Chapter One: Introduction

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1.1 Background

“A Cadastre is normally a parcel based and up-to-date land information system containing a record of interests in the land (e.g. rights, restriction and responsibilities). It usually includes a geometric description of land parcels linked to other records describing the nature of the interests, and often the value of the parcel and its improvements” (FIG, 1995).

Cadastral systems clearly define the limits of land parcels on the earth’s surface based on laws, rights, and title/deed registration for the parcel or property. In order to do that the survey is necessary to set accurate survey data to a cadastral. The concept of cadastral information system has been simplified and shown in Figure 1.1.

![Figure 1.1 Cadastral Information System Concepts](image)

However, the standard content of cadastral data is intended to support the automation and integration of publicly available land records information. The basic spatial unit of cadastre is a land parcel. The data that may appear in a cadastre include geometric data (such as coordinates, area, perimeter, and maps), property address, land use, real property information, duration of the tenure, details about the construction of buildings and apartments, population, and land taxation values (CERCO,1995).

A cadastral map is a geometric description which shows the boundaries of land parcels, building block, position, and roads, and it is an important document required when owners need to register their property. Unlike other topographic map, the cadastral surveyor at the cadastral office updates and adds information to map daily and this update on the map leads
to change in data in the land register file or new ownership file is opened. In contrast with digital map and database, the researcher can see that the hard-copy map is not an efficient method and is time consuming to execute. The possibility of using geographic information system (GIS) techniques have generated wide interest in cadastral system, and many countries have developed digital cadastral maps by using GIS techniques known as digital cadastral databases (DCDB).

However, this DCDB needs application software to add, update, delete, and search query in this database. This mean the application software will enable the map modification work to be carried out in more easily and efficient manner using DCDB.

1.2 Problem Statement

Current cadastral work in Libya is carried out manually and this has led to a number of serious problems resulting in legal battles for ownership of land titles. Title/deeds reported as being lost have been re-created resulting in having duplicate files for a signal cadastral (real estate). Furthermore, the current manual system does not support and track updates. There is a need therefore to do a piece of research in this area so that the existing system can be automated. The new computerized cadastral system would be able to resolve the current problems.

1.3 Research Objectives

Given the above problems, the research has stipulated the following objectives:

i) To identify the features of the cadastral information system (CIS).

ii) To compare the tools and techniques that have been used by some countries to develop CIS.
iii) To propose a framework for CIS based on the study of previous projects and existing system environment.

iv) To design and develop a web mapping prototype for CIS which issues cadastral certificates for the cadastral (real estate) based on the proposed framework.

1.4 Research Questions

In this research, the researcher seeks to solve the following research questions related to the system in cadastral office:

i) What is the existing situation in the cadastral office for the provision of cadastral system?

ii) What are the present tools and techniques that have been used in developing CIS?

iii) What are the new tools that can be used to improve the present situation?

iv) What are the general specifications that can be outlined in designing the new system based on analysis of the current system?

v) What are the needs of users that the system should be able to provide?

vi) How does the system work when implemented in a database and GIS?

1.5 Scope of the Research

The scope of the research would cover the following:

i) Cadastral area is about 30 km² from Shari Az-zawiyah district in Tripoli-Libya only.

ii) DCDB is created for the obtained area from hard-copy map with scale 1:1000 km.

iii) Registration and issue of certificates will be done only for the real estate (cadastral) that are included on selected maps.

iv) Ownership transfer will be done only for whole parcels and not for subdivided or merged parcels since the selected area is in the urban area.
1.6 **Elements of the Research**

The elements of this research study is elaborated at Figure 1.2

![Diagram of Elements of a Cadastral Web-Mapping Solution for a Libyan District (CW-MSLD)](image)

**Figure 1.2** Elements of a Cadastral Web-Mapping Solution for a Libyan District (CW-MSLD)

1.7 **Significance of Research / Contribution**

This research will attempt to propose a framework for CIS and develop web mapping prototype for cadastral system using GIS techniques. The project will demonstrate on how to develop a computerize cadastral system based on the proposed framework, this depends on the system requirements, techniques and tools available and the prototype system will support the DCDB where each parcel on the map is linked directly to its attribute data. In addition, this project will also focuses on the framework as outlined in cadastre 2014. The cadastre 2014 vision attempts to define a general framework for cadastral system for all countries in the world. For more information about cadastre 2014 see Section (2.3.2) in Chapter Two.

1.8 **Research Methodology**

A research methodology defines what the activity of research is, how to proceed, how to measure progress, and what constitutes success (Effenberg & Wolfgang, 2001). The case
study methodology has been applied to studies of cadastral system. Evans (1995) defined that a case study is an investigation of a specific system or phenomena from which generalisations are drawn and applied. The case study methodology in this research study does not mean given understanding a cadastral information system and analysis it but also to use a pilot study as the main input data to understand how the system interacts and operates with legal framework. The cadastral information system is developed based on GIS techniques to integrate the geographic data (cadastral map) with attribute data (land register data) where the input data is very important in the creation of any GIS application and it is the main component in GIS. Based on this reason, the case study method is selected as the main method in this research where the project’s pilot area is defined.

A Cadastral Web-Mapping Solution for a Libyan District (CW-MSLD) System consists of databases with both textual and geographical data that are highly integrated and the action plan should cover the data set in Tripoli Cadastral Office and it includes the following:

i) Map digitizing (convert from Raster to Vector).

ii) Geographic referencing and non geographic locators (e.g. parcel point, parcel description).

iii) Establishment of ICT Base for Tripoli Cadastral Office.

iv) Reconstruction of cadastral records.

v) Production of digital cadastral plans.

vi) Establishment of model for the future land information system in Tripoli.
1.9 Dissertation Structure

The dissertation structure of this research study is depicted in Figure 1.3. This dissertation is written in seven chapters and the dissertation structure diagram gives a brief summary for each chapter’s content and its contribution to the structure of the dissertation.

![Dissertation Structure Diagram](image)

**Figure 1.3** Dissertation Structure Diagram