Sustainable and Effective Land Management

Mehmet Fatih DİRİ, Turkey

Key words: Cadaster, Land registry, Land Administration, GIS, Property, Real Estate, TURKEY

SUMMARY

The property, addition to the economic dimension, is an important aspect of social and moral concept. General Directorate of Land Registry and Cadastre can be considered the heart of property in Turkey, carried out reforms in last decade has gained more powerful structure, more innovative and more sophisticated. Projects implemented by the institution such as provides significant gains in the country's administrative and sociological perspective, has achieved to a large extent economically. In 2003, the title deed revenue of 230 million dollars, as end of the year 2016 came to 3,10 billion dollars, increased by 900%. In order to increase the efficiency and quality of the land registry and cadastre services, with 135 million euro loan from the World Bank-funded and launched in 2008, Land Registry and Cadastre Modernization Project is carried out successfully. Innovative policies following GDLRC, also has a modern and integrated system of land registry and cadastre information. GDRLC as the architect of the Turkey's National Permanent GNSS Network, is the country's most important and most experienced institution in photogrammetry. GDLRC, with its professional teams in land registry and cadastre fields, 166 years experience-based knowledge and solution-oriented management approach; is quite keen on making cooperation and sharing experiences with other countries.

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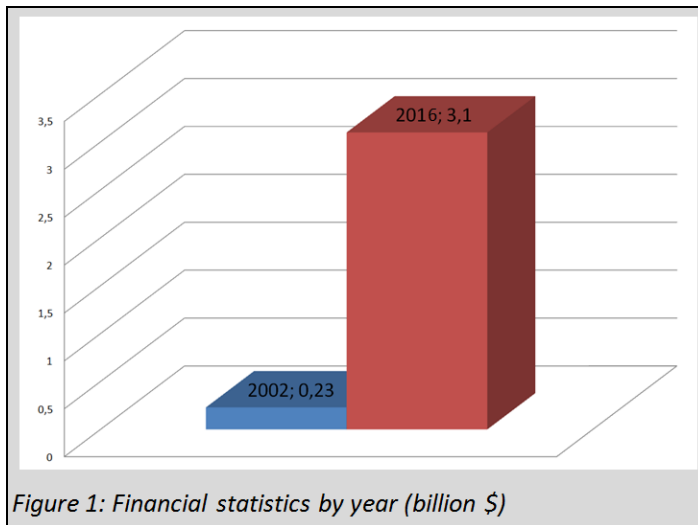## Mehmet Fatih DİRİ, Turkey

1. INTRODUCTION

Turkey not only belongs to Asia but also belongs to Europe as spatially, sociologically and cultural, is one of the oldest settlements of the World. Through to revolutions in social, politic and economic areas in her 90 years history, today, Turkey has become one of the most important country and by the agency of reforms in last decade, she aims that being a model country in her own zone. In parallel with these several successfully reforms, GDP has gone up 822,8 billion dollars in 2nd quarter of 2016 while it was 304,9 billion dollars in 2003. Turkey has also established more innovative, more efficient and more rapid institutions in last decade. Innovations which can be seen major industries like tourism, agriculture, transportation etc., have emerged also land management. The General Directorate of Land Registry and Cadastre (GDLRC), the most important land management institution of Turkey; is an architect of dynamic chain of service which includes preparing source data for all kinds of planning and organization on the ground and underground, providing spatial dimension data and displaying topographic structure, producing data that can meet the information need required for economy law, statistic, management, planning and various different scientific researches as well as all kinds of contractual transactions related to land registry and register of immovable properties, to follow-up, and control changes on the registers, to ensure the protection of archive records and documents. GDLRC is serving 20 million citizens every year as well as producing required basic data for many offices and institutions. Stability of economy and politics in the country has been reflected to GDLRC and many projects have accomplished within this framework since 2003 till today. It would be seen that every single project will contribute to the development of Turkey in the short, medium and long term. Cadastral works of 12.319 units, equals to %24, have been completed within the framework of the "Completion of Establishment Cadastre Project" in last decade(2003-2013), while only 39.376 units(equals to %76) had been completed in 80 years.(1923-2003) The Project provided 85 million dollars savings in the budget as well as providing 70 million dollars fee and tax income. In addition to this, the completion of establishment cadastre project defines ownership and provides the following: resolution of disputes, obtaining inventory of real estate, prevention of tax losses, providing regular urbanization, improving the investment climate, creating a functioning land registration system in EU process, contribution to works carried out as a part of e-state, development of base for the spatial information system. Completion of Establishment Cadastre Project participated in the "Prime Ministry Effective Source Use in Public Sector and Cost Reduction Project Contest" and came in 2nd place among 226 projects. There is another important project which called "Land Registry and Cadastre Modernization Project (LRCMP)" aims that increase the effect and quality of land registry and cadastre services with the total value of 135 million Euros provided by the World Bank.

LRCMP was started with the purpose of updating existing Land Registry and Cadastre information, as foreseen in the Law on Land Registry and Cadastre in a way and structure to form the base for Spatial Information Systems and offering for use by transferring in digital and legal to computer environment, has five components: Renewal and update of land registry and cadastre, service

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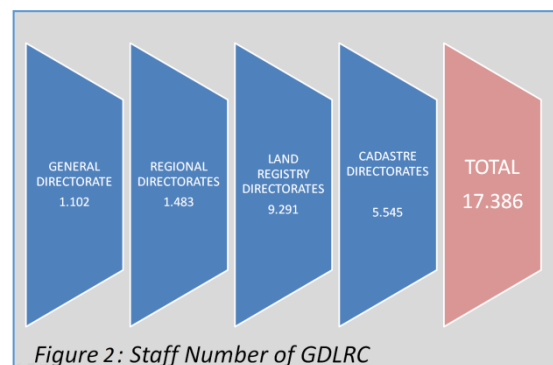Mehmet Fatih Diri (Turkey)

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improvement, human resources and institutional development, property valuation and project management. These two significant projects not only provide administrative and social benefits, but also obtain substantially economical profit. While 230 million dollars income had transferred in 2003, 3,10 billion dollars income had transferred by the end of 2016. In other words, income of GDLRC has increased at the rate of %**900** within the last decade.

Figure 1: Financial statistics by year (billion $)

2. STRUCTURE OF GDLRC

GDLRC, which is the determiner and executer of real property and ownership, ,affiliated to the Ministry of Environment and Urban Planning. Senior management consist of General Director, Deputies of General Director and Board of Land Registry and Cadastre. Consultation and control units which directly affliated to the General Director, home service units and supplementary service units which hieararchially affliated to General Director are form backbone of central management. Additively, GDLRC has efficient provincial structure with 22 regional directorates, 91

Figure 2 : Staff Number of GDLRC

cadastre directorates and 957 land registry directorates all around the country. There are more than 17000 personels in GDLRC with its professional teams in land registry and cadastre fields.

GDLRC has a mission that ensures reliable record of land register which is under the responsibility of the state on a regular basis. It tries to reach a significant target that being the leader organization which designs and direct real estate politics.

3. MISSIONS OF GDLRC

GDLRC main tasks are;
- − Record, update and service of land register

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- Establishment and renovation of homeland cadastre
- Photogrammetric and geodetic map production
- Establishment of land information system
- Cooperation with international organizations on issues related area of responsibility
- Identify and control operating principles and procedures of licensed survey and cadastral engineering offices
- Real estate brokerage activities

4. PROJECTS

4.1. TAKBIS

Land Registry and Cadastre Information System (TAKBIS) is one of the basic e-State projects aiming at uploading all ownership information within the country and allow people to search all kinds of answers in the electronic environment. The purpose is to allow carry out all kinds of transactions online; this would allow effective follow and control of both private and state immoveable properties by computers.

4 main software has been developed under the project. These are;

- Land Registry Application Software
- Cadastre Application Software
- Project Tracking Software
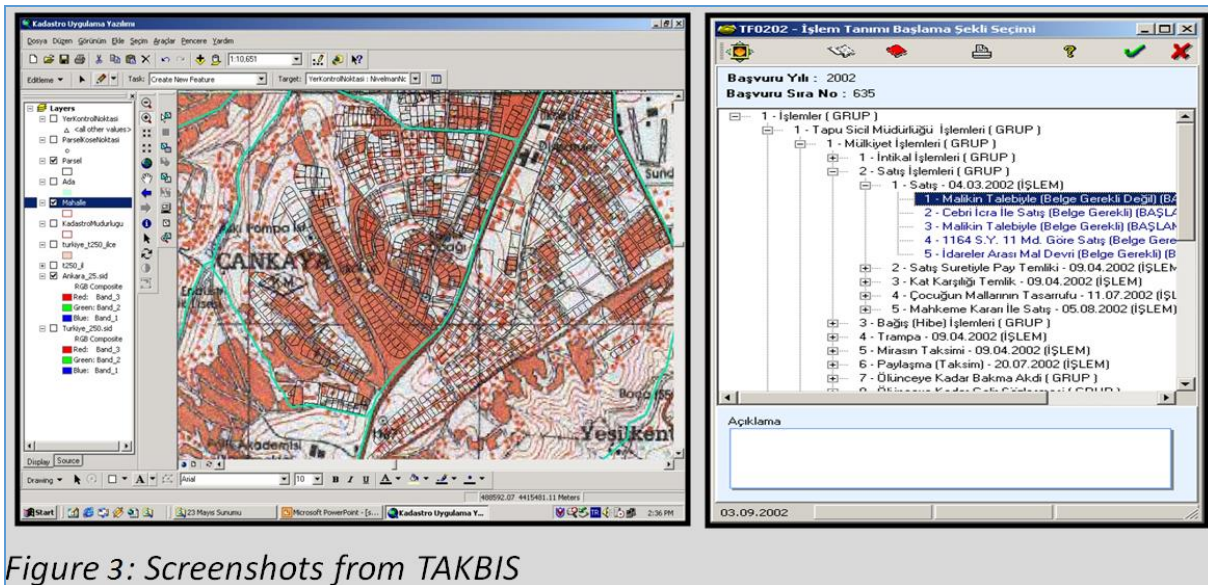- Resource Management (Office Automation) Software

Figure 3: Screenshots from TAKBIS

TAKBIS is an integrated information system that provides;

- Implementation of all transactions carried out by the GDLRC according to the regulations in the electronic environment by the standardization of transactions related to the land registry and cadastre technique,
- Minimization or elimination of risks in relation with transactions carried out by using control and warning mechanisms included to the developed software,
- Computer supported training on its own screen by providing information on the most regulation regarding the transaction to the staff and explanations about transactions,
- Carry out transactions similar to property sale from any place of Turkey by forming an integrated structure,
- Opportunity to monitor the performance of directorates and staff,
- Production of decision support functions and reports
- Accurate and updated data base for many institutions and all these transactions carried out with geographical information system/land information system logic.

TAKBIS project is the winner of 2006 e-TR awards e-service to citizen's category.

4.2. MEGSIS

Spatial Property System (MEGSIS); is an open-source application developed by GDLRC, where cadastral data are collected by the center system from de local users in the cadastral offices in digital .cad format and are harmonized with land registry data in order to be submitted to stakeholder institution, organization, municipalities and citizens by e-government link. Studies held under **MEGSIS** are collected under four main topics.

Figure 4: How MEGSIS work?

4.2.1 Web-based application software

It can be used for different levels and requirements and by the administrative frame of identification/authorization , internal and external users can input data, collect data, integrate land registry data and make queries using this software. It includes also modules for following-up and controlling a process.

4.2.2 International standard map services

Collected cadastral data within MEGSİS requested by institutions, organizations, municipalities within protocol is shared in standard format, which is open source and tested by commercial products.

4.2.3 E-Government Services

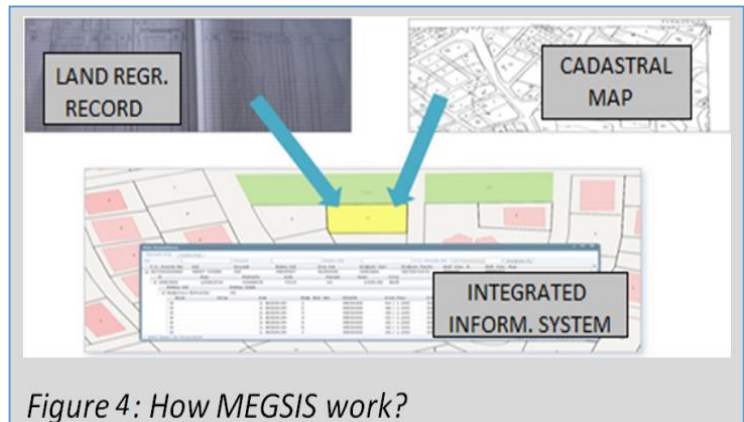Sustainable and Effective Land Management (8615)
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Collected cadastral data combined with land registry data as a map service is offered to the citizens for information purposes. These services offered by the www.turkiye.gov.tr internet address have the characteristic to be the one and only geographical service.

4.2.4   Orthophoto Services

Orthophoto maps produced in 1/5000 scale are offered via prepared services by the open source GDAL Library in TileMapService (TMS) standards.
MEGSIS can present various datum in common.

Also users can be display data integrated with several choices of layers like orthophoto, Google earth, thematic maps etc.
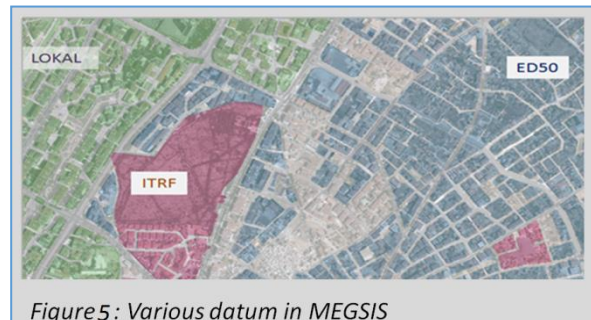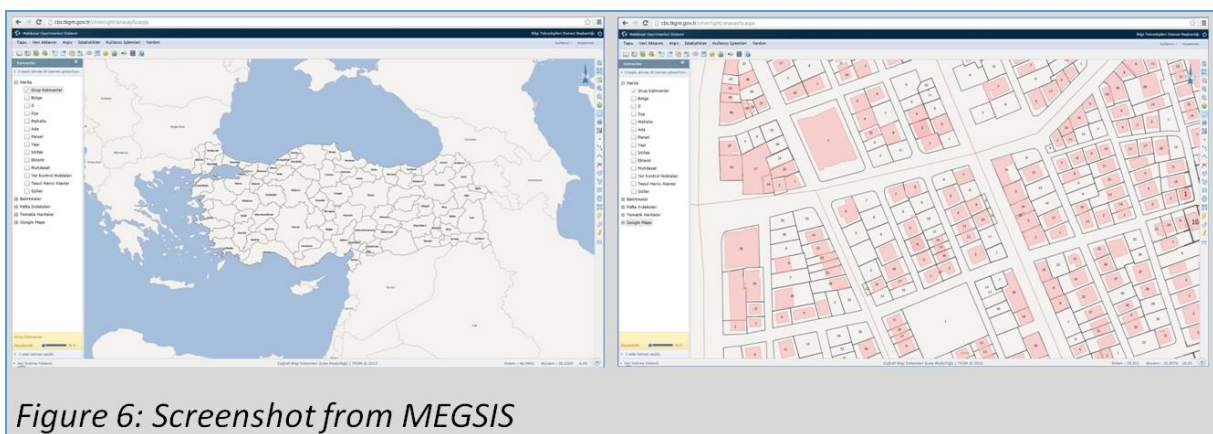

Figure 5 : Various datum in MEGSIS

Figure 6: Screenshot from MEGSIS

4.3. TARBIS

The Ottoman Empire which ruled a large geography from the Middle East to Balkans, from North Africa to Europe for more than 600 years, collected a rich archive that embraces all the culture under its domination on this large geography. This archive legacy is uploaded to the electronic environment as a part of Title Deed Information System. (TARBIS)

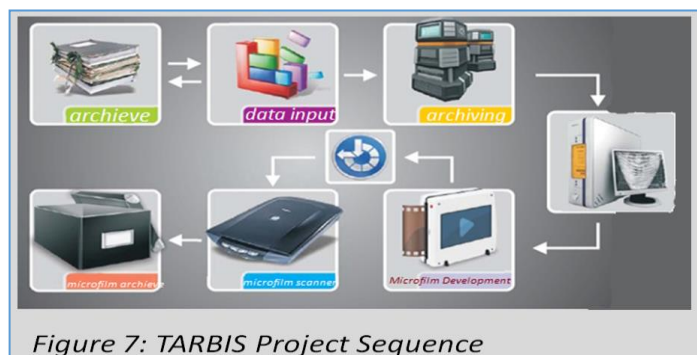*Figure 7: TARBIS Project Sequence*

4.4. TKMP

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Credit no: 7537-TU with the total value of 135 million Euros provided by the World Bank in order to increase the effect and quality of land registry and cadastre services came into effect on August 13, 2008 after it was published in the official gazette no:2008/13886.

The Land Registry and Cadastre Modernization Project (TKMP) was started with the purpose of updating existing Land Registry and Cadastre information, as foreseen in the Law on Land Registry and Cadastre in a way and structure to form the base for Spatial Information Systems and offering for use by transferring in digital and legal to computer environment, has five components.

1st Component: Renewal and Update of Land Registry and Cadastre

Renewal of 4.058.000 parcels out of targeted 4.100.000 parcels within the framework of the project is completed.

2nd Component: Service Improvement

4 main titles should be study under the component.

- Making cadastre and map information suitable to TAKBİS (integration of e-cadastre to the National spatial database
- Model office design and its construction
- Determination of implementation policies within renovation, maintaining quality control, supervision and technical support,
- Studies on CORS, HBB-TUCBS applications and services continue

3rd Component: Human Resources and Institutional Development

3 main titles should be study under the component.

- Determination of human resources strategies
- Carrying out works suitable to the institutional strategy and work plan
- Trainings of staff and contractors as a part of renovation

4th Component: Property Valuation

The project is made up of subcomponents such as pilot implementation and capacity forming. Property valuation field in Turkey includes providing the participation of all offices and institutions having relation with real property sector; determining problems and expectations; searching for solutions; analysis of legal, technical and administrative structure and works in regard to forming legal and structural regulations. The outcome of the real estate evaluation project:
- An important source of information will be formed by determining all the factors that may affect the value of immoveable and collecting them in an environment that will be available for updating, searching, analyzing and sharing,
- Proper taxation and follow-up of urban income emerged due to state investments
- Preventing tax and fee loss of the government

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– Comparison algorithm installed "Immovable Valuation System" suitable for searching throughout Turkey will have a positive impact on the economy will be provided

5th Component: Project Management

Planning, sourcing, accounting, finance and coordination activities are still carried out, project management trainings are completed. 3 main titles should be study under the component.
– Forming a productive project team by the participation of all required units of the institution
– Providing effective PLANNING, CONTROL and RISK MANAGEMENT during the project
– Establishing "Effective Communication"

4.5. TUSAGA – ACTIVE

TUSAGA- Active System (Turkish National Permanent G.N.S.S. Network – Active) provides map and location information about any place and any time in a project area within a few seconds with the centimeter accuracy. The TUSAGA Active System is made up of 146 permanent GNSS stations in Turkey and in the Turkish Republic of North Cyprus.

All stations are transmitting 24 hours long data to main control system at the GDLRC via internet.
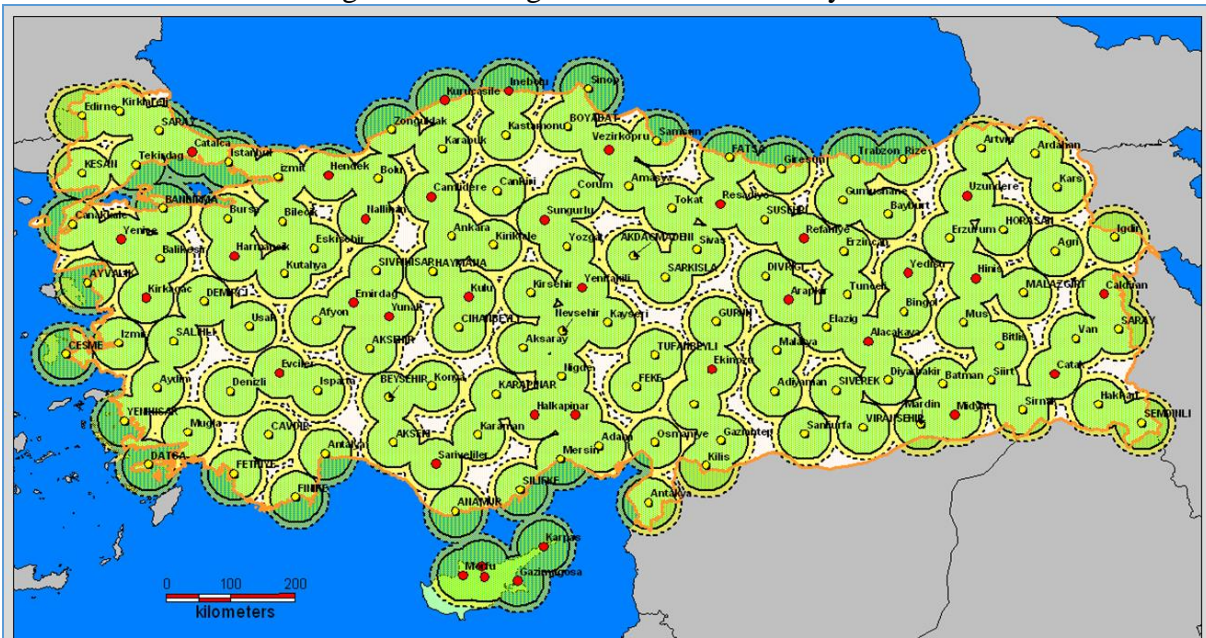

Figure 8: TUSAGA–Active GNSS Stations

TUSAGA – Active System especially focus on two survey techniques. These are;

4.5.1   Real Time Kinematic (RTK) Application

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All kinds of dual frequency GNSS receivers and all brands of GNSS receivers with RTCM correction are capable of using TUSAGA-Active network RTK correction data in order to access to real time precise location information.

4.5.2   Static GNSS Application

RINEX data from the TUSAGA-Active permanent station can be demanded from GDLRC in an effort to identify precise location with static GNSS measurement method by post-processing in the position of control point production with static measurement method and under circumstances obliging the establishment of location control point in the lack of adequate communication facilities.

4,201 users from 34 different universities, 235 different state offices and institutions, 264 different municipalities and 2234 different public sector companies are benefiting from TUSAGA-Active System.
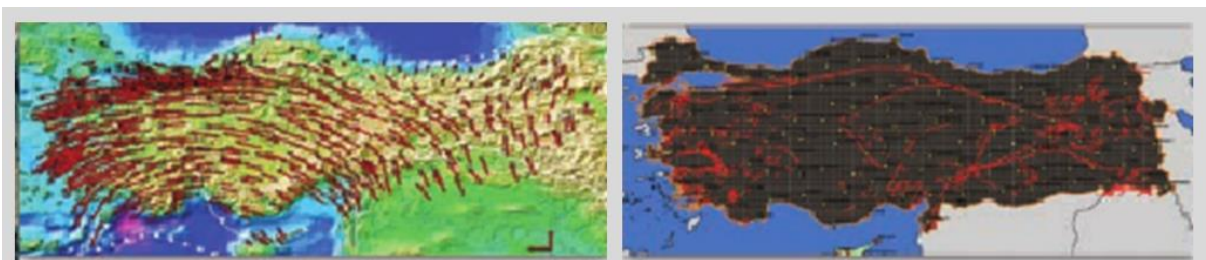

Figure 9: TUSAGA – Active in eartquake studies and weather forecast

TUSAGA-Active System is used in earthquake studies, improvement of weather forecast, military activities, mapping, navigation, construction, logistics and similar fields.

4.6. HBB

The Map Data Bank (HBB) is a spatial information system that allows the entry, update and usage of metadata about information and documents belonging to maps formed by institutions and offices which produce or sponsor the production of maps in the national level, by the related institutions, thus, prevents duplicate map production and waste of resources. . It is open on internet to all institutions which are producing map information.
There are many public offices which are producing maps and map information. HBB is developed for;
  – Providing production coordination between the institutions,
  – Preventing duplicate map and map information production,
  – Saving time, cost and labor,
  – Assisting to easy and fast access to information,
  – Preparing data for decision support system and form base for e-State applications.

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4.7. SKGP

The Continuous Institutional Development Project (SKGP) aims at including quality of quick service prioritizing the satisfaction of our citizens and staff to the institutional structure and maintaining its sustainability. 1073 units affiliated to our institutions were awarded with TS EN ISO 9001:2008 Quality Management System Certificate until 2013 and the GDLRC has more quality awards than any other state offices and institutions.

5. SERVICES

5.1. Land registry services

GDLRC has been providing the finest quality service in every single area of our country with a large transaction volume with its 166 years long knowledge and experience. Land registry services are given in 957 land registry directorates all over Turkey. Land registry directorates find solutions to property sale, donation, contract for lifelong support, distribution, mortgage, constitution of servitude, property ownership and similar contractual transactions; immediate descent, partition of immovable property, unification of

Figure 10: Title Deed Income (billion $)

immovable property, reconstruction transactions. GDLRC had transferred 948 million dollars fee income to the budget in 2008 and this figure rose to 3,10 billion dollars by 2016, allowing the General Directorate to increase its support to the state budget by two and a half times and to become an important contributor to the budget of the country.
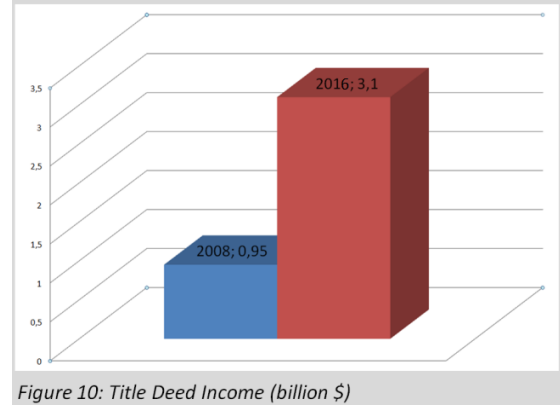
5.1.1 Online appointment system

Online Appointment System implemented by the GDLRC aims at providing quicker service to our citizens. People can make an appointment by visiting *http://onlinerandevu.tkgm.gov.tr* web address by using the internet which is one of the most important communication tools of our era.

5.1.2 SMS information system

SMS information system which became a part of daily life is included to our services in an effort to prevent waste of time, long waiting at the land registry directorates and to strengthen an impartial element of ownership which is the trust issue. With the new application, information regarding transaction time, fee information, contract appointment is sent to those who filled a pre application form via SMS. This new application protects citizens from fraud and forgery.

5.1.3 Land registry and cadaster line

GDLRC carrying out approximately 7 million transactions and giving service to more than 20 million citizens every year adopted its new dynamic body, the Land Registry and Cadastre Line, in

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order to minimize possible shortcomings that may occur during the service, provide information related to land registry and cadastre services and to get an appointment for transactions. Land Registry and Cadastre Line (444 82 78) can be called from any part of Turkey for suggestions, views and complaints regarding Land Registry and Cadastre Services.

5.2. Cadastral services

5.2.1 Cadastral works

Cadastral Works are carried out according to the existing Cadastre Law no: 3402 and dated 10/10/1987.

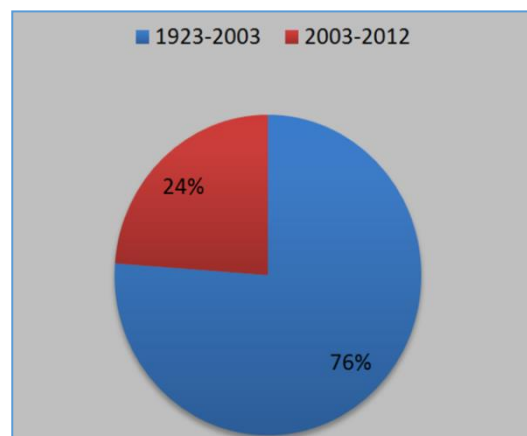Figure 11: Systematic Registration in Turkey

81 Cadastre Directorates conduct all across the Turkey;
 – Cadastral transactions;
 – Establishment of cadastre,
 – Renovation and updating cadastre,
 – Forest cadastre,
 – Zoning practice,
 – Land unification,
 – Expropriation,
 – Control and archive cadastral maps and plans.

5.2.2 Completion of establishment cadaster project

Cadastral works of 39.376 units have been completed by the end of 2002 since the establishment of the Republic of Turkey. Cadastral works of 12.319 units have been completed within the framework of the "Completion of establishment Cadastre Project" (2003- 2012) which began in 2003, in the last decade by using the institutional opportunities as well as service procurement from private sector. GDLRC participates in the "T.C. Prime Ministry Effective Source Use in Public Sector and Cost Reduction Project contest" with the project in 2007 and came in 2nd place among 226 projects.

Figure 12: Statistics of completition of cadastre by year

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5.2.3   Ortophoto map production

Digital orthophoto maps are produced in order to establish a National Orthophoto Information System and to be used in cadastre renewal works, land-use planning as well as urban transformation projects, management of natural disasters such as earthquakes, floods, erosion etc., agriculture and forestry activities. Digital Cadastre works provides service support to;
  – Decision support process,
  – Quality- integrity controls,
  – Forming a base for legal aspect
purposes of engineering projects of other institutions by producing 1/5000 scale and 30 cm resolution orthophoto based maps and these maps are also available to related users in digital copy or via web services.

Figure 13: Orhoto vs. Satellite Image of GDLRC

It is possible to reach orthophoto web services via web browser interface as well as CAD/GIS software suitable with OGC (the Open Geospatial Consortium) standards. GDLRC is capable of producing 70 thousands kilometers of orthophoto in a year with its 2 modern photogrammetric plane.

5.3. Archive services

5.3.1   Restoration

Maintenance and repair of achieved documents which are kept away from by uploading them to the electronic environment began at the Restoration Unit which was opened in 2007. It will be possible to pass our cultural legacy thanks to the restoration works carried out in the maintenance and repair, leaf casting and classic cover units by using modern techniques.

5.3.2   Server efendi exhibition hall

Our archive legacy, protected with modern methods, is open to visitors at the Server Efendi Exhibition hall which was opened in 2009 with the aim of contributing institutional promotion and raising the awareness of public. In addition to rare examples of the Classical Ottoman Arts such as calligraphy, paper marbling, cover and ornamentation as well as most precious tughra (sultan's signature) examples under old ownership documents, maps, royal decrees, cadastral record books, stamps, our exhibition hall also exhibits variety of ownership documents in a way that reflects the

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stages of the historical development and gives the opportunity to its visitors to see works belonging to the oldest times of the Ottoman empire.

Figure 14: Hagia Sofia Deed which written on the gazelle skin by Mehmet the Conqueror in 1461
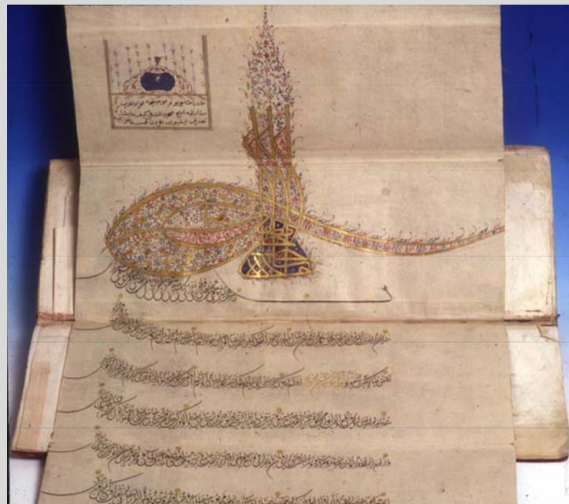
Figure 15: Old ownership record of which embellished with gold leaf in 1709

6. VISION

GDLRC aims that carrying out its duty more effective and more rapid while fact of property exists. Establishing a multi-purpose cadastre by developing finished homeland cadastre; create more sophisticated information system by analyzing existing systems, modernization of land registry and cadastre and improving all services are some of GDLRC medium-term targets. GDLRC's main purpose is; being the leader organization which design and direct real estate politics in Turkey and international actor in land registry and cadastre sectors in its own zone. GDLRC; with its professional teams in land registry and cadastre fields, 166 years experience-based knowledge and solution-oriented management approach; is quite keen on making cooperation with other countries.

BIOGRAPHICAL NOTES

Mehmet Fatih DİRİ, Born in Elbistan, Kahramanmaraş in 1982. Survey Engineer. Received a BS Degree in Geomatic Engineering from Istanbul Technical University in 2006. Continues MSc studies about Geographical Information Technologies in Middle East Technical University. Worked as various positions such as engineer, chief engineer, unit chief for 10 years in General Directorate of Land Registry and Cadastre. Working as Land Registry and Cadastre Expert in TKGM.

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