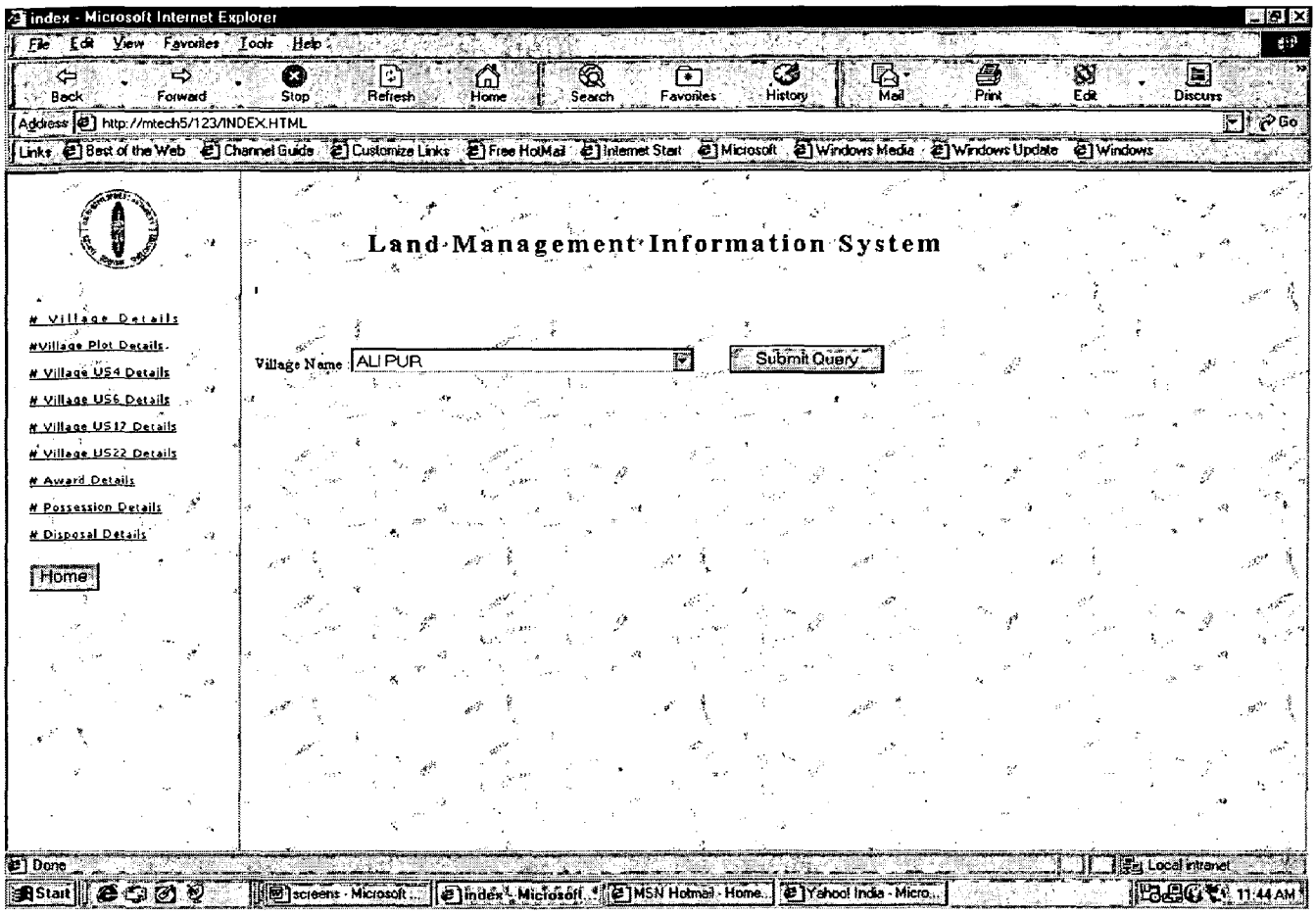

Fig 5.12: Query on Disposal Detail

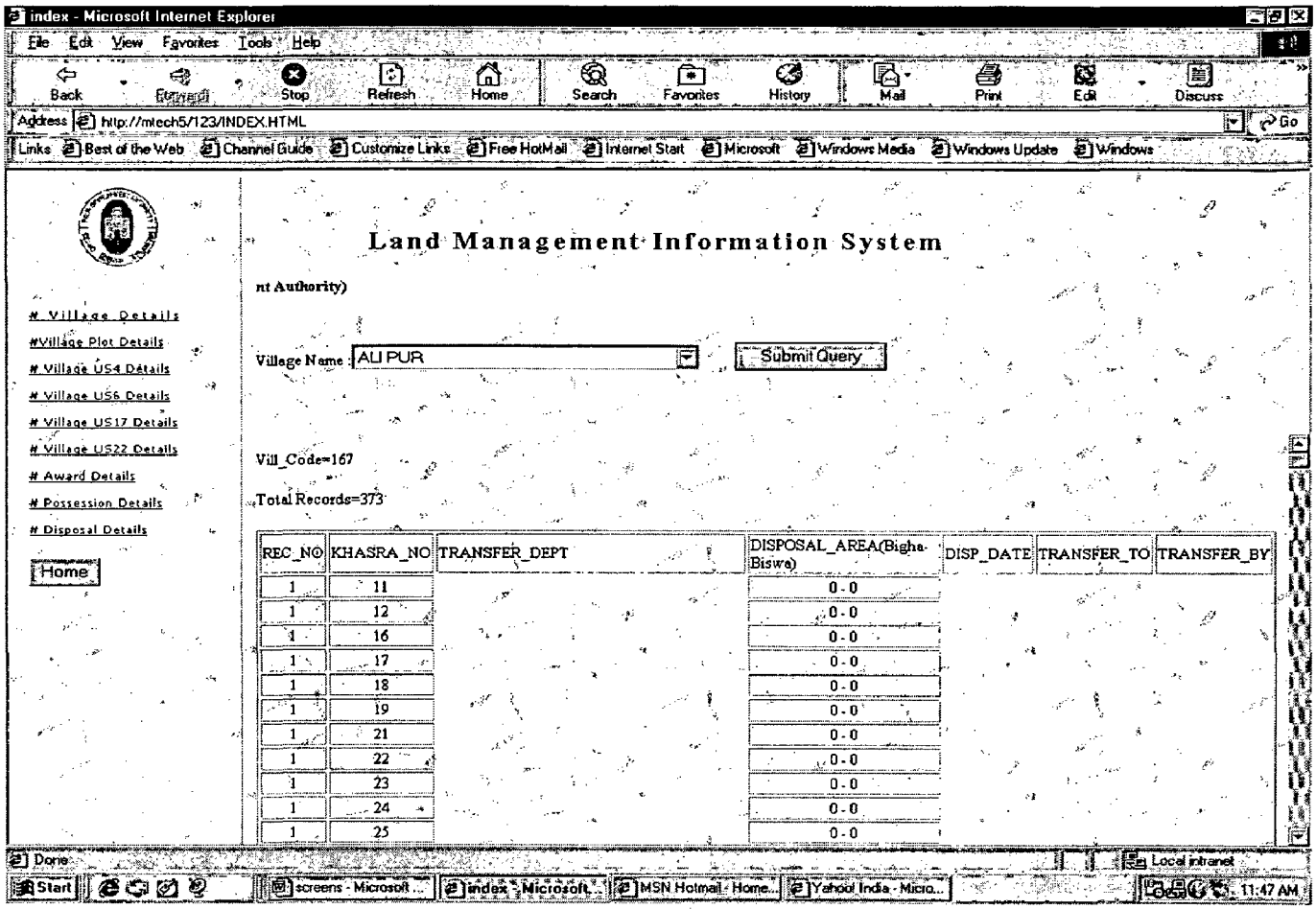

Fig 5.13: Result of Query on Disposal Detail

Chapter 6

CONCLUSION

It is desirable to have proper land records and its integration with other land parameters for planning and decision making. It will help in the proper and maximum land utilisation .

In order to develop a nationwide Land Management Information System, a uniform addressing mechanism to a plot is required to be developed. The conventional hierarchical addressing used to refer a plot in different regions of the country should be analysed further so as to arrive at an amiable and generalised system. The very day one, in this effort may not result to an accurate and zero error solution to this manual system. However, to achieve the goal a right start is the need of hour, which would get further rectification and enhancement with the ever-exploding technologies.

This dissertation outlines the basic methods and its real-time application in formulating a land management information system. However, it is prudent to mention here that this can further be enhanced and customized to match the specific requirements in the forthcoming scenarios.

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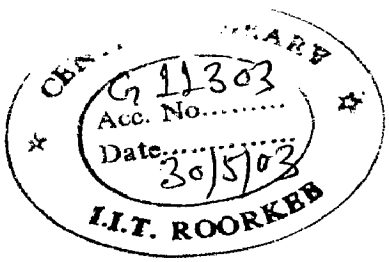
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